GiS Professional

issue 55 : December 2013

...joining the geography jigsaw

Promoting creative thinking in GIS

Is there a future for the census?

Interview: Land Registry's GI chief is INSPIREd

Have you ever tracked your cat's movements?

Are cloud technologies really disruptive?

Mr GIS sees webGIS in Cartography's future

Sell a spatial app without a map in sight!

and much more with

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GiS Professional

our mission. . .
to help grow the business for the whole GIS community by providing an effective, reliable and timely medium for news, information and comment.

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Front cover: The message at Cadcorp's recent fire services conference in November was that the creative use of GI is key to combating the challenge of tight budgets. Read more on page 18.
Images courtesy of Cadcorp.

to subscribe to GiSPro, turn to page 34.

read on. . .

welcome

to the December issue of *GIS Professional. . .*

A plea to map publishers!

By the time you read this we will be out of Movember and my charity fund-raising moustache will probably have disappeared – so here it is for posterity!

There are two INSPIRE related stories in this edition (pages 12 and 14), which demonstrate, I think, the drive of our national mapping and land registration agencies to stay at the forefront of technology and open data. Although I believe that these developments could have been entirely independent of any European Directive, the fact that they are happening now enables British agencies to market services and expertise that might otherwise have been seen as insular and specific. There can be no doubt that enthusiastically embracing INSPIRE, as well as OGC and ISO standards, gives these agencies further credibility that will underpin their exports to the wider world.

Talking of which we were really enthused by Esri founder and president Jack Dangermond's talk to the British Cartographic Society in October and then by his company's European Development Summit in London – read about both within (pages 26 and 29). At a more generic level we have an article from Atkins that explains more about the 'cloud' and how it affects us all (page 20) and a really useful application of GI 'behind the scenes' to save the Canal & Rivers Trust time, money and carbon credits (page 30).

> ***. . . how many friends have you had to disillusion when they wonder at the "up-to-date" satellite imagery on the web?***

The age of data

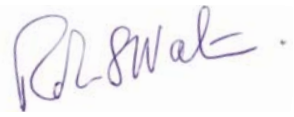
Following our editorial last time I am delighted to print a clarification from Ordnance Survey concerning my comments in the last issue on the metadata available to end users of OS MasterMap. Rob Andrew, Head of Corporate Communications, points out that OS "cannot control the application of updates provided and we have no control on how customers display the mapping and what information they decide to show alongside it." This was in fact my main point. Rob continues: "Ordnance Survey actually deploy two types of revision – systematic sweep of an area (predominantly remotely sensed) and targeted revision (predominantly ground surveyed). Changes that arise are "time stamped" in terms of attribution and made available to customers. Customers can then choose to make that metadata very explicit to their end users. However, the metadata is more applicable at the feature level rather than the area level. That is to say that although an area may not have been subject to a sweep for 12 months+, the revision of major change will nonetheless have taken place."

I think this reinforces my plea to map and data publishers to include some metadata that will always be available from the primary sources of that data. Ordnance Survey metadata is delivered explicitly at the feature level as Rob explains but also implicitly by the date of delivery of the 'change only updates'. Surely the very least we should expect from publishers is a statement alongside their map windows concerning the age of their data – how many times have you had to explain to friends that those popular satellite images are often several years out of date?

Lack of statistical evidence

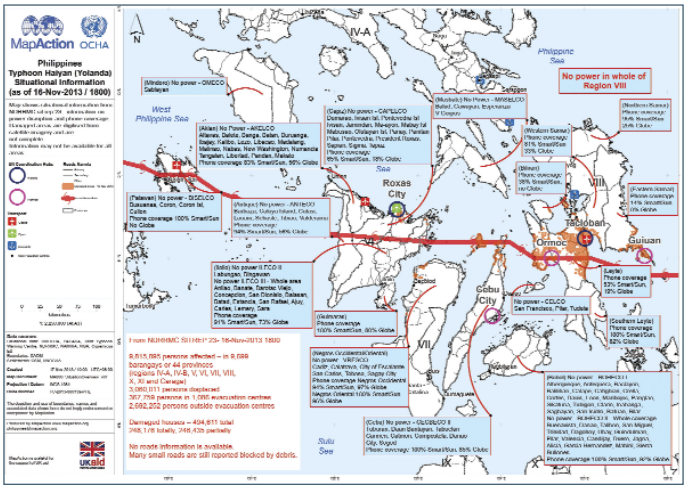
Recent public and political rows about migration statistics, health service provision and any number of "post code lotteries" have shown that there is often simply not enough data to inform useful debates – the result is that slanging matches between politicians, pressure groups and partisan media outlets just raise blood pressure but cannot reach sensible evidence-based conclusions. Unfortunately there are many people, groups and organisations with vested interests that do not want to debate accurate statistics anyway!

It is timely, therefore, that we carry a report on the current census consultation about what happens in 2021 – will we have a census at all, or should we rely on more timely but perhaps much less resolute 'administrative' data? Please read about this (page 09) and be prepared to comment quickly – the consultation closes soon after you receive this edition of *GIS Professional*. Then you will have a clear conscience to have, we hope, a Merry Christmas and a Happy New Year! Or, for our more generic friends across the pond, just plain Happy Holidays.



Robin Waters, Editor

MapAction deploy to Philippines



The Phillipines typhoon saw MapAction deploying a team of two, alongside the UN's Disaster Assessment and Coordination team, ahead of the typhoon making landfall. They are based in the Manila offices of the UN Office for the Coordination of Humanitarian Affairs (OCHA) and immediately produced maps of the infrastructure for Taclaban city and Busuanga islands; affected populations; storm path and storm surge; situational information on blocked routes; and evacuation centres. The team was joined by MapAction's Operations Director and other team members in the following days. In the UK the support base coordinated the gathering and preparation of data and are also coordinating with colleagues from other agencies and with online communities. The maps can be seen at http://www.mapaction.org/map-catalogue

Postcodes loom for Ireland

Irish communications minister Pat Rabbitte TD has announced approval for steps toward a national postcode system that will go live by 2015. The plan is to have a public database of unique identifiers for every home in the Republic. A consortium headed by Capita Ireland will develop, implement, and operate the new postcode system, which aims to help emergency, postal, and other service providers – including online services such as e-commerce platforms – to locate all households. At present more than 30% of all domestic addresses are not unique but all will have a seven-character code in the format A65 B2CD, with the first three characters relating to a general area or postal district in which the address is located. Existing postal districts in Dublin will appear as the first three characters of their new postcodes.

Czech agency upgrades

The Czech Republic's national mapping agency has implemented a web-based solution from Intergraph for distribution and publishing national geospatial data. The solution includes high-performance image compression and delivery for handling big data on a large scale. The agency's original system, based on Intergraph's GeoMedia, was recently upgraded to an integrated web-based portal, leveraging multiple Intergraph technologies as well as image exploitation and analysis from ERDAS IMAGINE.

Since 2005, the Land Survey Office has used a web-based portal to serve national geospatial data to the government, designers, network administrators, schools and entrepreneurs. The portal supports thousands of users and serves up to 4 million requests per day. As the demand for open web mapping services (like OGC-ISO WMS, WMTS and WFS) increased, the organization investigated solutions that would allow this data to be shared easily and directly in digital format.

Bahrain and OSI sign for five years

Ordnance Survey International has signed a five-year Specialist Advisory Framework Agreement with the Survey and Land Registration Bureau (SLRB) of the Kingdom of Bahrain. Both organisations will work collaboratively on a number of projects, the first of which will be the development of a long-term strategy to support SLRB in its role as the authoritative cadastral and mapping authority for the Kingdom. An earlier contract enabled the organisations to develop a national 3D spatial data model and this is now close to completion.

Geocoding extended

Aon Benfield, the reinsurance intermediary and capital advisor, has extended its contract for Pitney Bowes' Spectrum data management solution to continue to use the Enterprise Geocoding module for a further three years. The geocoding module translates common reference points, such as customer addresses, into coordinates that can be visualised on a map to provide up-to-date, accurate and consistent geocoding across international geographies. Location intelligence is central to Aon Benfield successfully assessing risk based on that location's historical information. http://pitneybowes.co.uk/software/location-intelligence/index.shtml .

Easy access system

A desktop GIS from GGP Systems has enabled Gosport Borough Council to successfully transfer decades' worth of paper maps, documents and records from multiple sources into an easy to access digital mapping environment. Carried out in response to government requirements for local authorities to catalogue their land assets, the transfer means that council operatives can now quickly establish who owns

Decades of paper maps have been transferred into a digital mapping system by Gosport Borough Council.

*There is more news of companies and organisations on our website at **www.pvpubs.com***
To get your company featured on these pages call Sharon Robson on +44 (0)1438 352617

what in the popular seaside resort.

Prolongs active life

Ordnance Survey has launched the 7th GeoVation Challenge on the theme of 'How can we encourage active lifestyles in Britain?' Following the success of previous challenges, OS is calling for innovative ideas that will encourage people to lead active lifestyles in the open; whatever their age. There is a slice of £100,000 on offer to help develop ventures that make best use of OS and other open data to solve problems. **champions@geovation.org.uk**.

Tree map completed

Bluesky has completed the first ever detailed digital map of tree canopy cover across England and Wales. The National Tree Map has been created from up-to-date, high resolution aerial photography, colour infrared data and detailed height models. It includes three map layers, recording more than 280 million trees covering around 20,000 square kilometres – some 13.5 per cent of our total land area. Work is underway to create similar coverage for Scotland.

Managing airports with GIS

Manchester Airports Group (MAG) has selected Esri UK to provide GIS to improve asset management and help manage the airport group's growth plans. The system will enable each of the group's airports to map and record asset information in one central database and share it between all departments. Due to go live in 2014, implementation is already underway. Major development projects such as Manchester's Airport City will be among those first to benefit from the new system. MAG also manage Stansted, East Midlands and Bournemouth airports.

Linked data portal from OSI

The Office for National Statistics (ONS) has launched its geographic linked data portal for the discovery, view and download of the definitive spatial datasets that support national statistics. The portal integrates data from postcode directories, boundaries, names and codes into a single online resource for all the geographical areas for which statistics are produced. As well as meeting the government's aim for Open Data and to provide "digital by default" services, the linked data portal is designed to complement the ONS Open Geography portal.
http://statistics.data.gov.uk/

BRIEFS

The Highway Authorities and Utilities Committee (HAUC (UK)) has reached an agreement with GeoPlace to analyse data on the performance of local authority and utility road works collected via the Electronic Transfer of Notification (EToN) applications used by all roadworks sponsors. The Department for Transport (DfT) has welcomed this initiative which will produce a quarterly performance scorecard analysing roadworks.

French AMJ Group has opened a UK branch in Ashford, Kent, to sell its Geosoft software offering town councils a complete land management solution. It is used by over 700 councils throughout France and is capable of integrating, storing, editing, analysing, and displaying geographically-referenced information for a variety of projects from cemeteries and networks to land and/or highway management systems.
www.amj-uk.com/-GIS-Solutions.html

1Spatial and its partner LSI have signed a contract extension with the US Census Bureau following the success of the 1Validate and 1Integrate software. The extension will focus on the provision of software licences and services in preparation for the 2020 Decennial Census and on widening the use of the technology within the Bureau.

Cadcorp sponsored a conference hosted by South Yorkshire Fire and Rescue Authority in Sheffield on 12 November discussing the big reductions in funding that are forcing fire and rescue services to make fundamental changes to their working practices and the smarter working enabled by a better understanding of the geography of risk.

Buglife, the Invertebrate Conservation Trust, has used Getmapping imagery to survey brownfield sites in the Thames Gateway, Europe's largest regeneration area. Buglife and Natural England mapped over 450 sites and identified 198 brownfield sites that are becoming increasingly important by providing refuges and links to other habitats to sustain biodiversity.

what3words has closed $500k seed funding from prominent 'angel' investors and the London-based mapping startup also unveiled its first API. **http://what3words.com**

Bluesky is expanding its international operations using a state-of-the-art airborne mapping system developed by Optech, which includes a LiDAR and fully integrated thermal sensor and high resolution camera.

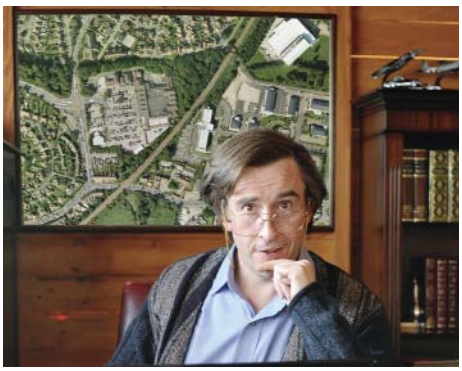
Symology, supplier of Street Works and Highway Asset Management systems has supplied its Insight solution to Dee Valley Water (DVW) for their street works team to meet the requirements of the New Roads

Phone app helps students map noise

Students visiting the Royal Geographical Society (with IBG) last month marked GIS Day by using a new mobile phone app to map noise levels in Hyde Park. This is the first time the technology has been used by schools in this way for collaborative fieldwork. Sixth form students from across London and South East England will create an interactive map to discover areas of noise pollution and tranquillity as part of this year's global GIS (Geographical Information Systems) Day celebrations.

The mapping activities, run by RGS-IBG in partnership with Esri UK, will demonstrate how mobile technologies can transform geographical fieldwork in schools. Students will use the 'Collector for ArcGIS' app to enhance and simplify the process of collecting geographical data. Audio, photos, videos and GPS data collected in the park can feed straight into a live online map accessible for students.

Cameo with Partridge for Bluesky



A large aerial photomap from Bluesky is making a cameo appearance in Alan Partridge's big screen debut Alpha Papa. Forming a backdrop for the nail biting moment Alan is called upon to help police negotiate a hostage situation the aerial photograph features alongside a more traditional street map.

and Street Works Act 1991 and the Traffic Management Act 2004.

emapsite is piloting a web map for all signatories to the One Scotland Mapping Agreement (OSMA) and will enable around 100 public sector bodies in Scotland to access Ordnance Survey map data online for planning processes, emergency and health services, analysis of transport and economic data, neighbourhood statistics, indices of multiple deprivation, natural wildlife habitats, etc.

1Spatial, a gold level member of Oracle PartnerNetwork (OPN) now has reselling rights for the Oracle Exadata Database Machine, an engineered system designed to achieve maximum performance at minimal cost. www.1spatial.com

A team of senseFly engineers have created a digital model of the Matterhorn with 20cm resolution in three dimensions. This required 11 flights by several eBee minidrones flying concurrently and collecting over 2200 images within just a few hours. The point-cloud so created contained 300 million points covering over 2800 hectares.

PEOPLE

Ordnance Survey International (OSI) has appointed **Chris Holcroft** and **John Kedar** as Directors of Strategic Business Development in its geospatial information management advisory service. Both have a long history of working with Ordnance Survey and the global geospatial industry. Chris has recently been chief executive of the Royal Meteorological Society and previously of the Association for Geographic Information and will be responsible for developing long-term partnerships in the Middle East and other geographies.

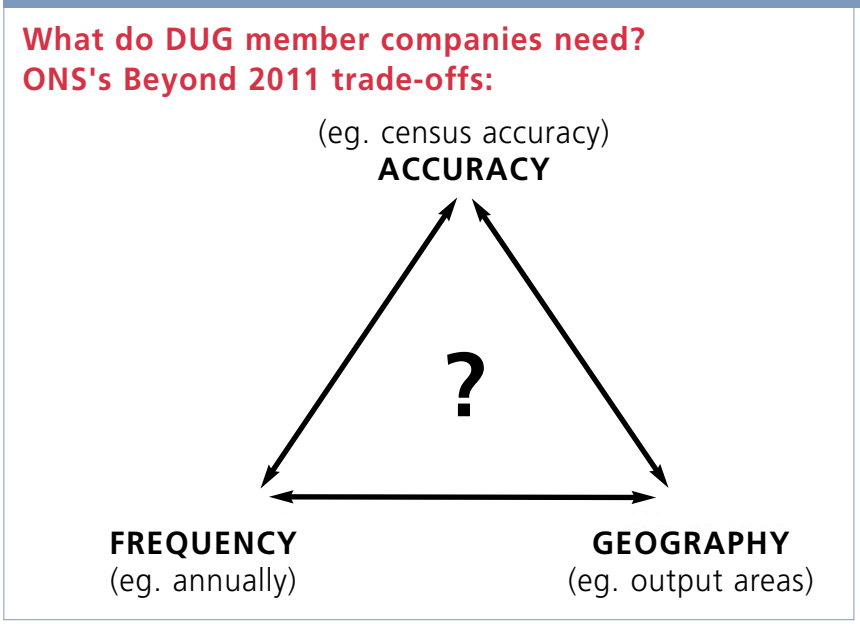
John is focusing on the Kingdom of Bahrain, responsible for offering long-term support to key government agencies, including working to embed fit-for-purpose and cost-effective national mapping, addressing and information sharing. He has 30 years' experience in the Army across a range of geospatial, intelligence and operational positions, including commanding the 650 strong Joint Aeronautical and Geospatial Organisation. He played a key role in furthering the role of geography on successful military operations, including disaster relief and the London 2012 Olympics.

John Kedar (left) and Chris Holcroft have joined OS International.

US rugged mobile computer manufacturer Juniper Systems has appointed **Simon Bowe** as its general manager of Juniper Systems Ltd, to spearhead UK and European operations. He will be setting up a new office and service centre to offer the complete range of the company's products and services to better serve its partners and customers in Europe and the surrounding regions. Bowe has held senior sales and management positions during his 30 years within the IT sector. He was general manager of the UK and EMEA division of DAP Technologies.

The University of Leicester has conferred the honorary title and status of Industrial Associate on **James Eddy**, technical director of Bluesky. As the company's technical innovator James has been working in partnership with the university on a number of projects including research into the development of a new system for Nightsky mapping and the use of specialist sensors for air quality monitoring. The title provides recognition of the significant and regular contribution to the work of the Department of Geography made by James and it runs for a period of five years. He has also contributed to the work of the University as chair of a steering group providing advice and guidance to G-STEP – a university service maximising the use of satellite imagery by business.

Bluesky has appointed **Donna Lyndsay** as Business Strategist. She has over 20 years' experience with GIS and was previously with Landmark Information Group, Stanfords map shop and Earth Resource Mapping before establishing her own consultancy.



Above: Keith Dugmore's trade-off triangle represents the dilemma – better accuracy, frequency or geography?

A future for the census?

Our editor has recently been viewing records of his ancestors in the census records from 1841 through to 1911 and his descendants will be able to do the same for the next 100 years. In 2111 they will finally find out where he was living – and with whom – in 2011. But that might just be the end of the line. The 2021 census might never happen.

THE OFFICE FOR NATIONAL STATISTICS (ONS) is consulting on '*The Census and future provision of population statistics in England and Wales*' with proposals that could lead to the replacement of the decennial census with information gleaned from 'existing government data' and annual sample surveys. As part of this consultation, Professor **David Rhind**, deputy chair of the UK Statistics Authority, chaired a meeting at the Royal Geographical Society on 21 October that explained the pros and cons of the two options currently being discussed.

The options The audience of over 100 was addressed by ONS experts, academics and census data users from both public and private sectors. The main benefit of moving to the use of 'administrative data plus surveys' would be the provision of much more up-to-date – annual – information at national, county and possibly district level. However, against this would be the loss of much of the detailed characteristics provided by the survey and certainly the end of small area statistics as we know them.

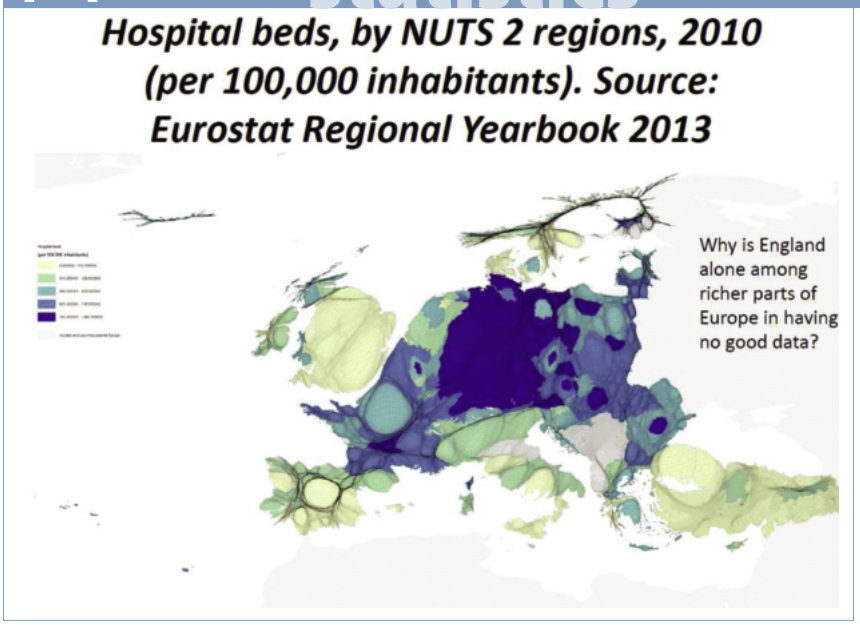
From the presentations and questions at the meeting it was clear that, while everyone was enthusiastic about getting more up-to-date statistics, there was very serious concern about the loss of small area statistics for local authorities and the health service as well as a likely loss of data about small ethnic groups.

Alistair Calder and **Andy Teague** from ONS said that there was always a review of the process between censuses but that in this case there are rapid societal changes, evolving user requirements, technological advances and improved data sources that need to be considered. The drivers are cost, efficiency, opportunity and the burden on the public. Eight options were initially considered from the full census – a long form for every household – to the use of an address register with a sample survey. The consultation is only being asked to consider two of these – the full census (done mainly online) and the use of administrative data with a sample survey. The former would also use administrative data to check the quality and with annual population estimates derived using births, deaths, etc. (sic). The second approach would be to use the NHS patient register, DWP/HMRC customer information system, electoral roll, school census, higher education statistics and births and deaths registers – but stripped of all names, addresses and dates of birth – as well as a 1% (compulsory) annual sample survey to adjust for errors and a 4% (compulsory) annual sample survey to collect 'characteristics' similar to those collected in 2011.

Richness v. regularity With the census option we get continuity, 'huge richness of data', accurate small area statistics and detailed cross tabulations but with perhaps an illusion of certainty in some respects and information that will be out of date very quickly. The administrative data approach will give much more frequent and almost as good population estimates on an annual basis at national, county and district levels but will not give reliable estimates at ward or parish levels and will not provide such rich characteristic data (ethnicity, accommodation, travel to work, etc).

Experiments have shown good correlation for population statistics between both methods (based on the use of admin data and a sample of the 2011 census) but with particular discrepancies in some areas (e.g. household size in London). It was also noted that it is actually getting more difficult to get a high response rate for the census and there will always be a need to provide an off-line alternative channel. The census option is also estimated to be about one third more expensive (spread over a decade) than the administrative option. However, the latter will require new legislation – around the time of the next election! ONS apparently think that 'the case for small area

> ***. . . the latter will require new legislation – around the time of the next election!***



Above: Prof Danny Dorling's cartogram highlights his argument that administrative data is not as good as is needed.

data is not yet made' – which has certainly raised some eyebrows in the academic community, in local authorities and in the health service.

ONS require feedback and case studies. They need any justifications for small area statistics – Output Areas in 2011 – and where the distribution of small numbers really matters (e.g. small ethnic groups) as well as where 'the ecological fallacy' is a significant issue. They also encourage us to think 'upside down'! If we had been using annual population stats from administrative data for the last 200 years would we be contemplating a change to a decennial snapshot? The consultation started in September and runs until 13 December with a decision expected sometime in 2014 for any necessary legislation in 2015.

Accuracy is the weak link? Prof **Danny Dorling**, Oxford University, led the academic response with a characteristically caustic commentary showing that the administrative data is not as good as is needed and is also being cut significantly. His cartograms speak louder than words though his concluding remark was telling: '*They* are suggesting not counting *you* because *they* think that *you* don't count'!!

Keith Dugmore from the Demographic User Group, representing the larger commercial users of census data, certainly thinks that *you* count. His group are only the tip of the iceberg of business users who rely on census data – often with much value added by commercial service providers – to run their businesses. Store location analysis, targeted advertising and transport planning would all be much more difficult without census data and, in particular, without the characteristics that would be lost with the administrative data option. He pointed out that a lot of this value added data is also now being used by public sector organisations to profile their own populations in order to provide more efficient services. His trade-off triangle represents the dilemma – better accuracy, frequency or geography? His answer: better geography and frequency at the expense of characteristic accuracy. Just as UK Plc relies on geospatial data from OS so it relies on census data from ONS.

> ***His answer: better geography and frequency at the expense of characteristic accuracy.***

The greater benefit **Mark Fransham**, Oxford City Council, is co-chair of the local authority liaison with central government on population statistics and is very worried at the potential loss of small area statistics. Parishes – the lowest level of administration – would be particularly affected in rural areas. In fact he suggested that 90+% of parishes in Suffolk (for example) would not get any population characteristics because they are smaller than the LSOAs (Lower Layer Super Output Areas), which would be the minimum areas for which these would be available. Within an urban area like Oxford, the city needs to know where people and households are, who they are and how they are changing – his case study shows a greater benefit from the geographic detail than the 'marginal' benefit of increased frequency (which would not be annual for this type of characteristic).

Nissa Finney and **Ludi Simpson** from Manchester University have been researching the use of small area statistics to find ethnic minorities and to derive the statistics needed for planning burial services or children's health needs and for providing accurate measures of ethnic segregation. They are convinced that 'having local population data is more critical now than ever before'. Knowing details about the local population will become increasingly important as work previously undertaken by local authorities is out-sourced: it will be necessary to know about communities to ensure that commissioned services reflect the population's needs.

Extra person years In theory, some of the disadvantages of the administrative data option can be overcome by 'small area estimation', which is complex but I think that the main message is that however the estimation is done – using the 1% population and the 4% characteristic survey – there will only be three and five year estimates for a very small number of statistics at LSOA level and none at all at OA level. The richness and resolution of the census will be dramatically diminished. Trials are in progress.

Philip Reed from the University of Leeds, on behalf of the British Academy, made a very good cost benefit case for directing health spending in old age to where it would provide the most 'extra person years' – and that means in poorer socio-economic areas. He argued that at the level of health service areas (which often change with each secretary of state) the benefit of more frequent statistics

outweighed the geographic resolution or accuracy of characteristics available from the census – his vote goes to the admin solution.

A hidden agenda? This meeting was organised by **David Martin** and the Independent Working Group with the support of the RGS-IBG, the Population Geography Research Group, the Demographics User Group and the British Society for Population Studies. David spoke last and asked everyone to respond to the consultation and particularly if they value small area statistics, which are clearly threatened by the administrative data option. After summarising the arguments he quoted several major users (DfT, DECC, DUG and the third sector) which all pointed to a vital and/or increasing need for small area census data. Arguably (and of course this may be the hidden agenda) a lack of small area statistics might lead to the demise of smaller units of local governments – town and parish councils!

At the start of the day, the ONS speakers claimed that the possible change was not primarily about saving money but about efficiency and providing more up-to-date information. The panel of speakers at the end believed that it would be naïve to think that the government would ignore the cost implications but the majority certainly believe that losing small area statistics would be detrimental to most local authorities, to the health service and to commercial use of 'the Census'. Danny Dorling personally vowed to fight against calling any statistics derived from administrative data any kind of 'census'.

Finally we were shown twelve reasons for a population census from Rickman in 1798 – the last two of which were:

- A census indicates a government's intention to promote the public good
- The life insurance industry would be stimulated by the results.

The insurance industry may not need stimulation but it certainly needs the best statistics it can get; whether or not the government actually promotes the public good is often argued but surely the intent is usually implied?

The current consultation will close on 13 December and any comments need to be made to ONS or through one of the professional societies by that date.

• For more details, go to beyond2011@ons.gov.uk or the Independent Working Group at: http://www.statsusernet.org.uk.

> ***. . . a lack of small area statistics might lead to the demise of smaller units of local governments. . .***

Peter Parslow is Principal Geographic Information Architect at Ordnance Survey Great Britain.

Inspired by INSPIRE

The INSPIRE Directive was still years in the future when Ordnance Survey became the first major map publisher to deliver a product – OS MasterMap – in the Geography Markup Language (GML). Now the rest of the world, or at least Europe, has caught up and **Peter Parslow** shares the OS experience for all to benefit.

COMPUTER ASSISTED geography is undergoing a long transition from cartographic representations to a data centric world. At Ordnance Survey, we have sometimes led that transition and sometimes followed. We launched OS MasterMap in 2001, just months after GML 2 was published; it was firmly in a world of points, lines and areas – vector cartography. More recently, we have launched several new products, "inspired by INSPIRE". This article concentrates on Ordnance Survey's experience in three specific aspects of this transition (versions of this paper were presented at the INSPIRE conference in Florence in June and at the AGI GeoCommunity in September 2013).

Conceptual model Ordnance Survey's digitisation project over some 25 years culminated in completion of the Land-Line files covering the whole of Great Britain in 1995. The conceptual model was conventional cartography – points and lines of different styles and text in various fonts.

OS MasterMap Topography Layer, from 2001, added classification of points, lines and areas with a theme, descriptive term and descriptive group. But surveying remains related to the concept of a conventional map and it is still difficult to produce any more than a large scale map from the data.

Since 2003, the General Feature Model developed by the International Organisation for Standardisation (ISO) and the Open Geospatial Consortium (OGC) has gained popularity with "features" becoming more important than their geometric representation. Buildings are no longer a tagged polygon but a feature associated with a geometry (footprint) and other properties, such as a postal delivery point or a 3D shape. INSPIRE adopted the GFM, which is known as its Generic Conceptual Model.

Ordnance Survey's new production system has features classified by form and function but still stored on point, line and area database features. Information is collected about "real world features" – geometry and other attributes such as names, stakeholders, addresses, routing restrictions and relationships to other features. All MasterMap layers are produced from this single, continuously maintained database.

OS VectorMap District (VMD), launched in April 2013, was the first product to follow this model explicitly and most of the product is automatically generalised from the same database. VMD immediately provides a more useful "layer" tree (assuming our classification is relevant!), with Roads, Buildings, Woodland, etc. immediately visible.

Styling is also much easier. VMD enables most features to be styled on a single string attribute and OS now provides style layer descriptors, which provide a formal definition for those systems re-implementing it in their own technology.

Geography Markup Language OGC published the original GML specification in 2000 and version 2 was launched in the following year. OS MasterMap was almost certainly the first GML product anywhere and moved to GML 2.1.2 from 2003, coinciding with the launch of the Integrated Transport Network ITN and AddressPoint layers. Unfortunately, being first meant that no one really knew what to do with it! Most software created to load or view MasterMap was custom built and "hard coded" to the early schema. Hence OS VectorMap Local was launched in 2009, still using GML 2.1.2 in the vain hope that existing MasterMap readers would also handle it.

Now "best practice" for GML modelling is based on the General Feature Model, which enables more software to read the data without being configured to the particular schema. VectorMap District is now published in GML 3.2.1. This was Ordnance Survey's first product in the same version of GML specified for INSPIRE, followed closely by OS Terrain vector (modelled on the draft INSPIRE Elevation specification) and OS MasterMap Sites Layer - also "inspired by INSPIRE". In particular, the main classifications are held separately from the schema files in GML Dictionaries. The forthcoming Rail and Water network layers, being produced in collaboration with Network Rail and the environment agencies respectively, also closely follow INSPIRE specifications.

GML is now a large and complex specification and OGC has therefore published the Simple Features Profile as a common subset, which is easier to implement:

- Geometry has only points, lines and areas, with coordinates all in the same reference system. ISO and INSPIRE default to a 2D space, although OGC and some INSPIRE themes allow for 3D. Hollow shapes, overhangs or caves are not allowed.
- "Level 0" attribution has to be very simple: only a few pre-defined data types and each attribute can only occur once on a feature.
- "Level 1" is more useful, but harder to implement with attributes occurring more than once. Application

> ***"GML is now a large and complex specification and OGC has therefore published the Simple Features Profile as a common subset. . ."***

schemas can define their own data types. But each attribute has its value either inline or by reference.

- "Level 2" allows the full range of GML attribution – only the geometry is constrained.

A number of GIS packages support simple features Level 1, with several more supporting Level 0.

Moving to GML 3 and beyond has simplified OS production systems with a choice of software able to create GML to a given schema without post-processing. Users should also benefit from easier loading and use of the data because more GIS software can handle GML 3.2 simple features.

Life cycle rules Database driven geography enables the relationship between the data and real world change to be made explicit. OS MasterMap features have a repeatable "change history" attribute, giving a little information about each past change – the date when the change was recorded and a brief statement of the type of change: position, other attributes, some internal production process. . .

The INSPIRE life cycle approach is different: the whole feature is copied, creating a new instance that shares the same identifier (with different version and lifespan dates). But there is no information about why the feature has changed.

Both approaches need proper feature/identifier management and agreed/published life cycle rules. Both "products" could be driven from the same production system and once the rules are defined and implemented in the capture system, maintaining this data is straightforward. However, it seems that only a minority of customers value the change history.

Both approaches enable change only update, which is useful for customers with large data holdings. The INSPIRE system may be easier to implement but there seems to be an assumption that any change to a feature originates from a change in the real world. This is not the case – a lot of changes come from changed capture requirements, different capture technology or simply correcting errors in the data.

INSPIRE compliance – three perspectives In this paper, I have made some digressions to discuss INSPIRE compliance. It seems valuable to consider this from three perspectives:

- **Conceptual model**
- **Encoding**
- **Reference system**

The majority of INSPIRE specifications are based on their Generic Conceptual Model. The exceptions are Orthoimagery and the gridded specifications used for Elevation and some others. As discussed above, we have been making this transition for some time and intend to complete the journey within the next few years.

Most of the INSPIRE specifications discuss GML 3.2.1 as their default or only encoding. Support for this format is increasing in GIS software and we intend to work with our customers and partners to enable this change. None of the INSPIRE attribution would fit in "Level 0"; but almost all should work with "Level 1".

INSPIRE compliant data must be made available with coordinates from a short list of reference systems, which for GB is latitude and longitude in ETRS-89. Most users of Ordnance Survey data – and of data derived from its products like most of the INSPIRE datasets in Great Britain – are familiar with and use British National Grid. There seems little demand for the pan-European solution at present and, in many cases, the transformation can be handled by existing software. However, behind the scenes there is a big change of mindset from a map reference in a projected "flat and square" world to coordinates related to the nearly-spherical earth.

Conclusions By introducing aspects of INSPIRE to our products over several years, we hope that we can help the British geographic information community to travel this road with us. That includes our end users, their suppliers and our partners. If you want to be involved in this journey, then please get in touch.

Of course, the journey will not end with INSPIRE. Whilst it will be useful for the "traditional" mapping and analysis work of the geographic information community, yet more changes of conceptual model are likely, including those needed for handling linked data and unstructured "big data".

> ***. . . a big change of mindset from a map reference in a projected "flat and square" world to coordinates related to the nearly-spherical earth.***

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- INSPIRE Generic Conceptual Model: **http://inspire.jrc.ec.europa.eu/documents/Data_Specifications/D2.5_v3.4rc3.pdf**
- ISO/TS 19109:2005 Geographic information – Rules for application schema, available from **http://www.iso.org or http://shop.bsigroup.com/**.
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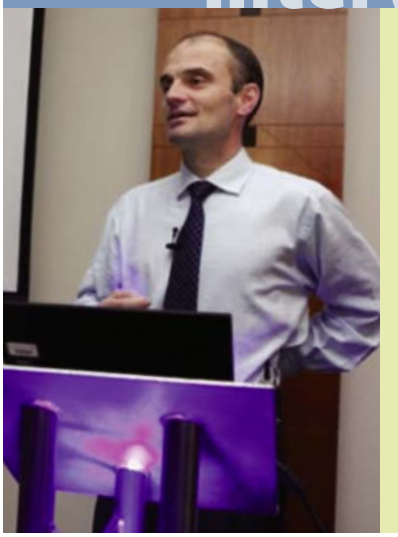
About the author

Peter Parslow is responsible for the team who lead development of Ordnance Survey's data products and the information architecture of production systems. He is involved in UK Location and INSPIRE, in metadata, data architecture and data specifications – especially at a technical level. He is also involved in developing geographic information standards, such as the ISO version of GML 3.3, and some of the underlying concepts.



Andrew Trigg has been with Land Registry since 2005 and was chair of the Association for Geographic Information (AGI) in 2011. He is currently Head of Data Strategy and Chief Geographic Information Officer. Previously, he worked at Ordnance Survey Great Britain, Wiltshire County Council and Laser-Scan after research at the NERC. He also holds a PhD from Nottingham University and was on the very first year of the very first GIS MSc in the UK, which was at University College London (UCL)!

Land Registry's GI chief is INSPIREd

Via the wonder that is Skype, Robin Waters talks across the waves to **Andrew Trigg** to discover more about latest developments with Land Registry, particularly its download service for INSPIRE Index Polygons.

FOR OVER 20 YEARS, the Land Register for England and Wales has been available for anyone to view but before 1990 it was "closed" to the public – you needed the permission of the owner of registered land in order to look at the register entries for that land and find out who owned it! And it was only in 1990 that compulsory registration, on transfer of title, reached every part of England and Wales. The Register is now in the forefront of a revolution in conveyancing that keeps the costs of buying and selling land and property in England and Wales amongst the lowest in the world.

In 2012, Land Registry put a subset of its index map online through data.gov.uk and in September 2013 it introduced its own download service for the INSPIRE Index Polygons.

We are therefore delighted to have been able to interview **Andrew Trigg**, Land Registry's Head of Data Strategy and Chief Geographic Information Officer, about these latest developments and the historic background to them. The interview was conducted by Skype to St Helena, the remote British Overseas Territory in the South Atlantic! Andrew was a member of a Land Registry team providing assistance to their Land Registry department, which is anticipating the completion of the airport in 2015. The team had to travel by air to Ascension Island and then by sea.

> ***"The INSPIRE specification requires that each polygon has a unique number rather than duplicate numbers where a multi polygon title exists."***

Very few, if any, other UK organisations have labelled their INSPIRE compliant datasets as "INSPIRE". Why has Land Registry done so?

A good question! INSPIRE was the catalyst that enabled us to release this version of the Index Map, which we might not have done otherwise. We also had to clearly distinguish between this version – which only shows freehold "polygons", as required by INSPIRE legislation – from the full Index Map, which also shows leasehold property. We hope to make the full Index Map available soon but it will be chargeable.

Can you explain the significance of the "index map" in Land Registry?

Land Registry exists to provide secure and government guaranteed title to land in England and Wales. Proving title to unregistered land requires expensive and time consuming work by lawyers relying on bundles of deeds – with land being described in words and with many different types of plans. Once registered all title plans are based on the most up-to-date large scale Ordnance Survey map at the time of registration. The Index Map is also based on OS mapping but is, as its name implies, just an index to individual title plans. The Index Map (and hence the INSPIRE version as well) is only *indicative* of the location and approximate size and shape of registered land. It has no legal status.

What are the main differences between the full index map and the INSPIRE version – and why?

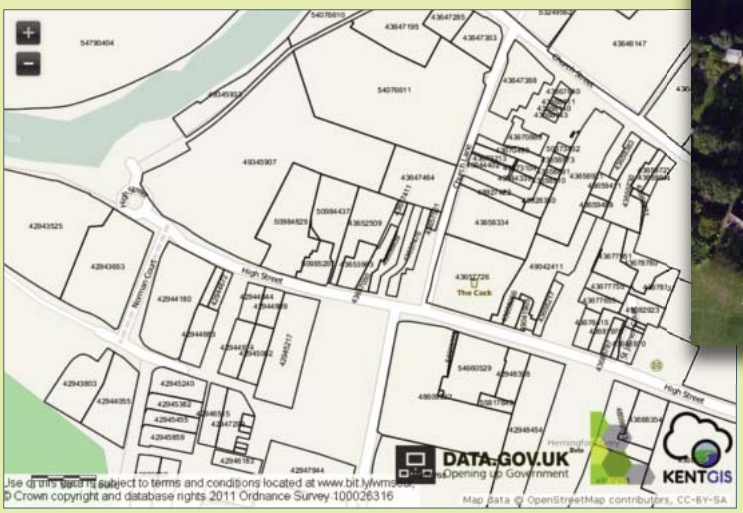
The full Index Map has leasehold and other, more obscure, classes of title such as "Possessory", as well as freehold polygons, and these have Land Registry title numbers. Many titles include more than one polygon, such as where garages are in blocks separate from housing. The INSPIRE specification requires that each polygon has a unique number rather than duplicate numbers where a multi polygon title exists. Part of the process for developing the INSPIRE dataset included a thorough review and updating of the Index Map, which is of general benefit. The INSPIRE version has been made available free of charge – for both viewing (via data.gov.uk) and for download from Land Registry's own website – as part of its strong support for the Government's Open Data programme.

Can you say anything about negotiations with the Ordnance Survey?

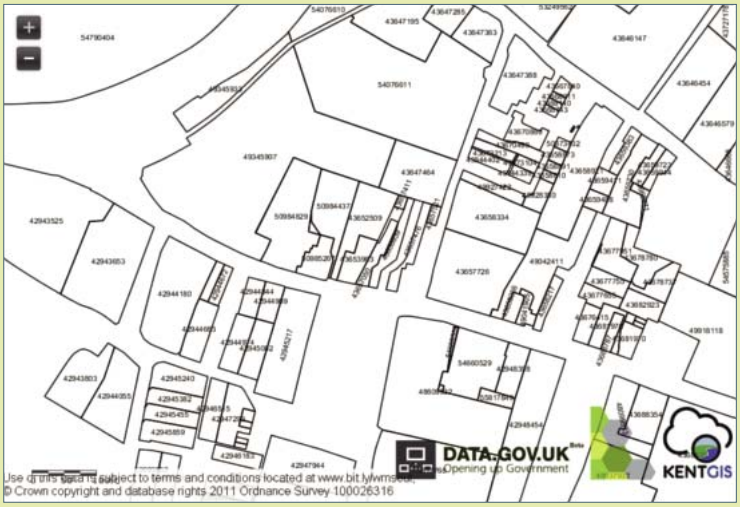
Land Registry has always been keen to ensure that it released its own data using the Open Government Licence (OGL) so that re-use is not restricted. This intention was relayed to Ordnance Survey. It needed to do this because the Index map uses OS mapping – nowadays OS MasterMap – which is subject to Crown copyright and must be licensed for any use. Although the Index Map uses only a small subset of OS MasterMap, it is still classed as "derived data" by Ordnance Survey.

OS has accepted that Land Registry data may be licensed using OGL and has added an extra facility to the Public Service Mapping Agreement, which frees organisations publishing INSPIRE data from the necessity

The four images show (anti-clockwise from right) an aerial image, Land Registry INSPIRE Index Polygons (with and without an Open Street Map background) from KentGIS and OS MasterMap from the Cambridgeshire County Council website.



The KentGIS website carries the following explanation: This map shows the indicative extent of property registered in England and Wales. Each polygon has a unique ID called the Land Registry-INSPIRE ID. This can be used in Land Registry's Find a Property service to obtain the title registration and plan information.



Note the properties – and highways & waterways – that are not registered (no polygons or indentifiers).

INSPIRE Index Polygons on KentGIS are available for internal business use only. They can be viewed publicly on data.gov.uk.

to track and check on the uses of the data being made by individuals and organisations who download it. Users accept the terms and conditions when downloading and are responsible for their own actions.

Land Registry is as open as we can be given the reliance on this third party OS data and we understand the constraints of the OS Trading Fund status – which are similar to our own.

The INSPIRE index map can be viewed on data.gov.uk – but only with certain OS backgrounds. Would Land Registry ideally be able to put up the MasterMap background from which the index polygons are derived?
We have no plans to serve OS MasterMap as a background to our INSPIRE Index Map. All datasets available on data.gov.uk, including our data, use Ordnance Survey mapping as the background. This is OS Open Data and therefore excludes the OS MasterMap Topography layer.

Are there any technical issues around the INSPIRE dataset that our readers might wish to understand?
The Index Polygons can be downloaded very easily from our website as GML (Geography Markup Language) files for each local authority district. GML is specified by the INSPIRE directive and is also used by, for example, Ordnance Survey for its MasterMap Topography layer. As such there are many open source or proprietary viewers and loaders depending on which GIS is being used.

The dataset is updated around the 17th of every month. Any polygon that crosses a local authority boundary is duplicated in both files and therefore any organisation needing to download more than one local authority will have to de-duplicate the

overlapping polygons to get a seamless coverage.

The zipped files vary in size from less than a megabyte for the Isles of Scilly to nearly 90Mb for Cornwall. The smallest number of polygons is also for Isles of Scilly – with just 878 while the largest is Birmingham with 318,000. London is broken down into its constituent boroughs.

All downloadable data is provided in national grid coordinates whereas the default presentation on the data.gov.uk viewing service is in a European wide projection that distorts familiar shapes in England and Wales.

Are there any data quality issues? Our continental friends are, for example, always surprised by the gaps!
Part of the effort involved in producing the INSPIRE Index Polygons was undoubtedly cleaning up the existing index map. We do not claim that it is perfect – and it is only indicative – but we know that it is a lot better than when we started!

Our friends in the rest of Europe expect their cadastres to be complete – to cover all land in their country. These were mostly established subsequent to the French revolution and Napoleon's influence on most of continental Europe. Cadastres were introduced systematically for the purpose of land taxation as much as ownership and were surveyed explicitly with boundary markers and precise measurements of areas.

In England and Wales there has never been a cadastre and although Land Registry was set up in 1862, it was only in 1990 that it became compulsory for all of England and Wales. Compulsory registration was introduced county by county and only on transfer of title. So land that has not changed ownership since compulsory registration was introduced in any particular area will not be registered unless an owner has chosen to do so voluntarily. Just under 20% of the land area of E & W is currently unregistered – for example large rural estates but also properties in built up areas that have simply not changed hands since their counties became compulsory areas.

> ***We do not claim that it is perfect – and it is only indicative – but we know that it is a lot better than when we started!***

Our system is based on "general boundaries" – land is described by reference to the largest scale OS map and the boundaries are not precisely coordinated. This is a pragmatic solution that has generally worked well but which is occasionally enhanced to a "fixed boundary" with the agreement of owners on either side.

Do you have any feedback from users yet?
We have had over seven thousand downloads of the datasets in less than two months since they became available in September. Feedback has been generally positive and there have not been that many queries. A few potential value added suppliers have suggested that they might derive useful information but we're not aware of any commercial applications yet.

We have seen that Kent GIS have put up all your data with Open Street Map – are there other ventures like this?
We aren't aware of any other attempts to put up the whole of the dataset although under the terms of the Open Government Licence, it is not possible to track who has downloaded the data and the subsequent use that they are making of it. We also know that many organisations are eagerly awaiting the release of the complete Index Map.

How does Land Registry see the overall data.gov/UK location Programme/INSPIRE progressing – is it well integrated?
We see ourselves in Land Registry as one of the leading departments providing Open Data following the government's initiatives and this is not confined to the polygon datasets. The UK Location Programme is currently in a state of flux, but it is clear that Defra remain responsible for INSPIRE compliance.

Land Registry is a member of the Public Data Group and is participating in the Open Data Energy and Environment Challenge, which is being supported by the Nesta innovation foundation and the Open Data Institute.

Adena Schutzberg is Principal of ABS Consulting Group Inc. and Executive Editor of Directions Magazine, www.directionsmag.com

Leave geospatial technology at home for a better adventure

If you spend the entire time staring at your favourite GPS for spatial awareness, you risk taking all the fun out of an adventure! Rely on your eyes and pay attention to your surroundings to gain real insight, argues **Adena Schutzberg**.

LAST WEEKEND I ran a long trail race. Runners repeated four loops to complete the entire distance. The start/finish hosted an aid station and there were two more on the loop where supportive volunteers provided water, snacks and encouragement. There's a lot of spatial awareness involved in successfully completing such a race. Some runners choose to use geospatial technology to help out with that awareness. I prefer to leave the technology at home.

No expectations The hosts of the event graciously offered two opportunities to run on the course in the weeks before the race. A member of the host club led visitors around the loop, since the actual trail markings, including small signs, survey tape, glow sticks and reflective bands, would not be installed until the day before the race. I ran with a fellow who'd done the previous practice run. He was disappointed that he had no idea of which way to turn at any given trail junction. I attended the practice run with no expectation of learning the route (or capturing it on a GPS). I was there to learn about the terrain and the surface.

Race day came and we lined up at the start in a field, in the dark, with our headlamps. For 30 minutes or so everyone just followed the person in front. As the long line broke up by pace, things got a bit tougher. Everyone had to keep an eye out to stay on course.

Distracted by GPS Several of my fellow runners wore their favourite GPS devices. These typically "ding" each mile and note both progress distance and pace. I wore a watch with the goal of timing each of my loops and trying to get them as even as possible. I measured my progress by looking forward to, then passing through, each aid station. It was somewhat far to the first aid station, a shorter distance to the second one, then quite a long way back to the start/finish.

As each loop passed, I gained more insight into the details of the course. I noticed the bodies of water, the long smooth dirt roads where you could run pretty fast, and the steep climbs that forced you to walk. But the most important landmark was an intersection where a group of volunteers marked the beginning and end of "a loop within the loop." I named the spot and the volunteers who monitored it as "the guys who won't let you cheat."

I began to look forward to this landmark since it was about a mile and a half from there to the start/finish. To my great surprise, a friend of mine managed to get lost on the little loop and head the wrong way. She probably ran a bit further than everyone else did. I wondered, but didn't ask, if she was distracted by her GPS.

Right: As each loop of the long trail race passed, more insight could be gained about the terrain by simply keeping an eye on your surroundings.
Image credit: By Fredlyfish4 (Own work) [CC-BY-SA-3.0 (http://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons.

Keep adventures fun On one loop, two women walking and looking intently at their GPS headed towards me. I figured they were geocaching, since we were in a state forest. "Is this the way to Al's?," they asked looking quizzically at the device then back to me. I assured them that yes, this was the way to the first aid station, known as Al Cat's Lounge. I figured they were volunteers on the way in for their shift. I wondered why they weren't just following the survey tape and arrows (backwards) to their destination.

I ran some of my last loop with a very friendly fellow from Connecticut. I let him go a few miles from the end as I "visited nature.". To my great pleasure, I saw him finishing the little loop, just as I was entering it. I finished a few minutes after he did. We congratulated one another and he pointed out that I was just 0.6 miles behind him. He knew the length of the little loop because he was not only wearing a GPS but also paying attention to it.

I was happy to have learned the length of that little loop only after I finished. I had purposely forgotten the distances between the aid stations that I read the day before the race. All that extra information (how fast I'm going, how far to the next aid station, how long the little loop is) would not have added to my experience. In fact, it makes races (and even training) more stressful and far less fun for me. There's a lot to be said for taking on an adventure without geospatial technology. That said, I'm still going to wear my watch.

Jamie Courtney (left) opens the conference by telling delegates that tools like GIS are vital and "inform our planning and service delivery options".

Creative use of GIS

Richard Spooner, marketing manager of Cadcorp, reports on the company's recent fire services conference, which highlighted the need for a creative use of geographic information to combat tight budgets.

FIRE AND RESCUE authorities in Britain have transformed themselves from organisations that dealt mainly with fire response into organisations that also cover prevention and protection, successfully reducing emergency incidents as a result. The challenge now is how to transform operations to reflect a different era of risk and demand – with a much reduced budget. A creative use of geographic information is key to rising to that challenge.

This was the overriding message from the Cadcorp fire services conference held at the South Yorkshire Fire and Rescue Services (SYFRS) headquarters in Sheffield on 12 November.

The conference was opened by **Jamie Courtney**, chief fire officer SYFRS: "We are all acutely aware of the financial challenges facing all of our organisations. The ability to provide a first class service delivery model with reduced capacity is driving us to find new and innovative ways of doing the same with less."

He continued: "The value of technology to assist us in achieving this is demonstrated in the use of tools such as GIS to inform our planning and service delivery options. It is vital that to support this process our staff and analysts have the tools that enable them to produce timely data and intelligence to inform decision-making. Cadcorp GIS has been used for a number of years within SYFR to do just that, and I am pleased that we are able to host their Annual Fire Conference for a second year."

> ***The challenge now is how to transform operations to reflect a different era of risk and demand – with a much reduced budget.***

Improving road network data **Gemma Polmear**, GIS analyst, Nottinghamshire Fire and Rescue Service (NFRS), emphasised the importance of road network data in facilitating vehicle mobilisation. She reported on a recent project undertaken by NFRS to enhance the OS MasterMap Integrated Transport Network Layer (OS ITN). While it provides an invaluable and detailed topological model of the road network, ITN doesn't carry information on road speeds. NFRS were able to add information on road speeds by deploying otherwise unused logs of GPS data. The data comprised four years of records of vehicle call-outs to incidents.

NFRS commissioned Cadcorp to develop an Automated Vehicle Location System that attached GPS points to road sections in OS ITN. It then became simple to calculate average speeds for a road section. Where there was no historical GPS record, speeds based on average speeds achieved on roads of similar types were assigned. The fire service is now using this enhanced ITN layer in turnout modelling and plans to extend its use to scenario and workload modelling, fire cover planning and resilience strategy development.

Targeted road safety The same creativity in using available data was shown by **Clare Nolan**, strategic risk analyst, Greater Manchester Fire and Rescue Service (GMFRS) on using GIS for incident prevention. For each borough of Greater Manchester, analysts have examined the incidence of fires by type of household based on a geodemographic classification. They then locate the household types at greatest risk and identify at-risk properties due a safety check. A similar approach is being used for road traffic collisions (RTCs). GMFRS don't attend all RTCs and, consequently, their historic data on RTCs is partial. However, analysts from GMFRS have explored using Market Analysis and Segmentation Tool (MAST) data from Road Safety Analysis Ltd. They use this road safety data to target the age group (17-25) of drivers and passengers more likely to be involved in an RTC. As MAST records a driver's home address, GMFRS can identify where there is the highest propensity for young residents to be involved in an RTC, and are targeting FE colleges in the locality.

Paul Skelton, data and information team at Tyne and Wear FRS, provided another example of a force not limited to the analysis of its own historic data. His point was that Cadcorp's Workload Modelling application would be enhanced if it could handle not only geographic variations in risk and response, but also temporal variations throughout the day. Both temporal and geographic variations in the profile of incidents influence where and how to deploy resources. Paul achieved – with Cadcorp's help – the ability to run simulation models based on prescriptive data about the possible variations in the deployment of resources throughout the day.

Right data, right tools An accurate and definitive addressing system is vital if the emergency services are to reach incidents quickly. **Andrew Cooling** of Ordnance Survey pointed out that until recently we have used different address registers, maintained by competing organisations, resulting in inefficiency and error.

So address information from Ordnance Survey and local authorities will now be combined to create a 'national address gazetteer database': one definitive source of

accurate publicly-owned spatial address data for the public sector. Andrew described the AddressBase products that are now available to the fire service. All data products will include a Unique Property Reference Number (UPRN), which will be the definitive property identifier used by all agencies in emergency services. He also provided an update on the progress of the fire services migrating from legacy products to AddressBase. Two authorities have completed the migration, forty two are in progress and five have yet to start.

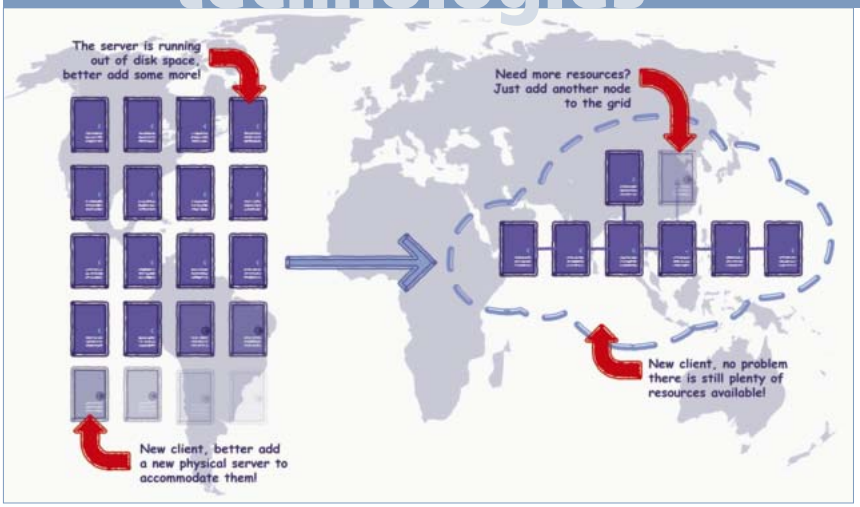
John Phillips, geographical information officer at Shropshire Fire and Rescue Service (SFRS), argued that access to the right data is not enough. You still need appropriate tools to analyse the data and those tools need to be easy to use. Before running a procurement exercise for a corporate GIS replacement in 2012, SFRS set about gathering user requirements. Fire service staff had the opportunity to say likes or dislikes about the current system, then what they required of a new system. Five features were essential: simple interface; easy to navigate menus; easy to use addressing; ability to link data to other systems; and the ability through customisation to give users what data or functions they need for their job.

What's new from Cadcorp? Usability and productivity was also emphasised by Cadcorp's technical director, **Martin Daly**. He provided a preview of the next release of Cadcorp SIS software and **Andrew Kemp**, head of presales, demonstrated the new features. With SIS 8.0, Cadcorp has introduced discrete additions and enhancements focusing on improving user productivity. While improvements in processing speed play a part, Martin explained that many gains in productivity in SIS 8.0 will be from developers having anticipated the user requirement for software which is both functional and easy to use. The emphasis seemed to resonate with the attendees, many of whom are being asked to do much more with existing or even reduced resources.

Above: Martin Daly discussed productivity gains with the next release of Cadcorp's SIS software, v8.0.

UK sales manager, **Gary Randle**, gave an account of web mapping in Cadcorp. Cadcorp has been delivering web mapping applications as part of an integrated software suite since 2001, initially as bespoke applications then as off-the-shelf internet and intranet applications. He anticipated a continued growth in the use of web mapping and web GIS in the fire services as they strive to share geographic information more widely throughout their organisations. He reported that Cadcorp was responding by increasing the resources it devotes to web application development and by including the web geoprocessing functionality that had previously been the preserve of the desktop.

This annual conference continues to be a highlight of the Cadcorp Fire User Group calendar – an opportunity for "birds of a feather" to share experiences through informal conversations as much as scheduled presentations.



Above: From server sprawl to optimised service provision in the Cloud. Smarter thinking about how services are architected and delivered is fundamental to benefitting from Cloud Computing.

The silver lining for GIS?

Colin Henderson of Atkins, with his feet firmly on the ground, suggests that it is worth looking closely at the "cloud" – is the technology really disruptive enough to change the way we work with spatial information? Apply the "Dad" test and see if it works for you.

AT THIS YEAR'S AGI GeoCommunity conference, I had the honour of giving a presentation and, in thinking about a topic, I found myself wondering whether "cloud" technologies are disruptive enough that they will fundamentally change the way we work with spatial information, or are they simply the same old thing wrapped up in new terminology?

It seems these days you can't venture near a computer without having "the cloud" thrust in your face! It is a minefield of terminology – are you looking at PaaS, SaaS, IaaS, DaaS, or NaaS? Is it a private cloud, public cloud, community cloud, distributed cloud or even a hybrid cloud? The choices and combinations are seemingly endless and to the vast majority – meaningless. My Dad certainly has no idea what any of this means and yet all his online activity is powered by it.

> ***The choices and combinations are seemingly endless and to the vast majority – meaningless.***

What's so special? In researching my presentation, a colleague pointed me in the direction of Gartner's 2013 *Hype Cycle for Emerging Technologies*[1]. Each year Gartner assess more than 2000 technologies for their business benefit, maturity and future direction. This year's Hype Cycle shows that cloud computing is currently sat in the "Trough of Disillusionment". Interestingly, location intelligence and consumer telematics are both well on their way to "Plateau of Productivity", and it will often be cloud-based technologies underpinning or driving them. Does this mean then that we are simply embracing cloud computing and utilising it? Is it in the trough of disillusionment because we are overwhelmed by its complexities or because we just don't get what is so special about it?

So what exactly is cloud computing or "the cloud"? Well, to some extent that very much depends on who you speak to and what their "angle" is. However, in reality, it is simply a snappy marketing term for distributed computing. There are effectively three core models, each one building on the other:

- **Infrastructure as a Service (IaaS)** is when physical or virtual servers are *supplied* by a service provider, with users bringing their own software and managing the server(s) themselves.
- **Platform as a Service (PaaS)** is when a computing platform is *delivered and managed* by a service provider, with users bringing their application(s) to run on the platform.
- **Software as a Service (SaaS)** is when users are provided access to software without having to worry about the platform it runs on, often all that is required is a web browser.

Most "cloud" services will be based on one of these three models and, in some cases, a combination of all three. It is also possible to run services on all three models with one provider; Microsoft's Azure platform, for example, would enable me to run several virtual machines (IaaS), deploy a website with a single click (PaaS) and run an office application (SaaS) – and of course I could utilise all three to offer my own services to clients.

So is cloud computing disruptive? For cloud computing to be considered disruptive it must affect an existing market, create a new market, or displace an earlier technology. The latter is certainly the experience of my business unit in Atkins, and I'm guessing the vast majority of other organisations out there. You see, we ran all of our internal business support systems (source code control, bug tracking, CRM, etc) and managed client services and applications using a traditional model of physical servers. New client coming on-board? No problem, stick another server in the rack! Database server running low on disk space? No problem, buy more hard drives or even a SAN! The problem of capacity was dealt with by adding more, and not by first examining current usage, so-called "server sprawl".

When one digs deeper into server utilisation it soon becomes apparent that the majority of servers are actually under-utilised; typically one or more servers work together to provide a single service or application but are not actually 100% utilised in that delivery. For example, a database server is only busy (and even then it is configuration dependent) whilst it is responding to a query – for the rest of the time it is idle and therefore under-utilised. There must be a better way to manage this infrastructure and still deliver robust and "performant" *[Ed: Apparently used by Microsoft to mean "performing to specification" – makes sense!]* services?

Creative thinking In our case, the answer came from our hosting partner, Vnetrix[2], in the form of CA Technologies Applogic Cloud Platform[3]. This is a full Cloud management solution enabling us to create an environment in which we can deliver infrastructure and services much like Azure platform and Amazon's AWS. Now we have the flexibility to build infrastructure that meets requirements on an application-by-application basis and scale it to meet increased demand, rather than having to plan ahead and over-specify a physical server. Increasing capacity is now a case of "hot adding" an additional node into the grid and setting up applications to scale out based on some metric such as CPU, memory or bandwidth utilisation. The result is that we are now running a seven node grid delivering all of our services internally and externally instead of more than twenty physical servers. The experience has been great and, in some cases, we have seen improved performance of services because it forces us to consider our configuration and optimisation more carefully.

This is an extreme example of utilising cloud technologies but what about all the others? Well, the possibilities are seemingly endless and all it really requires is a little creative thinking. For example, Dropbox (or other Cloud-based storage services) could be used to provide distributed network storage for a small project team to store all of their spatial data with the benefit of built-in versioning of the files and natural resilience that comes from the way the services are built.

Are cloud technologies disruptive enough to fundamentally change the way we work with spatial information? Well that very much depends on what you are trying to achieve. In some cases, it offers great benefits and a chance to shake things up and in other cases it is probably more of a distraction. To determine if it is the way forward one should ask the following questions:

- What do you want to do?
- Why do you need to do it?
- How are you currently doing it?
- Can you do it differently?
- Will the cloud help?

For me the guiding principle of cloud-based technologies is that they should enable people (including my Dad) to get stuff done in an unobtrusive way – the technology should be transparent to end-users. Users should be able to get stuff done conveniently, securely and with ease of use – what I like to call the Dad test – and the right combination of cloud technologies is often the way to achieve this.

Footnotes:

1) Gartner Hype Cycle reference : **http://www.gartner.com/newsrroom/id/2575515**
2) Vnetrix (**http://www.vnetrix.com**) is a Managed Services provider providing premium IT support, infrastructure management and hosting services for businesses of any size.
3) Computer Associates AppLogic(R): **http://www.ca.com/gb/cloud-platform.aspx**

About the author

Colin Henderson has over 12 years of experience within the field of Geographic Information working in both the private and public sectors. As a Principal GIS Consultant with Atkins, a leading design, engineering and project management consultancy, Colin is the lead architect delivering clients services and solutions with Open Source Software and Cloud-based technologies.

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> ***. . . the guiding principle of cloud-based technologies is that they should enable people (including my Dad) to get stuff done. . .***

Nick Milne, construction monitoring officer at Cambridge City Council, receiving his award from Daniel Goodwin, executive director of finance and policy at the Local Government Association (LGA) and Gesche Schmid, programme manager, transparency, LGA.

Trainspotting trumped by Archaeology

Robin Waters' take on the GeoPlace "Everything Happens Somewhere" conference and the Exemplar Awards. Although increasingly recognised as vital, the address infrastructure of even some of the emergency services is less than perfect.

NEWPORT AND CAMBRIDGE were in the running for the Street Naming and Numbering award this year. Newport has a scrap yard where many old steam locomotives ended up though some were saved for heritage railways all over the country. Some of the Castle, Kings and County Class loco names have now been used for local streets, which therefore go back through the era of the Western Region of BR to Brunel's GWR.

In fact Newport was "trumped" by Cambridge City Council. The ancient village of Trumpington is now part of the city, which has won this year's Street Naming and Numbering Exemplar Award with the help of the village's Residents' Association & Local History Group. Their research went much further back in history than British Railways or even God's Wonderful Railway and the judges came down on the side of Cambridge. A triumph for detailed research over pure nostalgia? Maybe – but choosing road names always brings out the best in our imaginations and/or eccentricities.

Road names are essential elements of addresses that need to be as distinctive and as unambiguous as possible, at least within their own towns or villages, so that the myriad users can operate effectively to save lives, deliver the mail and support local residents. These are the reasons that GeoPlace makes these Exemplar Awards and as their managing director, **Richard Mason**, said: 'The work of address and street data professionals is to enable all these to be done more efficiently'.

> ***. . . three police forces had exposed serious deficiencies in their address records – apparently there are still Woolworths in Cambs, Herts and Beds. . .***

Woolworths still about This year's "Everything Happens Somewhere" conference was held in October in Central London and featured some illuminating presentations from the police, highways professionals and local authorities as well as from GeoPlace itself. We heard that integrating the back offices of three police forces had exposed serious deficiencies in their address records – apparently there are still Woolworths in Cambs, Herts and Beds and even now there is no automated routing for emergency response.

Jerry McConkey is the chair of HAUC (UK) – the Highways Authorities and Utilities Committee – and a board member of the Joint Authorities Group (of Highway Authorities). He explained the relationships between the various stakeholders in the use and management of highways and particularly the role of GeoPlace as custodian of the National Street Gazetteer, which has become more important with the implementation of the new Street Works Act.

Steve Brandwood summarised current progress and issues at GeoPlace and touched on Royal Mail (postcodes), the forthcoming demise of OS AddressLayer2 and a weekly feed received from the Valuation Office Agency. GeoPlace is now achieving 99+% match with the Postcode Address File and 99% with Council Tax files from VOA but only 85% with Non Domestic Rates where addresses are much more problematic.

Andrew Young from Durham is the principal chair of the regional chairs address group. As such he thanked all the delegates for their hard work on the gazetteers and reinforced his messages about their importance for so many private and public sector organisations. The privatisation of Royal Mail was raised, of course, and his views on local authority relationships with RM are well known and were articulated in our August issue.

Awards The Citizen Award, sponsored by Defra, was won by South Staffordshire Council, which focused on waste management services making savings of 15% and also enabling the council to improve upon existing high levels of customer satisfaction.

Barnsley Metropolitan Borough Council was rewarded for their Improvement and Efficiency – the award is sponsored by the Local Government Association. Barnsley improved the identification and recording of information about local businesses quickly and accurately and working with the taxation team provided an enhanced revenue stream for the council.

The Society of IT Managers (Socitm) sponsor the

award for Innovation in Service Delivery, which was collected by the London Borough of Tower Hamlets. It managed to change the culture and operational models for numerous teams thereby producing large scale savings and other tangible efficiencies very quickly.

The Ordnance Survey sponsored Best Practice Award went to Nottingham City Council for working to national guidance and improving property identification across council and for external bodies, reducing address problems for both existing and new occupiers.

The Integration Award went jointly to Newham Council and North Somerset Council. The former changed council processes that used land and property tenure data resulting in the identification of sub-letting within council properties and a number of unlicensed privately rented properties. North Somerset followed many previous examples of optimising waste collection routes but focussed right down to the individual property level and devised sustainable links between a diverse range of systems.

Progress After lunch the conference broke up into several streams and all of the presentations are on www.geoplace.co.uk/geoplace/link.htm?nwid=263. I was fascinated by the very full statistics on the progress in take up of AddressBase products across both public and private sectors given by **Nick Turner**. It certainly seems that parts of the public sector are moving much faster than the private sector but that often this is hampered by ongoing contractual issues with incumbent IT or GIS service providers.

Another session was dedicated to explaining the quantified benefits where permitting of road works under the Traffic Management Act has improved traffic flows and reduced public complaints. In fact there are so many examples of how much more efficient the use of streets and property gazetteers is, it does make an observer wonder why every organisation is not up to best practice standards in 2013 – most of the data and infrastructure has been around for at least a decade!

Although the naming of streets can be an intellectual exercise or great fun (or both), it is the collection, management and dissemination of address information to all those who can potentially use it that is most important. Your ambulance driver really doesn't care whether your street is named after a steam locomotive or a local Anglo-Saxon hero – as long as it is unambiguous and the system tells him exactly where it is and how to get there.

Above: Richard Mason, managing director of GeoPlace LLP – 'The work of address and street data professionals is to enable all these to be done more efficiently'.

A screenshot example of the cats' tracked outdoor exploits!

Do you know where your cat is?

Have you ever wondered where your cat is or where it goes during the daytime, at night and when you are not at home? Having owned cats since his teens, **David Green** has thought about this on many occasions! But since owning two Siamese cats, his curiosity has been aroused even further. You might now be asking yourself, why?

CASUAL DAY-TO-DAY observations over many years have suggested to me that there might be a pattern to my cats' daily travel routine. The older cat is a 12 year old male Cream Point Siamese; the younger a 10 year old male Chocolate Tabby Point Siamese. Both cats seem to go out at regular but sometimes different times of the day and night. Although this pattern certainly changes slightly from day-to-day, even when the clocks change and when they are taken away on holiday to different places, there are definitely set daily routines that they follow. This regularity is sometimes complicated by other factors such as the weather, the presence or absence of my neighbour, the activities of the owner and whether other cats and animals are about in the neighbourhood.

Curious questions If it is raining, windy or snowing, both cats are reluctant to venture outside. If the owner is away, the cats either move next door or stay inside more, and often remain closer to their home. The older cat whilst often frequenting the neighbour's house and garden also seems to have a route that goes up the road, around the corner and back again. This route is only explored at certain times of the day, almost as an inspection of his complete territory. The younger one follows the same route occasionally but not completely. Part of the attraction to the garden next door is the neighbour's tendency to feed the birds and have a bird habitat enclosure. Part of the route seems to follow houses where there are also other cats and possibly food. But the younger one also seems to explore a different route along the road, sometimes along the edge of the road and sometimes across the road, through gardens and following a circuit back to home. The pathways for both cats seem to be about the same total distance.

> ***Familiarisation prior to data collection is important to ensure the items do not get removed and lost.***

There also appears to be a distance constraint. Neither cat seems to venture further than about three to four properties (approximately 100m) away in any direction.

Based on these general observations, I determined to investigate further and to provide some more objective answers to the following questions:

- Is there a pattern to their daily activities?
- Is it the same for both cats?
- Does one cat influence the other?
- Do they follow the same route and at the same time of day?
- Do their travels vary on a day-to-day basis?
- Does weather alter their routine?
- Do they have the same daily routine at different locations (homes)?
- Is there a maximum travel distance?

The geography "Home territory" is in a village near Aberdeen on a small residential housing area. The area is quiet and has a mix of small and large houses with mature gardens, a nearby woodland area, some stone dykes (walls), fences and variable topography. The cats have lived at the same location since they were a few months old. Home has two cat flaps and they have 24/7 freedom to roam. There is also a cat flap in a neighbouring house, which they use on a daily basis at all hours of the day! The cats have access to feeding bowls, a litter tray, and various places in the house to sleep e.g. chairs and beds, radiator beds.

As both cats get older they spend more time inside and in the conservatory if it is hot. Nights are usually spent in a house: their own or the neighbours. There are a handful of other cats in the area, some that visit, and territories seem to be marked quite clearly – often demonstrated by a conflict. There are some children around and some dogs, with local walkways. Access to neighbouring gardens is quite easy, despite hedges, trees and fences.

The cats wear collars when away from home and practical use of the tracking equipment required that both cats become used to a harness and the kit. Familiarisation prior to data collection is important to ensure the items do not get removed and lost.

Tracking the cats Over the years there have been many animal tracking studies using radio-controlled devices, antenna and GPS. A major limitation for

early radio-controlled studies was the size of equipment and antenna. This restricted the technique to larger animals. Cost and difficulties of attaching the kit so as not to inhibit movement and influence behaviour are also constraints. But now the size of GPS chips has allowed deployment on smaller domestic animals.

The availability of commercial tracking devices (e.g. Loc8Tor), G-Paws and "Tagg the Pet Tracker" (**www.pettracker.com**) have all demonstrated the practicality of tracking and locating smaller animals. A range of low-cost devices are marketed to pet owners for security from theft or going missing. These include GPS devices worn on a collar or harness. Some require just a SIM card, others need computer and internet connections. There are also subscription-based services enabling tracking on a typical internet mapping application and small video or still cameras can also be mounted on the collar to provide visual information about the route being followed.

Hardware and software This study used equipment from Mr Lee CatCam (**www.mr-lee-catcam.de**). The equipment is "custom-made" and is sold ready assembled or as a kit including tracking and video capture units that can be attached to a cat collar or a harness. The two cats were monitored for a week at a time over a month, and in different months during the summers of 2012 and 2013.

The standard software is @TripPC and facilitates configuration of the GPS device and uploading of the track into various map formats. The small GPS unit is simple to configure and activate, and can sample the location at set time intervals.

Some results Preliminary findings seem to confirm that there is a regularity in the cats' indoor and outdoor times; that one cat does its neighbourhood round at roughly the same time each day; and that each cat has its own territory. The older cat is the "boss cat" and is far more territorial. The younger cat does not display such regularity, although still territorial, and is probably the "undercat". Whilst he often follows the older cat around in the daytime, the evening time slots often find him inside either in his home or at the neighbour's house, whilst the older one is gallivanting around the neighbourhood!

The two cats occasionally share their outdoor exploits but generally seem to lead quite different lives. Their characters are also very different. The Cream Point Siamese has a set daily pattern of going out at certain times and following much the same route. The Chocolate Tabby is less keen on outdoor travel and, although he occasionally goes off on a territorial journey, marking all the time, he is a real hunter and is often to be found sitting underneath a neighbour's bird table!

The two "research assistants" were equipped with a tracking unit and harness.

Nook (above left), the Cream Point Siamese, is the older and more territorial "boss cat" while Norton (above), a Chocolate Tabby Point Siamese, is the "undercat".

Where to next? The study began with casual observations of two domestic Siamese cats living in their most familiar environment, home. To help understand these observations, the study used a combination of GPS-based trackers and a video camera to monitor each catduring the day and night, to map their locations and routes, as well as to video where they were and their activities during the daily routine. Additional studies will investigate if there is any difference when the cats are at a different location – in surroundings that are less familiar; a location where there is only one cat; whether Siamese exhibit different behaviour to the average "moggie"; whether the same behaviour is exhibited in different seasons; and whether similar behaviour is exhibited when the cats are in the care of the neighbour.

An addendum. . . Choosing a research assistant can be very important for a successful research project. Unfortunately, "Mr Lee" – the moggie trialling the equipment – must have been a very cooperative research assistant who enjoyed the task - my two Siamese were not! Siamese cats are noted for different behavioural characteristics as compared to the average moggie. Neither immediately accepted the harness. One cat decided that tracking does not involve moving; the other decided to practice to become a regular Houdini – neither really entering into the spirit of the exercise!

Of further interest:

- The Secret Life of the Cat: BBC 2 TV Programme: **http://www.bbc.co.uk/mediacentre/latestnews/2013/secret-life-of-the-cat.html**
- Bradshaw, J.W. S., Casey, R. A., and Brown, Sarah L., 2013. The Behaviour of the Domestic Cat. Cab Intl. 240p.

About the author

David R. Green is an academic researcher in the Department of Geography and Environment at the University of Aberdeen and Director of the M.Sc. in GIS. His current interests involve mobile field data collection.

> ***"One cat decided that tracking does not involve moving; the other decided to practice to become a regular Houdini. . ."***

Left: "GIS & Web Cartography" was the theme of an inspiring lecture given by Jack Dangermond, founder of Esri.

Web GIS set to transform Cartography

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

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

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

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

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

> ***GIS is a means of understanding and communicating. The better the cartography, the more effective GIS will be.***

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

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

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

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

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

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

WebGIS can integrate anything through dynamic linking between an object and associated multimedia, visual overlays of data using mashups and through spatial analysis modelling from distributed datasets. It will break down barriers and work towards a common operating picture and situation awareness. It will need a new kind of cartography and will be powered by services. Portals, powered by new, light-weight metadata tags, which could include user-ratings, will help users to search for and organise content. It will allow sharing between 'friends' in the cloud. It will be able to select content from various interchangeable sources. For example base mapping could come from the Ordnance Survey, satellite imagery or StreetView and, by switching between these sources, the user will be able to gain maximum benefit from each.

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

Nowhere are these skills and technologies emphasised better than in emergency response. Back in 2005 the response to hurricane Katrina was at times poor because people didn't share information. There was a lack of joined-up government. Since then the National Information Security Center has been formed in the US. The result could be seen in the much better response to Hurricane Sandy that hit New Jersey, a bigger storm than Katrina but with far less lethal human impact.

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

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

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

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

• *Images are courtesy of Martin Lubikowski, ML Design*

Above: After his talk, Jack Dangermond was presented with the BCS medal by Pete Jones, BCS President.

> ***By transforming GIS into Web GIS, almost anything can be integrated. . .***

Esri's Urban Observatory

This is my idea of a "cool app". The focus of the Urban Observatory is on the people who live in cities, the work they do there, their movement through transportation networks, the public facilities needed to run the city, and the natural systems that are impacted by the city's footprint.

The project's aim is to become a crowd-sourced, cloud-based portal and it is backed by Jack Dangermond and Richard Wurman (founder of the TED series of conferences and talks). They see the venture as not being so cities can rank themselves but so they can compare qualitative understanding through applying comparative analysis.

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

Dr Anne Kemp is a geographer who has worked in the infrastructure industry for 25 years. She is currently serving as Chair for AGI and is also Director at Atkins and Vice Chair of BIM4I, and of ICE's BIM Action Group.

AGI – coming of age, or new beginnings?

Breaking with traditions leads to frank discussions, consultations, feedback and planning as a new year looms and the Association prepares for its 25th anniversary year.

THE AGI WILL BE 25 YEARS OLD in 2014, and it has been a really good time to reflect and talk with members and across the industry about what we do, and what we can give, to the industry. We have had some very frank discussions across a wide range of organisations and sectors – and we are really grateful for all the feedback.

One insightful example of that was a meeting we had with the Suppliers Special Interest Group. We sat in a room with a range of different vendors and suppliers – some in direct competition with each other – and heard a dialogue which thrashed out why the AGI has an important role to play in promoting the industry and in raising its profile, not only with Government, but also across other industries, such as insurance, retail, and construction. And what AGI needs to do to deliver. I can genuinely say it is a privilege to have the opportunity to do something about it.

We have had one of our most successful years for events for quite a while, with the Showcases around the different regions generating what I think have been some quite different discussions and understanding about how we can add value in different sectors to what perhaps is our more traditional base. And it's good to see some of the papers from GeoCommunity now appearing in this publication.

All for the business plan We broke with tradition this year – our business planning is usually done by a small group of people and then brought back to Council. This year we wanted ALL Council to be involved, and to see the process through into a Business Plan and Implementation. Some of you may have seen our tweet on the Friday evening, to take on some needed sustenance, and prepare us for the detailed planning the following day. I can't say too much now, as we will be sending out our coordinated communications next month, but we really hope you will like the changes that are afoot. But let me hint that you will see a focused and punchy events and communications programme which will help raise our game and profile as an industry. As ever – we need you – we need your membership, your engagement – whether through attendance at events, at webinars – or as a volunteer. And we need to hear your stories – what are your experiences, and what help do you need? There could well be people in the membership or through our networks who we can help connect you with for mutual benefit.

> ***As ever – we need you – we need your membership, your engagement. . .***

Webcast for Level 2 BIM I was recently part of a New Civil Engineer and Architect's Journal live webcast to discuss "Level 2 BIM and beyond". The role of geospatial was discussed – and I was pleased to reflect that in the previous publication of NCE half an article on BIM for HS2 was actually about GIS. If you are interested, the streamed webinar will soon be on line and will be linked from the AGI website. This really underpins the message we are keenly aware of, or should be, that we have been managing information from disparate sources, and finding a common thread which can then deliver a better analysis, understanding, and decision-making process. We can share that experience and knowledge in making BIM work for infrastructure. This is also why we have a role to play in how industry and society deal with Big Data:
http://www.thesundaytimes.co.uk/sto/public/Appointments/article1334884.ece
And what I and others are seeing is that this is playing out in the discussions around Future and Smart Cities – or should we call it Smart Society. . . where does Environment get a say?! I think we have some exciting times ahead, if we can mobilise in the right way.

Awards Dinner looms Right now, we are looking forward to the AGI Dinner on 5th December at RGS, Kensington Gore – do book tickets for the event, as you will be able to hear all the best papers from the Showcase Events – as well as discover who has won the Awards this year. And there will be a few of us who are reviewing the entries and making our decisions on those winners. There are some really interesting entries, so I for one will be interested to see the outcome.

Please note there is an EGM, just before the AGI Dinner, as communicated on the AGI website, to present changes to the Articles which will help us deliver on our future plans.

And – given that I am writing this on 20th November – happy GIS Day!

AGI exists to "maximise the use of geographic information (GI) for the benefit of the citizen, good governance and commerce". Membership details are available from info@agi.org.uk or by calling: +44 (0)207 591 3190.

The recent Esri Developer Summit Europe saw plenty of enthusiasm from presenters and delegates alike.

Map Geeks on Thames

The Albert Embankment has MI6 at one end and Lambeth Palace at the other. And right between the two is the hotel where Esri held their Developer Summit Europe, which **Robin Waters** attended and which might provide more tools for James Bond than for even the most tech savvy Archbishop of Canterbury!

THE ESRI DEVELOPER SUMMIT EUROPE (DSE) was held on the banks of the Thames in London this year – in the Park Plaza Riverbank hotel on the Albert Embankment. On the first day, the weather was dismal outside and it was pretty dark down in the basement conference centre as well. Fortunately, the presenters and the audience were brilliant – lots of good humour, lots of enthusiasm and definitely a warm atmosphere.

Elsewhere in this issue we report on Jack Dangermond's talk to the British Cartographic Society and his receipt of the Society's Medal (page 26). Not by coincidence there were many common elements to his presentation and this summit. No doubt, as founder and president of Esri, Jack is privy to – and probably conceived – many of the developments being discussed at DSE. He would certainly approve of the 400 people from 28 countries learning about how best to take forward his life's work – the application of computer technology to geospatial information – through the platforms and tools being provided by Esri and its partners.

Geo-enrichment Arriving late, I was thrown straight into a case study about "geo-enrichment" of health service statistics. Specifically this was about the distribution of diabetes in the London Borough of Ealing. The number of diabetes cases per surgery was known and the locations of the surgeries were derived from their postcodes. Geo-enriching the spread sheet with the geographic distribution of alcohol and tobacco sales statistics showed no obvious correlations but adding census information on ethnicity showed a very striking correlation. It is well known that use of tobacco and alcohol are strongly correlated with diabetes but south Asian ethnicity is even more strongly correlated and the community in Southall is much less prone to smoking or drinking than the UK average. This live demonstration used an MS Excel spreadsheet and ArcGIS Online and did not need any special cartographic expertise.

The latest developments with ArcGIS Online are being made available in December. These include much more administrative support, a new "Viewer" role; 30m resolution Landsat 8 imagery and support of map tile re-sampling, as well as the geo-enrichment mentioned above. There was a call for all JavaScript developers to become cartographers – or was it a statement that they already were and must just get better? Appropriately after the Armistice Day silence there was another case study on Walking with the Wounded, showing how the charity's South Pole Allied Challenge was using Esri apps to tell their team members' stories, to track them across the ice and to show us how far we would have to walk to keep up with them!

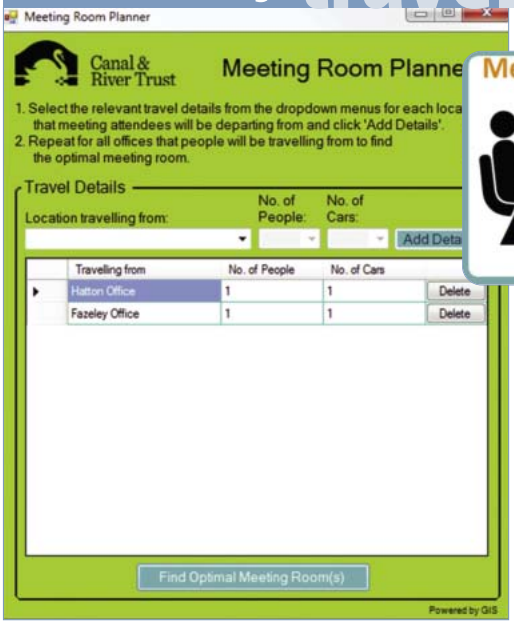
Many of the third party developers cheered several of the announcements about the ArcGIS Marketplace. The ArcGIS Online Specialty is for Esri Partners that provide apps using that platform – either for end users that have an ArcGIS Online subscription for themselves, or for new users that will access Esri services only through the application provider's own interface. Esri are now making it very easy for developers to become partners with very low up-front costs and with the flexibility of using "service credits" only when needed.

> ***"Many of the third party developers cheered several of the announcements about the ArcGIS Marketplace."***

Speedgeeking The afternoons keynote speaker was Amber Case, currently Director of Esri's R&D centre in Portland, Oregon. She co-founded Geoloqi, leaders in location-based smartphone applications, which was bought by Esri in 2012. Her team have developed the ArcGIS Geotrigger service and she is now focussed on 'ambient' apps that require less user interaction by exploiting the intelligent use of location.

To round off the day I went "speedgeeking"! Five minute sessions at several tables left me in a bit of a daze. Suffice it to say that the depths of Python are not my scene but the app for handling multiple devices is obviously very useful. Likewise accommodation along the West Highland Way – an app built from scratch every five minutes in five minutes – most impressive.

My overall impression – this event had the enthusiasm of FOSS4G overlaid on the professionalism and security of a large corporation. It remains to be seen if the ArcGIS Marketplace will be as successful as the Apple Store but I am certain that it will produce some very useful location-based services providing that the cartography is right!



Left: Figure 1 – The Meeting Room Planner presents users with simple instructions and only the relevant travel details.
Inset: The application's customised icon is displayed on the Trust's internal intranet

A subtle spatial solution

Some uses of GI in business can be hidden and still very useful even when the overt use of GIS is fundamental to the business itself. **Michelle Oldfield** of the Canal and Rivers Trust shows how an intrinsically spatial application can be designed, developed, implemented and "sold" to business users without a map in sight!

AT A TIME WHEN WE are confronted with powerful and frequent media coverage on the effects of climate change and global warming, we are constantly encouraged to do our part. GIS is already visibly embedded in the environmental sector as a powerful analytical and mapping tool, and its use actively encourages pro-environmental behaviour – but are businesses missing a trick?

The Canal & River Trust (the Trust) is the guardian of 2,000 miles of historic waterways across England and Wales. We are among the largest charities in the UK, maintaining the nation's third largest collection of listed structures, as well as museums, archives, navigations and hundreds of important wildlife sites. GIS has been utilised within the business since 2001 and is an invaluable tool within the organisation. Evolving ideas and increased implementation of GIS at the Trust has enabled enhanced organisational engagement, informed decision-making and extended efficiencies.

What's the problem? There is, however, always more to be done. As a geographically diverse organisation, we are aware of the high cost of mileage for face-to-face meetings amongst employees as well as the negative impact this has on the environment.

As part of its Green Plan established in 2010, the Trust has produced a Carbon Management Plan, working with the Carbon Trust, with the ambitious target of reducing carbon emissions by 25% by 2015 (from a 2009/10 baseline.) To aid with this, in 2011 the Trust established a £1 million "Green Fund" for projects that will reduce carbon emissions. The Fund typically applies to large-scale infrastructure projects, such as solar panels, energy efficiency improvements to operational buildings, more efficient pumping systems, etc.

The GIS team wanted to contribute to this target and, based on the premise that 10% of energy savings (worth £500,000 to the Trust) can be made through behavioural changes, built a simple, spatially-centred application to help the Trust encourage positive environmental behaviour – The Meeting Room Planner.

Optimal location A proposal was submitted to the Green Fund initiative to create an innovative application that analyses the carbon cost of meetings between employees and suggests the "optimal" office for them to meet. It was awarded funding as it met the criteria of enabling reduction of carbon emissions, whilst saving energy and money and thus contributing to core business goals.

Developed on a C# platform and employing an open source API from Google, The Meeting Room Planner works out the best place to hold a meeting with colleagues from different locations across the country, even if it is not one of the attendees' home offices. It calculates cost, carbon emission and travelling time, so the cheapest, greenest and most efficient place to meet can be determined.

It was envisaged that the application would serve the organisation by supplying a user-friendly tool to enable colleagues to make more efficient and environmentally sensitive decisions. They could reduce carbon emissions at the same time as saving money on petrol expenses and time spent on travelling.

> ***. . . it met the criteria of enabling reduction of carbon emissions, whilst saving energy and money. . .***

Increase speed, increase usage In today's busy working environment, it was essential to make the response time between submitting the request and getting the results back as short as possible. As the application revolves around office-to-office routes we pre-cooked the data (meaning routes were calculated in advance, since we know there are a limited number of offices in known locations), which makes the application run quickly and efficiently, consequently encouraging people to use it.

We took advantage of the Google Distance Matrix API as there were over 600 distances to be calculated and we needed to find an efficient way of calculating them using a familiar route planner. We were able to capitalise on the availability of Microsoft Visual Web Developer 2010 Express as a freely downloadable product through which to deploy the API. The output of the calculations was in "json" (JavaScript Object

Notation, a data interchange format) so utilising skills within our team, we wrote a simple Python script to extract only the relevant information for this project; the extraction ultimately taking a matter of seconds.

Location, Location, Location Using the funding assigned through the Green Fund, we purchased a copy of Visual Studio 2010, built the application using C# and deployed it as an executable (.exe) file. As per our marketing strategy, it is launched through a variety of links on our intranet service. Upon deployment, the application imports the pre-cooked data into an array that is held in the user's computer memory, until the user closes the application.

A member of our development team was able to develop, edit and install simple mechanisms to amend the application if required, in approximately five working days.

Additionally, comprehensive details of each meeting room and the particular facilities available are held within the application, offering a one-stop shop for all required information.

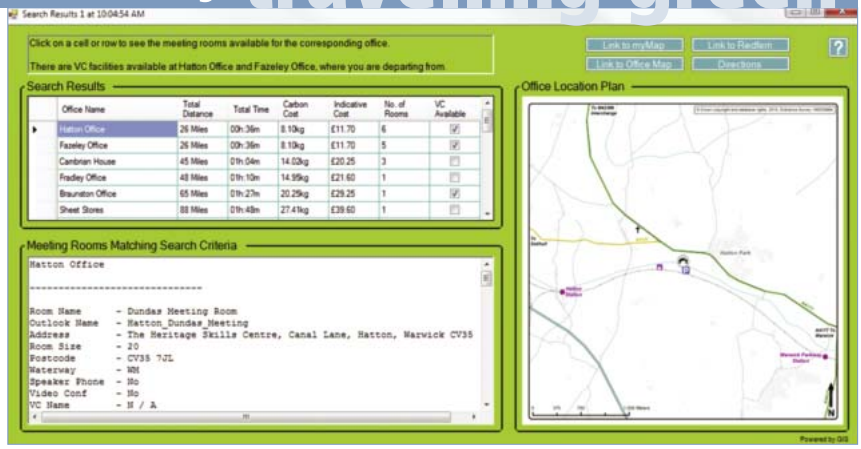
Keep it simple In addition to being functional and intuitive, it was critical that the application was presented professionally to the business. The visualisation of the application, especially the first page, needed to entice people to use it and reflect corporate guidelines.

Key requirements were to keep the application simple and easy to use. We opted for minimum text throughout the application and tested the application on colleagues to ensure that it worked intuitively. A pop-up summary box contained information on the purpose, cost calculation methodologies and how to feedback or report problems.

The user is presented with simple instructions, the familiar Trust logo and colours and only the option of completing the relevant travel details (see figure 1). The overall results are then presented in an easy to read grid format (see figure 2). The potential meeting places are listed in optimal order (so the "best" office to meet is at the top) and are accompanied with some essential information. Listed are the total distance, time, carbon cost and the indicative financial cost, to help raise the profile of the "cost" of business travel, the number of rooms available and whether or not any video conferencing facilities are available at the particular office, which makes for a more holistic costing.

Once an office has been selected, information relating to that office is displayed. Only the rooms that fit the initial search criteria (e.g. number of people / size of room) are shown to the user. It was inferred that successful presentation of this information would encourage greater use of the available technology such as video and telephone conferencing.

At the top of the results page, there is a small box that advises if there are any video conferencing facilities available at the attendees own offices. This additional message should encourage people not to travel if there are such facilities available.



Above: Figure 2 – Overall results from the application are presented in an easy to read grid format.

The application provides specific items, such as MS Outlook calendar names and room names/numbers, on one page to help streamline the process of booking a room. The eleven administrators who maintain this information have a simple process to ensure that it's kept up-to-date and this gives them a sense of ownership and responsibility. This, in turn, has led to greater confidence and encourages people to use the application.

The intrinsically spatial nature of the application was deliberately hidden from the user and they are presented with a simple user interface that we hoped would be more comfortable for them to use. Maps were produced for each of the 25 office locations to help people to understand the actual location and to locate public transport options. Bespoke background mapping products were applied depending upon whether the office was in an urban or rural area.

The GIS team has been developing an Esri ArcGIS for Server solution ("myMap") for their internal web mapping service and it was a good opportunity to provide links to this from the meeting room planner and integrate the results into a more traditional map-based interface. Supplementary to this, we also incorporated a button that links directly to the website that must be used by employees to book train travel.

Ready, set, launch The application went live in March 2013 and, in order to ensure a successful launch, we devised a marketing strategy that was designed to emphasise that this was a tool for the business, developed by the GIS team, but not necessarily a GIS tool. We used a number of channels and colleagues from different departments to communicate and coordinate the launch effectively.

The application is now permanently displayed on the home page of the Trust's internal intranet with its customised icon and summarised explanation; the planner opens quickly with the click of a button. We wrote a short piece for our internal publication *The Source*, which was released two weeks after the launch of the application. In addition, we used the organisation's monthly "Core Brief", aimed at informing employees of important news and activities at the Trust, which is distributed to everyone from the CEO downwards.

As this was developed by the GIS team, we also

> ***"The intrinsically spatial nature of the application was deliberately hidden from the user. . ."***

About the author
Michelle Oldfield has been working for the Canal & River Trust (formally British Waterways) for 3.5 years, after two years as an aerial surveyor at Geomatics Group. Michelle has recently begun transitioning into the world of development, on a very steep learning curve!
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placed a link on our own portal pages as another link to the application. Finally, as the original objective of the application was to support the business in meeting its carbon emissions targets, the application was also placed on the Green Plan Pages of our intranet.

Success: let's talk numbers By taking advantage of the skills within the team, we were able to keep our costs to a minimum. The Green Fund provided us with enough money to purchase the software required by our developer and we were able to create the maps required using the existing Esri ArcGIS software in use at the Trust. The Google Distance Matrix API was not only freely available but also enabled us to acquire the data necessary for the application in a timely and efficient manner.

From the beginning, it was made clear that quantifying the success of the application would be challenging. Nevertheless, efforts were made to measure the benefits to the business. We can measure usage with a log file that counts each use of the application, which enables us to monitor trends. There have been 425 unique users accessing the application since its release – this is over 50% of office-based staff, which is a significant achievement considering that not all office-based staff are required to travel anyway! On average, it is now used over 50 times per month.

These numbers infer that people have already started to change their behaviour and attitudes towards planning and travelling to a meeting, derived from the regular use of the application. The key measure of success will be through a comparison of business mileage a year after the introduction of the application. The log file also stores the office locations that were used in a search. This enables us to find the offices that would most benefit from the installation of remote conferencing equipment.

To summarise. . . The Meeting Room Planner is an example of an organisation adopting an application dependent on spatial information to stimulate a change in attitudes and behaviour to meet environmental and financial targets. It was designed to help the business mobilise positive environmental behaviour and encourage the use of GIS as a tool that can increase efficiency and help inform decisions.

The impact of empowering the business to make better informed decisions, and any potential changes in behaviour, will take time to quantify. However, the recognition that geographical information has been fundamental to this application has been immediate.

• *All images are courtesy of Canal & River Trust*

*There is more news of products and services on our website at **www.pvpubs.com***
To get your company featured on this page call Sharon Robson on +44 (0)1438 352617

Trimble updates GeoExplorer

Trimble has introduced the next generation of its GeoExplorer range – the Geo 7X which includes an integrated laser rangefinder, extended GNSS capabilities and improved hardware performance. This handheld data collector can enhance productivity in difficult physical conditions and challenging GNSS environments. If a location is inaccessible or cannot receive satellite signals users can now use the new Flightwave technology to capture easily offset measurements. Users can simply point and shoot to log the position, avoiding dangerous conditions or right-of-way challenges.

The Geo 7X is compatible with existing and planned GNSS satellite systems, including GPS, GLONASS, Galileo, QZSS and the Chinese BeiDou. With 1 GHz processor and 4Gb of memory running MS Windows 6.5, the unit offers enhanced computing performance and includes a 4.2 inch sunlight readable LED touch display and a 5 Mpx camera for geo-tagging.

Community payback app

An app from The Staffordshire and West Midlands (SWM) Probation Trust will help the public choose payback work for criminals. 'Get Community Payback' was one of four winners in Ordnance Survey's 2012 GeoVation Challenge, themed as "transforming Britain's neighbourhoods". The Trust was awarded £41,000 to develop the business plan.

The free app works on Android phones, enabling users to take a photo of a "grotspot" in their local area. The image is automatically geo-tagged and sent directly to the local Probation Trust. If the work is suitable for offenders, it will be scheduled. When the work has finished, the app will automatically notify the person who suggested the work and show them a map with pictures and information about Community Payback projects in the local area.

Discovery for Envitia

Envitia has launched Discovery 2.7 for modelling and simulation, enabling organisations to share and reuse geospatial and modelling data. Users can find, transform and stream geospatial data into applications using open standards via a web portal. Discovery reduces the time spent hunting for data and makes more time for data visualisation and exploitation and bridges the gap between live and synthetic environments by providing end-to-end workflow management for over 100 data types. These include all standard geospatial formats such as GeoTIFF, Shape, and VMap, as well as 2D and 3D simulation data assets such as OpenFlight, CDB, Collada VBS2, and 3DS data. The management tools include highly configurable business logic that takes the pain out of repetitive data management tasks while the web portal provides search tools for data managers and modellers to find, evaluate, download and reuse relevant data assets.

Trial pops up Index Map

Landmark Information Group has carried out a four-week trial with Land Registry data from its Promap Labs portal. The application shows the LR Index Map overlaid on OS MasterMap and pops up the address, title number and (commercial) owner of any parcel. Individual owners or tenants cannot be identified although this information is available on application to the LR with the title number. The trial covered all properties within the NN (Northampton) postcode region and provided significantly more information in a more user-friendly environment than the free INSPIRE Index Map now available on **data.gov.uk**.

Carole Ankers from Landmark said before the trial: "We are anticipating a huge amount of interest in Land Registry data, as our customers often ask for it. We will provide feedback to Land Registry for evaluation with the aim of determining the usability, functionality and best content for its future roll-out plans."

BRIEFS

Altus Positioning Systems' GIS-1 is a versatile Personal Digital Assistant (PDA) for data collection and geolocation. The unit integrates modern wireless technologies on a Win Mobile platform for mobile survey applications. It can be used as a data collection device with Altus' APS-series GNSS receivers. It supports WiFi, Bluetooth and a Tri-Band GSM/GPRS/EDGE/HSPA cellular modem enabling it as a smartphone.

Organisations sourcing their digital map, business and geo-demographic data from MapMechanics can now visualise it using the Tableau range of business intelligence analytics software. Available datasets in Tableau include ForGIS and Geoplan data – both provide postcode boundary information at various degrees of detail.

Whether you are redecorating at home or in the office, why not include a map? A World Map, a Continental or Country Map, any area of the UK in varying detail, or historic 1920s 1 inch mapping of Scotland / 1940s for England are all available. Any wall up to 3 metres wide for £195, or any wall up to 6 metres wide for £345 (+ P&P - maps are free of VAT). More from XYZ Maps, **www.xyzmaps.com**

Astonishingly bright

Juniper Systems has launched Archer 2, the latest generation rugged handheld with an "astonishingly bright" display, extra-long battery life, and enhanced GPS. It incorporates a 4.3 inch Illumiview high-visibility display and runs for up to 20 hours on one charge. It also has a glove-friendly numeric keypad and a top IP68 rating for dust and water.

calendar

| seminars | conferences | exhibitions | courses | events | workshops | symposiums |

We welcome advance details of conferences, seminars, exhibitions and other events which are likely to be of interest to the GIS community. Please mention the name of the event, venue, date and point of contact for further information and send to Hayley Tear, *GISPro*, 2B North Road, Stevenage, Herts SG1 4AT or e-mail: *hayley@pvpubs.demon.co.uk*.

JANUARY 2014

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

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

FEBRUARY 2014

International LiDAR Mapping Forum 2014
17-19 February 2014, Denver, Colorado, USA.
More information: www.lidarmap.org/international

MARCH 2014

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

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

APRIL 2014

GISRUK 2014 conference
16-18 April 2014, School of Geographical and Earth Sciences, University of Glasgow
More information: www.glasgow.ac.uk/gisruk

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

MAY 2014

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

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