


Location Technology Insights

Women in GIS Leadership: Developing a Grassroots Approach

A stylized illustration of green grass blades of varying heights and shades of green, set against a solid blue background. The grass is located at the bottom of the page, partially overlapping the dark blue footer.

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Publisher: Durk Haarsma

Editor: Niall Conway
niall.conway@gis-professional.com

Content manager & Sub-editor: Jason Poole
jason.poole@geomares.co.uk

Advertising: Sharon Robson
sharon.robson@geomares.co.uk

EDITORIAL ADVISORY BOARD

James Kavanagh
Dr Mukl Haklay
Adena Schutzberg
Dr Suchith Anand
Chris Holcroft

CONTRIBUTING EDITORS

Steven Eglinton
Sabine de Milliano

CONTACT DETAILS

Geomares Publishing UK Ltd
Unit 2A Mindenhall Court, High Street
Stevenage, Hertfordshire, SG1 3BG, UK
Tel: +44 (0)1438 352617
e-mail: editor@geomares.co.uk
web: www.gis-professional.com

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COVER STORY

Image represents a grassroots approach for getting women in a GIS leadership role. Image credits to Niall Conway.



P. 14 CAREER EXPECTATIONS FOR THE GIS PROFESSIONAL: CONSULTING

In part two of the series, Tim Hayes discusses the world of consulting in the GIS industry and whether this will be the right career path for you.



P. 18 WOMEN IN GIS LEADERSHIP

Josie Hawkey and Nathan Heazlewood share their thoughts and experiences on female leadership within the GIS industry. Can more be done to push women to the forefront?



P. 20 'WOMEN IN GEOSPATIAL BREAKFAST'

To mark International Women's Day, Holly Smith reports on the recent 'Women in Geospatial Breakfast' event where some valuable wisdom was shared by industry leaders.



P. 22 THE POWER OF POSTGRESQL AND POSTGIS

An interview with Paul Ramsey of CARTO about how both PostgreSQL and PostGIS can provide a solid foundation for any organisational GIS architecture.



P. 24 INTEGRATING CLOUD DATA SERVICES WITHIN THE SCOTTISH PUBLIC SECTOR

Faith Clark explains how central and local governments in Scotland are benefiting from a new generation of cloud data services.



P. 26 A GEOGRAPHER IN A CAD WORLD

David Crowther shares his experiences of working for Cadline as a GIS Application Engineer, and in particular what it is like to work as a Geographer within the 'CAD world'.



P. 05 Editorial

P. 06 News

P. 13 The View from Here

P. 17 Elevator Pitch

P. 21 Geovate 2018

P. 29 AGI's Chair Report

P. 30 Calendar

P. 31 Classified

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Gender Balance in the GIS World

Welcome to the second edition of GIS Professional for 2018! The first quarter has seen lots of developments in the field of locational data and technology across a wide range of industries, which we hope to cover in this edition.

Considering that the world recently celebrated International Women's Day, this edition is as good as any to include some perspectives on the topic of gender in the geospatial workplace. Personally, I like to think that the field of GIS attracts a more balanced professional community because it is a creative, multi-disciplinary, and out-of-the-box thinking discipline - one which is both technical and non-technical. While this might require some stretch of thinking, I also like to think that gender balance is more natural to the geospatial world since geographers and mapmakers alike are very much in-tune with and aware of the interdependent components which make up our ever-changing world - both human and natural.

Although, impressively enough, our industry is known to have a better gender balance than its IT counterpart, much more needs to be done. Therefore, this edition includes an article by Josie Hawkey (with assistance from regular contributor Nathan Heazlewood) who discusses some of the key considerations concerning the need to develop female leadership at the grassroots level. According to Josie, mentorship, flexible working arrangements, and policy change are essential if the industry is to retain female talent and potential industry leaders. On the same topic, this edition also includes a contribution from Holly Smith of the AGI Early Careers Network who shares some the wisdom which she gained while attending the recent Women in Geospatial Breakfast event which was co-organised by the OGC, the AGI and Geovation.

Aside from these articles, we have lots of other interesting pieces in this edition of GIS Professional.

This includes the second installment of a three-part series by Tim Hayes, who focuses on GIS career opportunities within the world of consultancy (including the all-important 'billable hour' concept). Other articles topics include the potential of Cloud Data Services integration within the Scottish public sector, what it means to be a 'Geographer in the CAD World' (including valuable suggestions for overcoming the inherent misunderstanding between geospatial and design), as well as an interview with Paul Ramsey of CARTO on the potential of open-source in the enterprise environment.

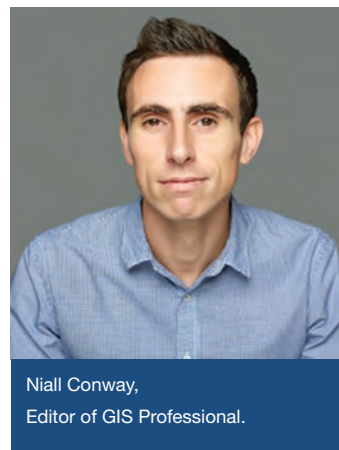
As usual, this edition also covers some of the main industry news and updates, including the long-awaited release of QGIS 3.0, the recent partnership between Microsoft and Ordnance Survey, the announcement of an Irish National Space Strategy, as well as recent updates to the EuroGeographics EuroGlobalMap. Other news includes celebrations of Landsat-8's five year anniversary in orbit, the outcome of the recent Uber/Waymo court battle, as well as the discovery of an ancient Mayan city using LiDAR technology.

Finally, also have regular contributions from Adena Schutzberg, Katie Decker, and Abigail Page, who, in light of the recent Facebook/Cambridge Analytica scandal, discusses the 'awakening' of understanding within the geospatial industry of the important topic of data ethics.

I hope that you enjoy this edition of GIS Pro!

Regards,

Niall Conway, Editor



Niall Conway,
Editor of GIS Professional.

News in Brief

Moovit, who have raised another US\$50m led by Intel for its urban transit app, used by 120 million people globally across 2,000 cities in 80 countries, plans Mobileye collaboration. (*techcrunch.com*)

Citymapper has launched a hybrid bus-taxi 'Smart Ride' service in London - "somewhere between a bus and a taxi". The company struggles with Transport for London regulations which "limit its buses to "dumb", unchanging routes and restrict its on-demand services to a van." (*wired.co.uk*)

Google's linkage of the unity engine with Google Maps is a game changer as it will allow developers to build Pokémon Go style games set in the real-world. (*forbes.com*)

QGIS 3.0 Finally Released!

The long awaited QGIS 3.0 has finally been released. According to a recent tweet by a QGIS committee chair, the opensource software "is flying off the shelves - 2.5 terabytes of download traffic over the last 24 hours". Based on initial reviews of the much revamped software, the many developers, documenters, testers, and funders have created something special. Among the many new and improved features include a fully integrated 3D environment, support for the OGC Geopackage file format, a universal Search bar, a much improved processing toolbox, and a Unified Data Source Manager. The new version also contains improvements to its style rendering capabilities (such as point clustering), labelling functionality, attribute expression search and data preview capabilities - all for a better user experience.

DAQRI Worksense Suite Includes 3D Capture

DAQRI has released a productivity suite for augmented reality called Worksense. The suite includes five apps, which reconfigure DAQRI's hardware and software capabilities to enable different applications.

DAQRI Show combines video, voice, and 3D collaboration so you can "show" your view to colleagues for remote assistance. DAQRI Tag attaches information about your assets in the real world—including live data from IoT systems. DAQRI Model processes BIM 360 Models and displays them as full-scale interactive walkthroughs. DAQRI Guide offers a way to give field employees step by step directions. DAQRI Scan is designed to let anyone critically assess a facility or piece of equipment by capturing 3D models. These models are sharable, and can be used for virtually any application you currently use 3D models for.

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Microsoft and Esri Launch Geospatial AI on Azure

Microsoft and Esri will be offering the GeoAI Data Science Virtual Machine (DSVM) as part of their Data Science Virtual Machine/Deep Learning Virtual Machine family of products on Azure. This is a result of a collaboration between the two companies and will bring AI, cloud technology and infrastructure, geospatial analytics and visualisation together to help create more powerful and intelligent applications.

The DSVM is a popular experimentation and modelling environment on Azure that provides a host of AI, machine learning and data science tools.

The Geo AI Data Science VM extends the AI and data science toolkits in the Windows Server 2016 edition of the Data Science VM by adding ArcGIS Pro and interfaces in both Python and R to help data scientists leverage the spatial data, rich GIS processing, visualisation and analytics in ArcGIS Pro to create better AI applications.

For the geospatial analytics professionals, this product now brings in powerful AI and predictive analytics capabilities including deep learning and machine learning algorithms.

Esri Acquires ClearTerra Location Data Extraction Technology

Esri has announced it has acquired technology from ClearTerra, a creator of geospatial and activity-based intelligence tools. This acquisition will provide the ArcGIS platform users the ability to easily discover and extract geographic coordinates from unstructured textual data like emails, briefings and reports, instantly generating intelligent map-based information.

This capability will make mapping this information easier across many industries including defence, intelligence, and public safety organisations. The acquisition also brings workflow-enhancing software technologies into the ArcGIS platform.

ClearTerra LocateXT technology allows analysts to rapidly scan through documents without having to spend hours reading, copying, pasting and running spreadsheet formulas, placing the results instantly into geospatial features. ClearTerra FindFZ technology also provides enhanced search capabilities for ArcGIS incorporating the powerful techniques found in internet search engines.

Mapbox Launches Global AR Location Platform

Mapbox has launched Mapbox AR, a comprehensive toolkit combining AR rendering software with global location data built on the location platform used by over 1 million registered developers, including AR vanguards like FitnessAR and Keep.

Used for a variety of different needs, Mapbox AR enables a new level of AR applications and gameplay. Reality-grade location data includes a global navigable map that is constantly evolving with usage, and custom 3D building footprints optimised for dynamic interaction, international land use and terrain coverage — all made available at scale through SDKs and APIs, including the Unity Maps SDK.

Mapbox AR's reality-grade location platform features include Live location data; 3D digital elevation model; Multi-user, multiplayer support; Satellite imagery compression for low bandwidth environments; Rooftop UV mapping; High resolution land cover, and land use data classification; and 32-bit vertex mesh support.

Uber and Waymo Abruptly Settle for US\$245 Million

After five days in court, the 12 month Uber/Waymo case ended in February. The dispute, over how Waymo's trade secrets appeared in Uber Lidar designs, ended with a settlement between the two companies - 0.34% of Uber equity (valued at approximately US\$245 Million) being awarded to Waymo. The settlement also included a commitment by Uber not to use Waymo hardware or software intellectual property in their own self-driving car technology.

According to allegations, one of Waymo's former engineers had, in early 2016, stolen trade secrets from the Alphabet-owned company before leaving to form his own start-up. The start-up was soon after acquired by Uber (under the former Uber CEO Travis Kalanick) and its technology was subsequently used to help advance its self-driving car program. The current Uber CEO denies any wrongdoing by the company.

Although this is a sizeable punishment, it seems that it could

have been a much harsher one for the company which launched its own autonomous vehicle program in 2015. If nothing else, the dispute serves as a reminder of the fierce competition which exists in the emerging autonomous driving market.

Original article source: www.wired.com/story/uber-waymo-lawsuit-settlement/





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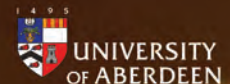


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Full details regarding entry requirements, available funding, application process:

www.abdn.ac.uk/gis | cpsgrad@abdn.ac.uk



Esri Releases Survey123 for ArcGIS with Spike Integration

Esri, the global leader in spatial analytics, has announced the software release of Survey123 for ArcGIS mobile application with Spike, a laser measurement solution by ikeGPS. This paired technology accelerates field data capture and asset inspection activities. Spike allows users to measure hard-to-reach objects from a distance simply by taking a photo with their smartphone or tablet. Users can then capture real-time measurements from that image, including areas, elevations, distances between two points, and GPS/GNSS location.

Using Spike with Survey123 relieves fieldworkers of the burden of carrying paper maps to find the object of interest and lugging multiple pieces of specialised, expensive measuring equipment. Instead, with just a single mobile device, fieldworkers can locate the correct asset, record measurement data, and report accurate data directly back to the office.

The ability to capture accurate measurements in the field is particularly useful when working in areas that don't lend themselves to hands-on or close-up measurement. Spike's laser can be used in ranges from 6 to 650 feet, with the option to select units of measurement in inches, feet, metres, or centimetres. With it, a single fieldworker is able to more quickly and safely accomplish what may otherwise have taken multiple field staff and costly equipment.

EuroGeographics Updates EuroGlobalMap

EuroGeographics, the body which represents members of the Association for the European National Mapping, Cadastral and Land Registry Authorities, has released a new version of EuroGlobalMap, its open data map created from official national sources and covering 45 countries and territories.

The update includes changes to the transport, administrative and settlement themes in order to make the map more consistent, comparable and easily shared across the national sources, as well as making it more compliant with the INSPIRE metadata regulations. Since its launch in 2013, more than 6,500 users have downloaded EuroGlobalMap free of charge for purposes such as application development, data visualisation, demographic and socio-economic analysis, hydrology, energy and environment modelling, education and research.

Landsat 8 Celebrates Five Years in Orbit

On 11 February, the Landsat 8 Earth-observing satellite marked five years in operation. To date, the satellite has achieved some 26,500 planetary orbits and has captured over 1 million "scenes" and images of the planet. Impressively, Landsat 8 observations now represent a significant proportion of data collected under the 45 year old Landsat program.

Landsat 8, which makes global measurements of Earth's land surface, represents a major advance for NASA among the growing number of government and commercial Earth Observation programs worldwide. The global coverage and faster data acquisition rates of this, and similar, satellites present a range of new and exciting opportunities and application for scientists, businesses, and resource managers who use this data.

Landsat 8, the predecessor to Landsat 9 (which is due for launch in 2020) is the latest in a series of satellites which provide the most consistent reference point for imagery of our planet. The satellite boasts sophisticated technology such as an Operational Land Imager (OLI), which collects data in two spectral bands that can detect coastal, aerosol, and cloud features, as well as a Thermal Infrared Sensor (TIRS) for land surface temperature measurement. Although the satellite was built with an estimated five-year design life, it is expected to last much longer thanks to the durability of onboard instruments and a minimal number of moving parts.

Landsat 8 is considered a major advance for the scientific community since it allows for the mapping of water quality indicators in coastal and inland waters (e.g. chlorophyll, dissolved organic matter, and suspended sediment). It is also used for the purposes of mapping the movement of glaciers, ice sheets, and sea ice in real time, as well as for the monitoring of vegetation health (using indicators such as leaf index) by land management agencies.

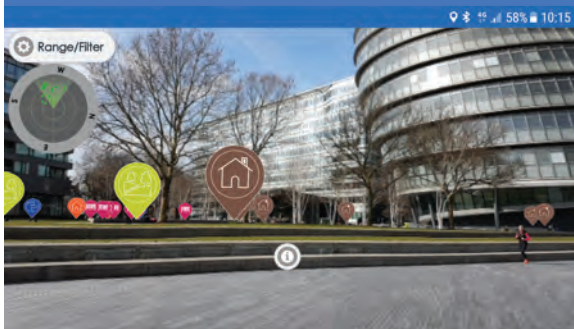
The Landsat program data archive is managed by the US Geological Survey (USGS) and is made freely available to the world by NASA. Together with the ESA Copernicus data, which is also freely available to the public, it is expected that much of the available satellite information will be harmonised with imagery from other sources in order to deliver an even more comprehensive temporal and spatiotemporal view of the world.

Original article source: www.nasa.gov/feature/goddard/2018/landsat-8-marks-five-years-in-orbit



Digital representation of Landsat 8 satellite. Copyright NASA.

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Geospatial App to Combat Sexual Harassment in Public Space

In a latest of spinouts from London's Geovation hub, a new and innovative app called Safe & The City uses GPS technology, crowdsourced information and official crime



data in order to tackle opportunistic sexual harassment and violence against women in public spaces. The award-winning app enables its users to report incidents based on how safe a route feels and alerts users in advance before they approach intersections with a patterned history of crime. As well as having obtained investment of £20k from the Ordnance Survey backed Geovation Programme Initiative, the company has established an experienced advisory board comprised of senior figures behind the likes of FindMaps, Aroxo Matt Rogers, Deliveroo, and Import.io. The iOS version of the app is available now - the Android app version is soon to follow.

Irish National Space Strategy Focuses on EO and Geospatial



In February, the Irish government announced the set-up of the country's first national Space Strategy for Enterprise. Launched by the Department of Business, Enterprise and Innovation,

the strategy seeks to maximise its return on investment in the European Space Agency (ESA) and in the European Union's (EU) flagship space programmes, Copernicus, Galileo, and Horizon 2020. The next steps for the government is to establish a steering group and consultation process to oversee the development of the Space Strategy, which aims to exploit opportunities for Irish business in the growing sector. In particular, the Strategy seeks to promote synergies with other sectors, such as ICT and Aerospace, hardware, software, Earth Observation, communications and navigation satellites.

Currently, over 60 Irish companies are benefiting from contracts with ESA, and five new companies are expected to enter the sector each year between now and 2020. Employment resulting from these contracts is expected to reach 4,500 by 2020.

Bluesky Uses Mobile Phones to Create 3D Maps

Aerial mapping company Bluesky has completed a research project backed by the UK government's innovation agency, Innovate UK, to develop the use of mobile phones for capturing accurate 3D spatial information.

The nine month investigation focussed on the use of standard smartphone technology to capture and calibrate video footage, then convert it to 3D information. Accurate measurements of essential infrastructure, such as overhead power lines and other utility facilities, could then be extracted using specially developed algorithms and workflows. Designed to provide an accurate record of the feature's location and its environment, the Bluesky project is expected to appeal to electricity Distribution Network Operators (DNO) and other organisations with a dispersed asset base, as a low-cost measurement and auditing tool.

During the project, Bluesky tested a number of hardware, software and deployment options. These included the use of aerial photography to add control points to the video footage. As the project progressed, it was established that in remote areas there were insufficient features, for example road markings, lamp posts or buildings, to establish the required control. Therefore, alternative innovative methodologies including the use of a calibration object or the measurement of a feature within the imagery was developed.

Working alongside project partner ADAS, Bluesky also undertook rigorous testing of the solution establishing and documenting the field data capture process, identifying minimum hardware requirements, such as camera pixel capacity, and additional developments to the data delivery mechanism. Following minor enhancements and additional trials, the mobile phone mapping tool, complete with data processing and hosting services, should launch in Q2 2018.



Noise Maps Created for German Federal Railway Authority

The German Federal Railway Authority, and under the direction of Disy Informationssysteme GmbH, have completed the European Union (EU) environmental noise mapping of the main German railway lines. In addition to the actual noise calculations, it includes a very complex data management system to check, clean, and homogenise huge data sets as a basis for the noise propagation calculations. The results of this noise mapping are the basis for noise action planning and are available to the public.

The Eisenbahn-Bundesamt (EBA) (German Federal Railway Authority) is required to prepare noise maps for German railway lines every five years. The EBA has now completed the third round of noise mapping for all urban areas with more than 100,000 residents and for main lines with over 30,000 trains per year. The calculation incorporates some 16,500km of main railway lines and 70 urban areas. The current mapping thereby covers an area of over 50,000km².

The checking of input data was undertaken for the most part by the project partner Pöyry Deutschland GmbH, a consulting and engineering firm. Building on the evaluated timetable data and the consolidated main railway lines, Pöyry creates a 4D geometrical object that unifies all noise-relevant parameters.

Processing the terrain model and the actual sound propagation calculations were the responsibility of the software and engineering firm SoundPLAN GmbH. From terrain elevation points on a 10x10m grid for the whole of Germany, a digital ground model was created.

Microsoft and OS Join Forces

Ordnance
Survey
recently
partnered
with
tech-giant



Microsoft in order to identify roofs from its remote sensing data. The experiment, to accelerate visual data analysis of satellite and aerial imagery, used Microsoft's machine learning technologies to achieve 87% accuracy within its first week. It is expected that the process could help reduce the home insurance costs based on the type of roof (e.g. gabled, hipped, or flat), which each have a different maintenance cost. Machine learning is already being used by UK bodies to identify bodies of water during periods of flooding, as well as by the Rural Payments Agency to calculate land management subsidies to farmers.

Sprawling Maya Network Discovered under Guatemala jungle

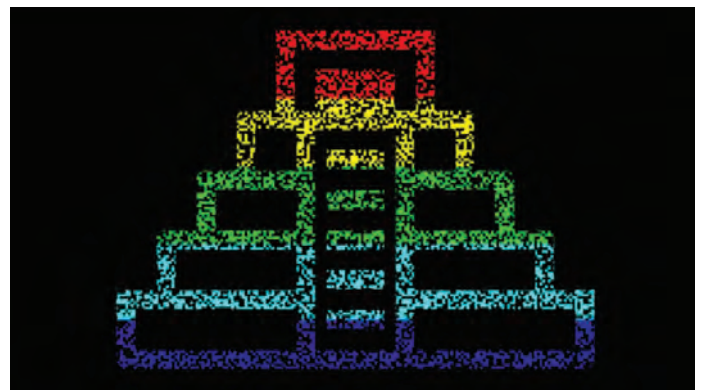
Lidar technology continues to demonstrate its powerful capability in revealing the world to us. In two separate studies, Lidar technology (standing for “light detection and ranging”) was used to identify hundreds of previously unknown ruins structures of the 3,000 year long Mayan civilization. According to a recent BBC news article, the scale and population density of the Mayan civilization has been “grossly underestimated and could, in fact, be three or four times greater than previously thought”.

The studies by researchers at Brown University and the University of Houston used airborne Lidar sensors to reveal the extensive cities and monuments of the ancient civilization (including homes, raised highways, and complex irrigation and terracing systems, and defensive fortifications) which were buried deep in the thick rainforest. Lidar technology used included the Teledyne Optech Titan - the first commercial multispectral Lidar sensor to incorporate superior laser wavelengths (for improved classification accuracy) and ground sampling capabilities which is used for vegetative and forestry applications.

In terms of the process, these Lidar lasers managed to penetrate some 2,100 km² of canopy in order to collect almost a million data points per second from the forest floor - in the process saving

archaeologists years of on-the-ground searching. These highly accurate measurements were then used within GIS to produce a detailed 3D image of the ground surface topography, giving archaeologists a “bare earth” view of the structures underneath.

Today, Lidar is helping archaeologists to discover more and more about the ancient world. Most recently, the technology was also used to reveal previously hidden cities near the iconic temple of Angkor Wat in Cambodia.



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Knowing What You Don't Know

It's been a rough week for an instructor who teaches in an online college sociology course. The instructor in question assigned a paper comparing social phenomena in two different countries. One particular student compared the use of social media in the United States and Australia. Subsequently, the instructor informed the student that Australia is not a country and gave the paper a failing grade.

The news coverage of the story suggests the instructor and student completed several e-mail exchanges before the instructor agreed that Australia is both a country and a continent. The student in question even provided authoritative data from the government of Australia which supported her side. In the end, the instructor changed the grade to B+ and the school replaced the instructor and returned the student's tuition.

I fear the instructor's education, which included a PhD in philosophy, failed him or her on a crucial point: *knowing what you don't know*. I am not concerned that the instructor didn't know this specific fact; I suspect that many educated individuals worldwide would not know that Australia is both a country and continent. What I am concerned about is that this particular instructor, apparently, was confident enough not to carry out a quick check. "Alexa! Is Australia a country?"

Here's a second story on the same theme. I had an opportunity to interview several GIS students this week. A group of us were interviewing finalists for a scholarship. Before the interview, I let my fellow interviewers know that I might ask some hard questions. I made sure they knew that "I don't know" was a valid answer from a student. One rather experienced student noted she mostly worked with ArcGIS but also had taken a course on QGIS. I

observed that ArcGIS was proprietary and that QGIS was open source. Then I asked the student to explain the main difference between the two software packages. The response was incorrect. Later in the interview, I asked the same candidate to explain how ground penetrating radar worked; she had mentioned it in a response to another question. Again, the reply was incorrect.

A second, less experienced student explained that her project work involved downloading data from a provincial data site in Canada. She noted the data was in shapefile format. I asked why it was in shapefile format and she guessed that it was because it was an easy format to use. I agreed and pushed on, "Shapefiles are an open format. Can you tell me what that means?" She replied, "I don't know." I was pleased this student knew what she did not know!

I have one final story to share. I saw a blog post a week or so after these other two experiences. The author announced a new addressing system from Google, Open Location Codes or "plus codes", and wondered, as I did, why he had not read more about it in the press. So, while I was still reading the post, I looked it up. The announcement was previously covered by the press... back in 2015 when the system was announced! It seems the blogger had just run into it for the first time and was confident that he was breaking important geospatial news. Clearly, in this case, the author didn't know what he didn't know.

I want to close with a quote which I have heard a few times as a clarinet player in a community band. Keith Brion, the former director of bands at Yale, was leading a rehearsal a few years ago. He told us, "... the difference between a professional and an amateur musician is that a professional knows which notes to leave out." Said another way, professional musicians know what they can't play at the level required and they leave those passages for others to cover. Similarly, students and professionals involved in geospatial technologies need to become comfortable with what we "don't know" and what we "think we know".



Adena Schutzberg has worked in geospatial technologies for more than 25 years. She is a member of the Esri Education Team.



Career Expectations for the GIS Professional: Consulting

This is the second in a series of three articles pertaining to what you can expect as a GIS Professional on a chosen career path. This part refers specifically to the world of consulting, one which can be defined in three ways. Firstly, if you seek job security, then do not consider a career in this field; secondly, if you wish to forever tackle high-angle professional challenges, then consulting is meant for you; thirdly, if you wish to do what GIS'ers like to refer to as "real GIS", then be wary as there are many flavours of consulting.

THE BANE OF THE BILLABLE HOUR

It is important to always remember that consultants are in the business of making money. This pursuit of profit is mainly achieved through the billable hour. In this field, every minute of every hour spent on project or task work will be billed to the client at a standard rate set by the company you work for. This is accounted for in your timesheet which is carefully scrutinised down to the last penny by the project manager.



So 'what does this mean for GIS?' you may ask. Well, unless the consulting firm is providing a specific GIS software application or services for a specific business process that will generate or save money for the client, GIS does not make money but rather takes money to operate and run. For anyone who is exploring career opportunities in the field of consulting, it is critical to understand this concept, since the

'billable hour' often tends to be the bane of the GIS Professional in the consulting world.

Billable hours are what 'grease the wheels' of the consulting world. Time is money, and unless you are lucky enough to be managed by GIS Professionals or work for a firm that is run by GIS Professionals, few project managers will understand the time and effort

Billable hours are what grease the wheels of the consulting world.

involved in building and maintaining a robust GIS. Unfortunately, it is not uncommon for GIS professionals to be on the receiving end of misinformed questions from Project Managers: "Why did you spend four hours making a map?", or "I only wanted a graphic, why did it take two hours to finish?" Naturally, this confusion about the 'map-maker's' role can lead to endless frustration for the GIS Professional.

FLAVOURS OF CONSULTING

Just like ice cream, there are many flavours of consulting. Here the GIS Professional is at an advantage as most use GIS in one form or another. For the purposes of this article, I shall focus on three

areas: Engineering/Environmental Consultants, GIS Consulting, and Location Analytics.

Within the world of engineering/environmental consultants, expect to be part of the "engineer's world". Unfortunately, few of your non-GIS colleagues will understand what you do and/or the effort it takes to do it. Most will mistake GIS for CAD, or, worse, as "pretty" graphics simply needed to fill in a report to a client. You will also be faced with co-workers who took that one GIS class and consider themselves equally, or more, qualified as you, the one who has a GISP or GIS Certificate or both. In addition, another not-uncommon situation you can expect to face is being viewed as the usurper

by the resident graphic artists, landscape architects, and CAD technicians who also make "nice pictures". Then, be prepared for the possibility of getting frowns from the IT staff that may also do database work just like you, but on a whole different level. In a project, you, the GIS Professional, will very likely be relegated to the low or lowest status. You will simply be viewed as the person who made the "cool graphics". If you can maintain your confidence level among this onslaught then you will have a reasonable chance of survival.

There are many engineering/environmental consulting firms, and

if one does not suit you, then you must realise that it is up to you to effect change (i.e. “move on”), as the organisation you work for will not change. My advice is to look for an engineering/environmental consulting firm that actually markets a GIS product or process. It is these types of firms, thanks to their supportive atmosphere for all things geospatial, that will allow for a greater amount of professional growth. In terms of identifying these firms, it is important to conduct research on them based on the job description which outlines the function of GIS within the organisation.

GIS consulting is a product and/or process-centric world which is run by GIS Professionals. It is important to appreciate that not all GIS Professionals are prepared or suited to this competitive field. Unfortunately, very few, if any, academic GIS programs prepare the GIS Professional with the necessary skills to succeed in this flavour of consulting. Skills in diverse fields such as marketing, sales, project management, coding, public speaking, enterprise database management/manipulation, scheduling, and teamwork are necessary in this world. Given this fact, it is up to you to best prepare yourself by learning and mastering these skills, so that you can choose from some of the most common roles which are available to the GIS Professional, including sales and marketing, training, technical support, or application development. Depending on the company, you could be involved in



systems integration. This includes building/designing elaborate enterprise GIS databases and integrating GIS into business processes, for example, asset management and, Computerised Maintenance Management Systems. In my opinion, however, the most important skill to master in the GIS consulting world is the art of public speaking, including

order to analyse geographic data for the purpose of determining optimal retail locations and/or spatial-centric sales/marketing forecasts. GIS professionals who choose a career in this field can expect to work with extensive geographic datasets containing a plethora of demographic elements. Knowledge and understanding of geostatistics is a necessary part

Just like ice cream, there are many flavours of consulting.

communication and conflict resolution skills. This is important since you will often be required to work directly with clients on the ‘front line’, rather than being relegated to back-office support (as often happens in most engineering/environmental consulting firms).

Another consulting world which is run by GIS Professionals is Location Analytics, which, although similar to GIS consulting, is actually tied to a specific purpose. Location analysts work with businesses in

of the equation, and you will be required to develop reports which will be critical in terms of informing the operations and strategy of business clients. As in the world of GIS consulting, public speaking is important in this field, especially since you will be working directly with a variety of clients. The ability to justify your findings in a clear, concise, and non-technical manner is extremely important. Consulting does, after all, involve one for-profit organisation speaking to another for-profit organisation.

CONCLUSION

Consulting, like other areas of GIS, has its pros and cons. If you are suited to the fast pace and

'live or die' attitude of the business world, and the challenge of dealing with a range of demanding clients, then you

the skills that will make you most useful to the firm you choose to work for, master the art of public speaking, and if one firm does

ABOUT THE AUTHOR

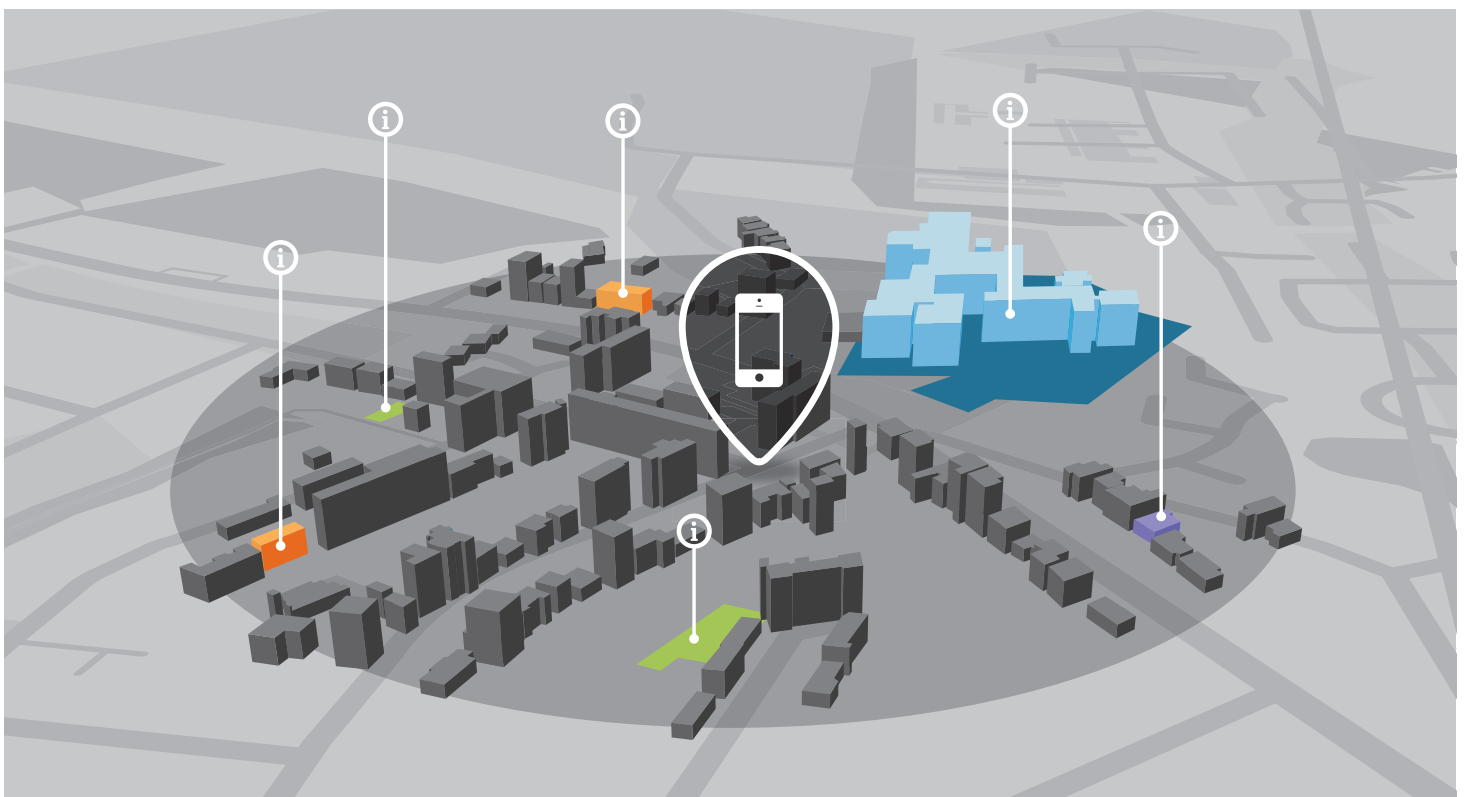
Tim Hayes, MSc is a GIS professional with 25 years experience. He is currently a GIS manager at the City of San Jose in California, where he supervises a team of three GIS professionals at a municipal utility authority. Tim holds a Bachelor's and Master's Degree in Geography, as well as a Certificate in GIS, and his career has spanned the private, government, and utilities sectors.



... not all GIS Professionals are prepared or suited to this competitive field.

can expect a rewarding career in this field. If, on the other hand, you prefer, steady pace, routine, and predictability, then you should probably stay away from consulting. To sum up, the common denominators across the different consulting areas, (engineering, environmental, GIS, and Location Analytics) are: learn that it is up to you to develop

not suit your fancy do not hesitate to work for another. In order to avoid being labelled as a maker of 'pretty' maps, it is up to you to take your career into your own hands, to develop your soft and hard skillsets, and to find a firm that fits best and maximises your career advantage. As per the popular maxim in the business world, 'if you fail, try, and try again.'



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Spatial Analytics Helps Businesses Identify Risky Locations Before It Costs Them

All businesses must think about the role that location plays when making decisions. In the age of globalisation, this has taken on a more crucial and larger-scale priority. Modern commercial industry frequently relies on international supply chains. While this new global model was born out of cost-benefit necessity, the unique risks that remote locations present can often set back any savings by causing disruptions ranging from political turbulence to natural disasters. When companies are operating in parts of the world that are gravely affected by factors such as global warming, civil war, and/or economic instability, knowing the best place to manufacture requires more than just low taxes or overhead. Identifying political and natural risks associated with location is crucial to making the best decisions.

FORECASTING RISK

In today's world, political unrest, civil wars, and terrorism not only pose a threat to the population of the affected regions but also to the increasingly globalised world economy. Even nonviolent conflicts can endanger supply chains and therefore pose a risk to the scheduled supply of goods.

CONIAS Risk Intelligence is a spin-off solution from Heidelberg University in Germany. With over 20 years of experience in quantitative empirical conflict research, this tool provides analytics and risk assessments of global political security situations on a continuously updated, sub-national basis. Like a weather forecast, users receive evaluations of the latest situation in a location and a prediction about its most probable course and outcome. The CONIAS database is the world's most comprehensive available compilation of conflict data.

TIME AND DATA

Using spatial analytics, CONIAS assesses the area where a company's supply chain will be located and assigns it a risk rating. This ability to make predictions based on the situations that the application has analysed is gleaned through data on political conflicts dating back to 1945. Over 800 conflicts informed the pattern recognition capability that allows CONIAS to identify hospitable locations for businesses to operate their manufacturing.

However, data on what and where these conflicts occurred is only part of how this predictive technology works. Time is another crucial factor. Certain conflicts

are more prone to happen during certain times of the year, while other types of unrest are typical to elections or weather events. This is especially the case now that the effects of global warming are being felt in volatile parts of the world, the increasingly extreme seasons that affect droughts and farmland must be considered when assessing locations for risk.

RISK INDICATORS

The CONIAS Conflict Risk Plug-in, which is also available as a dataset, offers a comprehensive assessment of the security situation worldwide, augmenting the flow of information and the planning capabilities within an organisation's supply chain management.

The Structural Conflict Risk indicator informs about the structural disposition and inclination of particular countries and their respective regions towards political violence. Its purpose is to identify and make predictions about the long-term conflict risk. The Current Conflict Risk indicator informs users about the actual political risk in a region on a monthly basis. This is based on the specific intensities of the conflicts that prevail in the region at a given point in time. Furthermore, the Conflict Risk Trend outlines the anticipated risk of a sub-national region in the upcoming months and is updated monthly. This indicator takes several factors into account, like past conflict intensity fluctuations, the respective conflict items, and their affinity to conflict escalation.

When it comes to decision-making, predictive analytics is quickly becoming an indispensable tool for businesses and governments alike - especially where organisations will claim an edge in the future is being able to apply the power of prediction to areas that are frequently unpredictable, such as political unrest. CONIAS has demonstrated that, with enough authoritative historic data, as well as sophisticated mapping and analytics, companies can operate on a global stage and leave nothing to chance.

ABOUT THE AUTHOR



Katie Decker
Community Manager, Esri
Startup Program
Esri | 520 Broadway, Suite 200 |
Santa Monica, CA 90401

P: 909-793-2853 ext. 1-2040
KDecker@esri.com

Women in GIS Leadership - Developing a Grassroots Approach

62% of young women do not see themselves staying in the GIS industry for more than ten years, this is related to the fact that at management level women are outnumbered four to one.

A recent study titled “Graduate Pathways for GIS Professionals” by Mairead de Roiste of Victoria University, Wellington found that nearly two-thirds of female graduates expect to leave the industry within 10 years, noting that greater support is required for these women at the ‘grassroots’ level. This statistic should shock people in our industry and act as motivation for retaining talented graduates.

... women have the tendency to understate their achievements and often need encouragement...

A factor related to this has been highlighted by two well-known industry commentators who have analysed the gender imbalance within GIS. Sarah Lewin noted that a recent UK GIS conference comprised of only 33% females, while according to Nathan Heazlewood only 20% of GIS managers in New Zealand

are female. Considering these examples, it is critical that we, as an industry, ensure that the gender imbalance at management level is addressed, so that women can see a career progression pathway for themselves.

INFLEXIBLE WORK

Several interviews with women who face the need to decide between management and family indicate that inflexibility forces females to

self-select into alternative positions, such as advisory, specialist or contract jobs, which offer similar seniority to management, but also more flexibility. Although flexible work arrangements are becoming more common, it is, unfortunately, rare to see these arrangements at the management level. Managing a team is demanding, and since employees need to be able to contact their supervisor at any time, working flexible hours can make this difficult. One young mother who was interviewed described how she, upon returning to work, decided to hand over her management position to the person that covered her maternity leave because she could not dedicate enough time to run her team the way she wanted to.

ALTERNATIVE POSITIONS

As experienced women take up these alternative roles there are unintended side effects for the industry. Less experienced female professionals do not get to work directly with these women and, therefore, the transfer of skills and knowledge to the next generation does not occur naturally. This does not, however, mean that women do not and cannot learn from male managers.

The experience you pick up from your own manager day to day is key to providing building blocks for moving into higher positions yourself. Having a relatable manager means that you can more easily envision yourself in their position. For women, this means that if they see other women leading successful teams while they juggle other commitments at home it will give them confidence in their ability to do the same.

ROLE MODELS

Thankfully, the wider geospatial industry does have a number of inspiring women leaders. For example, Laura Dangermond, co-founder of Esri, Corinne Vigreux, co-founder of TomTom, and Barbara Ryan, Director of GEO, have all spent years building up their respective organisations. Dangermond has overseen the growth of a very widespread software system, Vigreux has led the way for bringing GIS applications into the everyday lives of consumers, and Ryan has managed the huge task of gathering an immense range of GIS data sources into a comprehensive system.



Female torchbearers such as these women are often seen at conferences, meaning that their visibility provides inspiration to younger attendees who wish to work in a modern workplace. However, this is just the beginning. Conference organisers should look to increase the diversity of speakers on the main stage. In the future, managers need to persuade women who complete interesting projects to submit presentation proposals. After all (and without wanting to over generalise), in my experience, women have a tendency to understate their achievements and, therefore, often need more encouragement to volunteer for speaking events.

While trailblazing women leaders are an inspiration, unfortunately, these role-models are not so accessible in every-day situations. Likewise, women at the top of the industry cannot possibly reach out to and interact with every young female to give them advice. If these women at the grassroots of the industry don't have a female manager they can look to, then they need to source this advice from elsewhere.

Having a relatable manager means that you can more easily envision yourself in their position.

Many of the women I interviewed mentioned that their mentors were the key source of encouragement and support. These mentors help craft and edit CVs, they give advice on job opportunities and on juggling work and family commitments, and they provide insights into how the industry operates. While, it may be unreasonable to expect every female junior person to have a female manager, mentorships provide an alternative avenue for women to share their knowledge with

future GIS leaders. Unfortunately, however, in the GIS industry, there are few formal mentoring programmes. Graduates must seek out mentors on their own, which can be difficult if they don't have confidence or don't know whom to ask. Conversely, experienced professionals often don't realise how valuable their advice would be to younger professionals. Thankfully, formal mentoring programs do exist, particularly through the likes of the British Association for Geographic Information Early Careers Network, which helps to connect these people.

ENACTING FUTURE CHANGE

A year ago, I interviewed for a GIS job. After connecting to the video conference, I was taken aback to see that all three of my interviewers were female. During my six year career so far, encompassing four very different GIS roles, I have never had an interview with an all-female panel. In fact, if there was a female panel member then she was typically the HR representative who had little or no GIS knowledge. This experience, however, compared to my usual experience with all-male panels, highlighted to me the gender

imbalance at senior levels. Also, since the interview led to a job offer, it led me to ask some questions. Were, for example, the ideas that I expressed treated any differently by a female panel? Did these ladies better relate to and understand my career interests and motivations? Or was I simply more relaxed in the company of an all-female interview panel?

WHAT YOU CAN DO

While formal policy changes, such as creating flexi-time working



From left to right: Corinne Vigreux (TomTom), Laura Dangermond (Esri), and Barbara Ryan (GEO).

arrangements or building a mentoring programme will go a long way, very often smaller, less obvious initiatives can have a long-term impact. Encouraging experienced staff to become a mentor, even in the absence of a formal program, will provide direct benefits to everyone involved. Hiring a diverse team, including being considerate of applicants that have taken time out, will provide employees that have a different perspective when approaching problems. In this regard, it is vital that females in the industry make an effort to speak at conferences where they can demonstrate their successes, offer advice to others, and push for changes to the modern workplace where flexibility becomes the norm.

Everyone in the GIS industry should ensure that younger generations of GIS professionals, male or female, will be enthusiastic, committed, and feel that they have a future career pathway. If we, as an industry, take the steps outlined above and nurture our grassroots then this will become a reality.

Opinions expressed do not necessarily reflect the views of the authors' employers, nor any other party.



Nathan Heazlewood and Josie Hawkey.

Women in Geospatial Breakfast

- An Early Careers Perspective

I kicked off International Women's Day 2018 in the best way possible by taking part in the "Women in Geospatial" breakfast, a discussion on careers and challenges that women in the geospatial profession face.

Opportunities like these are a great way to network and share successes, fears, and experiences with an open-minded group. Sometimes, forums like this can be dominated by high-flyers – confident people, natural networkers – which may be intimidating to someone who's just starting out in their career. This wasn't at all the case at the Geovation Hub: as an empowering experience, it was exactly the kind of event I'd encourage anyone setting out on their careers to look out for.

Thanks to some excellent organisation by Denise McKenzie, Open Geospatial Consortium (OGC), two fantastic speakers shared their career tips and struggles with a room of around 25 women (and men!). Kate Royse (British Geological Society) and Marie-Francoise Voidrot (OGC) talked about career progression, struggles, and things they have learned throughout.

A key topic was a need for real role models in our industry. We all know that people at the top of their careers – people who seem to have achieved everything – can be inspiring, but sometimes those levels of accomplishment can be overwhelming. The advice? Keep your eyes open for role models at all stages of your career; it doesn't have to be someone right at the very peak of theirs.

And at the other end of the spectrum? Remember, you may be a role model to someone and not realise it. Just because you are not the CEO doesn't mean you are not successful. People still look up to you. This is relevant to all stages of a career, even in the early years.

Success was also a key theme in the discussion. Success is what is right for you, not what looks right to the outside world. Make choices that are right for you and your life; choices that make you happy. Value your own decisions and successes: if you don't, no one else will. This is really important, especially in the early careers as we may fall under the radar when it comes to being valued in work. Be proud of your work and value yourself, and don't be scared to 'big yourself up' occasionally!

On the other hand, don't be afraid to fail: if you are going to push yourself, it's likely that you won't succeed all of the time, but those 'near misses' may well be out of your control anyway. Learn to recognise what's what, and don't beat yourself up when perfection seems just out of your grasp.

Kate told a story of applying for her 'dream' job but not getting it, and

being frustrated at not knowing why. She said "Years later they told me I didn't get the role because I'd have changed the world. They weren't ready for me." Things may be out of your control, so don't hold onto failure for too long.

Many of the people at the event mentioned they did some sort of volunteering outside their main work. From youth groups to the AGI committee, volunteering is a great way to gain skills you won't necessarily pick up in your day to day work. I volunteer for the AGI Early Careers Network (ECN) and with the RSPB, gaining skills such as outside conservation work and communicating with my peers (via magazine articles!) – both of which wouldn't normally fall into my everyday job.

Volunteering is a great way to meet like-minded people and to develop a professional network. As a bonus, I can vouch for the fact that it's also great fun! In this regard, if you're looking for an opportunity, and you'd value working alongside people who are still, like myself, at the early stage of their career, why not drop me a line (@hollynws; @AGI_ECN; ecn@agi.org.uk) and volunteer with the AGI Early Careers Network?



Let's Geovate!

The theme for this year's Geovation challenge was "Building Greener Smarter Communities" and it was sponsored by Innovate UK and Northumbria Water Group to the tune of £185k.

This one day conference took place on 16 February at the Royal Geographical Society (with IBG) in London. It marked the third day of the Geovation camp, during which the ten best ideas get developed into ventures that could attract funding. The format for the day was a morning of talks and an afternoon during which the ten finalists presented their pitches to a panel of judges, culminating in the award of funding to the teams with the most promising ideas.

LINKS TO SDG'S

Chris Parker from the Ordnance Survey opened with some background. Annual Geovation challenges have been running for ten years and are intended to promote innovative use of Ordnance Survey products to address the theme. The idea is to think global - the themes have links to the UN's Sustainable Development Goals - but to act local. The challenge is to scale the best ideas up in a sustainable way by thinking smartly as well as using smart technology.

IT'S COOL TO REUSE

The highlight of the morning was undoubtedly a stirring talk from Wayne Hemmings, co-founder of Red Or Dead and Hemmings Design. He gave a vivid account of his entrepreneurial activities when he first arrived in London in the 1980s. He put his success down to

a spirit of reuse fostered at an early age, to the point that the furnishings in his own home are all reused or second hand. He bemoaned 'the bank of mum and dad' mentality, but wondered how entrepreneurs would fare today in a world of chain stores and without the independent traders and the street markets which enabled him to succeed.

GEOVATION SUCCESSES

The afternoon started with an update from two previous Geovation winners. Chris Parker reminded us of the 2016 winner, Refill, which promotes the refilling of water bottles. With waste plastic right at the top of the environmental agenda, it's time has come (www.refill.org.uk). Sam Parton then introduced OpenPlay, which is a

addressing the problem - 'Plastic Clever', which aims to provide resources for schools, and 'Plastic Patrol' which 'gamifies' the collection of plastic waste. 'Oasis' changes communities through the power of flowers. They have converted a barren three-acre site and generated income from the produce. 'Neat' matches up growers who have a surplus with eaters who would like to buy fresh and local produce. In a similar vein, 'FoodSpot' matches up people who want to grow food but have no space with businesses and individuals with unused space. 'Portable Ecosystems' want to install portable garden units (PGUs) in places which have been paved over.

'Offigo' gets local businesses to combine their resources online as

With waste plastic right at the top of the environmental agenda, it's time has come...

discovery and booking system for sports facilities. The system is now being used in seven countries. When he went to the Geovation camp he revealed that he was down to his last few pounds and had no 'Plan B'. He had to win.

THE PITCHES

The teams were then given five minutes each to present their pitches. 'Community Friend Walks' aims to empower those who have lost the confidence to walk. 'Happy Crocodile' aims to help get children to walk to school by using geography to plan secure routes and organise volunteer leaders.

Plastic waste has been in the headlines following 'Blue Planet', and two teams had already been

a means of promoting local high streets and help shoppers find what they want. 'WareHAUS' plan to construct modular housing units within currently disused property and rent them out to 'key workers'.

AND THE WINNER IS...

The judges recognised the desperate state of housing in Britain and awarded £50k to 'WareHAUS', £20k to 'Offigo' and £20k to 'Portable Garden Systems'. There were other awards to 'Happy Crocodile', 'Plastic Patrol' and 'Plastic Clever' (working together), and 'Community Friend Walks'.

For more information on the challenges and Geovation in general, visit www.geovation.uk

Interview: Paul Ramsey - The Power of PostgreSQL & PostGIS

In this article, we speak to Paul Ramsey about how both PostgreSQL and PostGIS can provide a solid foundation for any small to large organisational GIS architecture. Paul, a Solutions Engineer at Carto, has been working with geospatial software for over 15 years: consulting to government and industry; building a geospatial software company; and programming on open source software. He co-founded the PostGIS spatial database project in 2001 and is currently an active developer and member of the project steering committee. In 2008, Paul received the Sol Katz Award for achievement in open source geospatial software, and he speaks and teaches regularly at conferences around the world. In the following discussion, Paul provides some insights into the market position of PostgreSQL and PostGIS compared to that of big-name vendor options.

GIS PROFESSIONAL: IF A GIS MANAGER IS PLANNING A FROM-SCRATCH INSTALLATION, THE FIRST CONCERN SHOULD BE THE GIS STORAGE LAYER - IS THIS A FAIR ASSERTION? OR IS THERE SOMETHING ELSE YOU THINK SHOULD TAKE PLACE OF PREFERENCE AS THE GIS STACK FOUNDATION?

Paul Ramsey: Building technology infrastructure around a database is a good practice, but only if the staff feels comfortable and competent with it. Otherwise, it's a magical box in the corner and requests start getting bottlenecked with a small core of staff technology wizards. If everyone doesn't feel some ownership of it, feel that they get value from it, it will just breed resentment.

So folks have to see the advantage in terms of building multiple channels to data (web, desktop, analysis), in terms of data integrity under concurrent use, and in terms of in-place analytical power (spatial SQL queries). For a "GIS shop", that means that staff who are accustomed to reasoning about data visually or via a GUI will probably need some training in SQL, preferably around use cases

that demonstrate the advantages of breaking away from the desktop.

That said, the architectural advantages of a database-centric set-up are pretty obvious: uniform access to data via a standard query language, one canonical working copy, concurrent access, easy automation of common tasks, and standards-based connections between systems. Without staff buy-in though, all that is for naught.

GIS PRO: FILES OR DATABASES? IN THE OLD DAYS, WE SAID 'STORE YOUR VECTOR DATA IN A DATABASE, YOUR RASTER DATA IN THE FILE SYSTEM'. DOES THIS MANTRA STILL HOLD TRUE? ARE THERE ANY SCENARIOS THAT COME TO MIND THAT MIGHT MAKE STORING ALL

YOUR DATA AS FILES, OR STORING ALL YOUR DATA (INCLUDING RASTERS) IN THE DATABASE?

PR: Just talking about vectors, if my team was small enough, using a decent file format like GeoPackage for all the data could make sense. The danger is really one of versioning and process locking: one file means one editor at a time. That can lead to either multiple files or lots of waiting around, so an "all files" installation really has issues of scale.

For rasters, I don't think there is *ever* a situation where putting *all* your rasters in a database would make sense. For some select data, like elevation models or continuous modelling results, data that you might want to combine and analyse with vectors on the fly, having them co-located in the database with the vectors can unlock interesting capabilities. But *all* rasters implies having visual data in there too, stuff that's really only used for backdrop and eyeballing, and that's just silly.

GIS PRO: WHAT DO YOU THINK ARE THE KEY CHARACTERISTICS OF AN 'ENTERPRISE READY' DATABASE? I MEAN THIS PARTICULARLY FROM THE POINT OF VIEW OF SOMEONE



MAKING A PURCHASING DECISION BETWEEN SOME OF THE OTHER MAJOR PLAYERS - ORACLE SPATIAL, MICROSOFT SQL SERVER, MYSQL, MARIADB.

PR: There are a few things that distinguish an “enterprise” from the average guy on the street: the quantity of data, the number of simultaneous users, the need for security and access control, and the willingness to pay extra for the word “enterprise”.

At this point, I feel that the only thing PostgreSQL is missing relative to the other leading brands is a face-to-face sales force out knocking on doors and taking people to lunch. All the technical aspects -- scale, concurrency, integration with authentication/authorisation directories, cryptographic support, granular security roles and row-level security -- that's all there. If there's concern about “enterprise” PostgreSQL it's almost certainly a perception issue, not a features issue.

GIS PRO: CAN YOU SPEAK ABOUT THE COST OF OWNERSHIP FOR POSTGIS - ARE THERE ANY FORMAL STUDIES DONE WHICH ILLUSTRATE THE COMPARATIVE COST BETWEEN DIFFERENT SPATIAL DATA STORES? OR ARE THERE ANY USEFUL ANECDOTAL CASE STUDIES OUT THERE?

PR: The software cost for PostGIS is certainly lower, starting from the zero dollar acquisition cost. Once you get into running it, the external support cost can be as low as zero for organisations that feel safe without a net, into the thousands for commercial PostgreSQL support from companies like EnterpriseDB or 2ndQuadrant. They are almost always a fraction of equivalent big vendor maintenance prices though.

The staff cost of ownership is a weird one. On the one hand,

the base cost of someone who describes themselves as a “Proprietary DBA” is always going to be fairly pricey. There's also an assumption that a DBA does “DBA things” exclusively. Generally, people don't DBA a ‘proprietary’ database instance off the side of their desk. So there's an “organisation size” filter right away in the market for the staff of these proprietary companies.

“... treat unstructured data as a first class citizen...”

The flip side is that, while lots of people have enough PostgreSQL experience to keep a modest installation up and running and backed up, the population of people with deep PostgreSQL administrative DBA experience is still small and growing. At this point, the best bet for getting a full-time “PostgreSQL DBA” is actually to hire a DBA of a proprietary company and have them train themselves up on PostgreSQL details, as the broader DBA concepts transfer over just fine.

GIS PRO: A GIS MANAGER PLANNING A DEPLOYMENT, TRYING TO CHOOSE AN APPROPRIATE GEOSPATIAL DATASTORE, AND LOOKING AT POSTGRES/SQL/POSTGIS AS AN OPTION MIGHT TAKE SOME COMFORT FROM KNOWING THAT IT HAS BEEN USED IN LARGE DEPLOYMENTS BY OTHER ORGANISATIONS ELSEWHERE. CAN YOU GIVE SOME EXAMPLES OF WHERE THIS IS THE CASE? AND WHAT KIND OF DATA VOLUMES HAVE BEEN MANAGED IN THESE SETTINGS?

PR: The example I keep coming back to is one of the oldest: the French National Mapping Agency started managing their national planimetric base in PostGIS over 10 years ago. At this point, it's

practically a legacy system. That's a big operational data set, over 150 million features, and I think they chose PostGIS in a fair comparison over the likes of proprietary tools.

In terms of size, there are a number of organisations in the UK that load and work with the Ordnance Survey MasterMap product in PostGIS. That's a data set of over

500 million features. Most GIS managers don't have a problem of that scale to deal with.

And of course, it's worth mentioning that OpenStreetMap runs their service on a couple of beefy PostgreSQL servers. That's a world's worth of data under continuous editing load. They don't use PostGIS spatial types for their raw data model, but PostGIS is used behind the rendering chain that spits out the visual representation of OSM you see on the web.

GIS PRO: FINALLY, CAN YOU SPEAK A BIT ABOUT THE FUTURE AND WHERE THE DEMAND MAY BE, PARTICULARLY IN TERMS OF ADDRESSING THE UNSTRUCTURED DATA TREND?

PR: NoSQL turned out to be a bit of a flash-in-the-pan, and PostgreSQL learned the two important lessons it needed from that moment: first, treat unstructured data as a first class citizen, with a JSON data type; and second, be prepared to scale horizontally. Thankfully, developments in terms of JSON support for building non-schema constrained apps that are not schema-constrained, the development of a scalable multi-master PostgreSQL extension, and improved support for partitioning and foreign data access in the community development have changed all of this.

Paul Ramsey.



How Cloud Data Services are Easing Integration within the Scottish Public Sector

Central and local government in Scotland are benefiting from a new generation of Cloud data services that are providing easier, more open access to map and geographic data resources explains Faith Clark, Marketing Consultant, Marketing Edge.

THE GLOBAL GEOSPATIAL MARKET

The latest market research has estimated that the global geospatial analytics market was worth around US\$40 billion in 2017 and is expected to register a compound annual growth rate close to 18% per year, during the period 2018 to 2023. The report by Research and Markets, titled 'Global Geospatial Analytics Market - Growth, Trends, and Forecasts (2018 - 2023)' also revealed that, in 2017, Europe was the largest geospatial market, accounting for around 35% of the global market share.

However, as the Global Geospatial Analytics report authors go on to explain there is 'a gradual shift in market dynamics of geospatial analytics which has transformed

the way end users interact with technology. The focus has shifted from standalone products with limited geo-referencing to the concept of 'system integration', wherein, geospatial analytics is being integrated across all the major workflows and solutions within a business.

INTEGRATION – A CHALLENGE FOR GOVERNMENT

The One Scotland Mapping Agreement (OSMA) is an overarching licence agreement that gives local and central government in Scotland access to some of the UK's Ordnance Survey mapping products. With over 100 members, the OSMA has successfully removed the previous barriers to data sharing restrictions between members and it is estimated that this has led to a threefold increase in the use of spatial data within the public sector in Scotland. As the Global Geospatial Analytics report identified, organisations are shifting from standalone systems, previously deployed by OSMA members, to integrated systems.

To that effect the Scottish Government, as the lead for the OSMA, set about identifying and procuring a more efficient way of managing and distributing large volumes of data. Key goals of the project were to reduce the significant data processing overheads for members and reduce the individual organisation costs for managing data.

The proposed outcome was to find a single hosted solution that would provide access to up-to-date, fully maintained data across a multi-stakeholder environment via highly performant and secure web mapping services.

Scottish GIS company thinkWhere, a specialist in open source technologies that had already developed cloud-based solutions for organisations such as the British Library, Balfour Beatty, and Local Authorities, was appointed by the Scottish Government to tackle the OSMA requirement. The innovative technology company's latest platform, theMapCloud, offered the perfect solution - a platform that allows digital maps and associated information to be shared anywhere in the world using internet-connected devices.

LOOKING TO CLOUD & OPEN SOURCE TECHNOLOGY

theMapCloud includes a securely hosted, fully managed depository for geographically referenced data, in this case, the 20 or so Ordnance Survey data products covered by



Scottish Government South Building. © BLOM 2010.

the OSMA, effectively acting as an online 'geospatial library'. Hosted on a Cloud infrastructure offered by Amazon Web Services (AWS) and managed by thinkWhere, theMapCloud supports highly reliable, scalable and performant web-services as required by the Scottish Government and OSMA members.

The OSMA products are supplied, or accessed, through a Web Map Service (WMS), Web Map Tile Service (WMTS), or Web Feature Service (WFS) using credentials that are unique to each member organisation. Additionally, thinkWhere has developed an OSAddressBase Search, and users are currently running a pilot project to test an OS MasterMap WFS. Architected using Open Source technologies and frameworks, including PostgreSQL, PostGIS, GeoServer and MapProxy, the thinkWhere services are all fully compliant with the appropriate OGC standards.

OSMA WEB SERVICES IN ACTION

The Web Services developed for the Scottish Government and OSMA members by thinkWhere are cost-effective, and efficiently streamline data distribution across all OSMA member sites. They are proving to be a speedy and effective way of accessing OS products using the existing software and infrastructure of the OSMA members. This includes access to data via desktop GIS (such as QGIS or ArcMap) or web clients, including OpenLayers. The web mapping service provides easy, on-demand access to background maps with WMTS tiles or rendered WMS images delivered as raster files, making them quick to load but without attributes. This means that they are ideal for plotting additional information, georeferencing other attributes, and for contextual background mapping purposes.

The WFS services provide access to OS AddressBase premium - a data product containing detailed address records for the whole of Scotland. thinkWhere's Search API offers dynamic querying and address records that can be extracted by geographic location, postcode, address lines or UPRN (Unique Property Reference Number).

"The OSMA web services provided by thinkWhere offer an efficient and practical way of accessing huge volumes of data," commented Ross McDonald, Corporate GIS Data Coordinator at Angus Council, an OSMA member organisation. "Using the thinkWhere web services saves us time and offers great flexibility, as well as providing an accurate up-to-date standardised base map for a consistent look and feel for all council mapping output."

One example of the OSMA web services in action is the Scottish Government Heat Map application, also developed by thinkWhere. An online solution to help support the work set out in the Scottish Government's Heat Generation Policy Statement on District Heating, the interactive map allows users to see where there are opportunities for decentralised energy products and heat networks,

and to assess heat density and proximity to heat sources.

The Scottish Environment Protection Agency (SEPA) are also using thinkWhere web services and OSMA products to deliver an online flood map. "The OSMA web services delivered by thinkWhere are becoming the standard background for SEPA mapping applications," added Duncan Taylor, IS Development Unit Manager at SEPA. "Reliability and performance are excellent, and we have benefited from a significant reduction in the cost of the maintaining our own OS data services."

Alan Moore, Chief Executive of thinkWhere, concluded, "The work undertaken both with the Scottish Government and other OSMA member organisations has underpinned and informed the ongoing development of theMapCloud. We have exciting plans for expanding our service and product offerings into a market that goes way beyond individual or groups of organisations, even at the national scale of this project, and is without doubt global. The use of open source technology and market leading web services means that we can, and do, operate without borders, both in terms of location and the function and scale of partner organisations."



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A Geographer in a CAD World!

It's been three and a half years since I joined Cadline as a GIS Application Engineer, and my new job title was probably the first sign that I was now a "Geographer in a CAD World". I have worked in GIS for nearly 20 years, and in all the roles that I have undertaken, at heart, I have always considered myself to be a GIS Consultant. Yet working for a Platinum Autodesk Partner I am now referred to as an "Application Engineer". It's a name I simply can't get used to, as I see Engineers as those who plan, build and implement complex projects using CAD software – such as Autodesk Electrical, Plant, Civils and Manufacturing. I don't build things, do I? As I once told my dad, "I simply do maps on computers".

As a GIS Consultant I have often stared at the banks of CAD users' screens and seen elements of the Matrix in the "Dark Art" of the work they do, and now I'm actually living

InfraWorks, which enables you to visualise 3D Models using both CAD and geospatial assets. Having trained the Vertical Mapper extension to MapInfo back in the

Why on earth would you ever draw a closed shape as a Polyline?

day to day in the "CAD World" I felt a little out of my comfort zone. In fact, my very first client introduced me to how far apart I believed the CAD and GIS world to be. I sat in the CAD Team's office and watched as each CAD technician digitised land parcels as "polyline" objects. I still use this story every time I deliver a GIS training course and reveal how alien it seems to me to digitise what is essentially a closed shape as a polyline and not a polygon. How can they perform spatial analysis? How can they create thematic maps of land ownership? Why are they not concerned with the attributes of each land parcel? Why on earth would you ever draw a closed shape as a Polyline?

On my next CAD project, I was introduced to Autodesk

we used InfraWorks as part of a planning application to visualise the environmental impact of a new school building. We received the proposed building design from the architect as a Revit file and as soon as I opened the file I knew there was again a disconnect between CAD and GIS. The Revit building appeared some 2km away from the proposed site! I contacted the architect and they explained it was their usual practice to design their buildings somewhere near the site. Sorry, somewhere near the site? Surely not? What about the current site conditions? The transport links? The local utilities? Any environmental constraints? Surely these were essential when designing a new building? I kept quiet and decided maybe not.

Very soon it was eating away at me. Was GIS a concept that simply didn't have a place in the CAD



world? Was I truly a “Geographer living in a CAD World”, where geospatial data didn’t matter? This wasn’t what I had joined up for, so I decided to do something about it.

In the past five to ten years I had already made a conscious choice to explore and promote the value of Open Source GIS applications, such as QGIS, GeoServer, GDAL, and PostGIS, with the interoperability of spatial datasets at the core of this. Implementing “One Source of Truth” via a spatial database (PostGIS, SQL or Oracle) means that you can deliver a cost-effective geospatial architecture where all users have real-time access to datasets stored in a federated environment. This is a step change in working for many organisations that are dependent on GIS and who, historically, have stored their spatial datasets as flat files across multiple file storage systems. I thought that if we could lift GIS users out of their dependency on data in ring-fenced silos, then surely a Geographer could help implement this in a CAD world?

So, over the last year at Cadline, I started to dedicate my time to exploring this opportunity further - undertaking R&D to discover if Autodesk applications can seamlessly integrate with federated geospatial assets. It quickly became apparent that these connections do exist and indeed they have been there for a while! They include links to Web Map Services, Web Feature Services, connections to PostGIS database tables and many other geospatial compliant formats. I thought this is game-changing. We need to start to promote these services, and, now, as part of my current role, I regularly undertake presentations and onsite user groups to illustrate how you can successfully integrate many Autodesk applications with

geospatial datasets, without the need to duplicate, translate, and transfer geospatial data into CAD compliant formats.

Lately, I have started to wonder - why has there been a need to promote this? Why have CAD users not taken advantage of these services? Well maybe they thought GIS was a “Dark Art”, maybe they didn’t want to be “CAD Users in a Geographer’s World!” I believe that the same concerns that I had as a Geographer working in

datasets as flat GIS files or indeed as layers in a DWG. Well, no more. This doesn’t need to be the case. We can all live in an integrated world, where CAD, GIS, and other users are accessing the same spatial data from that “One Source of Truth”.

In fact, Autodesk as an organisation has already seen the value in this relationship, making a commitment to increase CAD and GIS interoperability through a joint partnership with ESRI, opening up Autodesk applications

... for many CAD operatives... geospatial datasets are seen as remote, obscure and too complex to understand.

a CAD World, are reflected for many CAD operatives, where geospatial datasets are seen as remote, obscure and too complex to understand. This has meant that it’s become common-place for an architect to work in a Coordinate Reference System free world and the CAD Technician to create line work, with no thought for attribute information, or the fact that the project would benefit from undertaking spatial analysis in the future. This separation of CAD and GIS software, data and tasks have led to CAD users relying on GIS geeks to provide their spatial

to directly access spatial feeds from an ArcGIS online account. We see this as a positive move. It highlights the dependency that these two “Dark Arts” have with each other and how, through increased interoperability, the use of geospatial assets and fundamental GIS techniques will only become more prevalent in CAD software. Maybe it’s not a bad thing being a Geographer in a CAD World, and maybe there are exciting times ahead being a GIS Application Engineer. Perhaps even drawing Land Parcels as Polylines is not incorrect at all!



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The Age of Geospatial Data Ethics

Today, we are seeing a sudden awakening around the topic of data ethics. Although ethics have always existed, the recent scandals around Facebook and Cambridge Analytica have changed the tone of the discussion - especially as we learn that our personal data is actually a monetisable resource. These recent developments, which have received the full glare of the media spotlight, should be considered as a ringing alarm clock that is impossible to stop.

On the positive side, these scandals have forced citizens to ask some important questions: what happens to my data, how much do I want to share, and what does it mean when I give it away? It has also forced us to question how, as individuals, we can balance the huge benefits of integrated services with the knowledge that somewhere in pages of terms and conditions we're allowing our most personal details to be used (if not exploited) for political or commercial agendas.

Location, as we all know, has a very particular value. My personal details are, for example, of particular interest to third parties if they can be tied to where I may vote and where I shop - especially since my socio-economic habits can be extrapolated to make assumptions about how to influence others with similar behaviour.

And of course, we're not just consumers - we're practitioners too. We live in an increasingly digital literate society where we need to deal with an ever-increasing amount of data. This brings with it not just management considerations, but ethical ones also - as was highlighted during the well-attended AGI Scotland annual event in February, which had a whole programme stream dedicated to the issues of security and privacy.

During the event, Don Smith - an expert on Cyber Security on an international level - illustrated his presentation with real and extreme examples of Russian attacks. His message was simple, yet extremely important: human behaviour enables the compromise of corporate organisations.

Another related issue which was discussed was that of the significant impact which GDPR is having on today's organisations - including AGI. In order

to demonstrate the wide-ranging impact of GDPR, attendees were introduced to examples such as the British Geological Survey's Borehole Records and, in particular, how yesterday's legacy recording methods may not meet today's stringent criteria for protecting personal data. This led to an animated debate during the event which centred around the potential dangers associated with misinterpretation of such criteria. Today's organisations may, therefore, be forced to take a highly risk-averse approach concerning the use of core reference data (such as addressing), which is a vital part of our national data infrastructure.

I'm watching with interest to see whether the recent events may have an impact on our government and regulators. Following the Facebook scandal, will we see changes of substance during 2018? Closer to home, how will government and the agencies dealing with our national data infrastructure handle citizens' concerns? This is an enduring concern, and one that our new Geospatial Commission will no doubt be considering within its ambitions for a national spatial data strategy. By enabling better use of geospatial data for the growth of the UK economy, with clarity on the management and governance of data for the public good, building confidence with citizens will be a key focus of the Commission.

Before we reach GDPR deadlines in May, there's a great event coming up in April that I'm super excited about. We're working with the Royal Scottish Geographical Society to stage an event at the Edinburgh International Science Festival. Our expert panel will be throwing the spotlight on the real innovations in uses of geospatial data. We've evolved over the past 30 years: simple mapmakers have become a data-centric community of innovators and thought leaders - and we've made advances that wouldn't have been dreamed of in the past. I'm interested to see just how much this is recognised by the audience - and to what extent, following the most recent Facebook scandal, privacy and ethics play a part in the debate! I hope to see you there.



Abigail Page is Chair of the AGI's Council, which is formed from elected members of the AGI. Its main role is to set the strategic direction for the organisation. www.agi.org.uk

Got an event to list?

Go to www.gis-professional.com/events

GEODATA IRELAND 2018

25 April 2018, Dublin, Ireland
www.geoaware.info/irelandshowcase

FIG WORKING WEEK 2018

6-11 May 2018, Istanbul, Turkey
www.fig.net

EVERYTHING HAPPENS SOMEWHERE 2018

10 May 2018, Birmingham, UK
www.geoplace.co.uk

GEO BUSINESS 2018

22-23 May 2018, London, UK
www.geobusinessshow.com

SPAR3D EXPO & CONFERENCE

5-7 June 2018, Anaheim, California, USA
www.spar3d.com/event

7TH INTERNATIONAL CONFERENCE ON CARTOGRAPHY & GIS

18-23 June 2018, Sozopol, Bulgaria
<https://iccgis2018.cartography-gis.com>

ESRI USER CONFERENCE 2018

9-13 July 2018, San Diego, USA
www.esri.com/about/events/uc

COASTGIS 2018

27-29 September 2018, Ísafjörður, Iceland
www.uw.is/conferences/coastgis_2018



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