



Forewarned is forearmed

In the heart of the City of London, a team of risk analysts is busy assessing the potential for conflict across the globe long before it happens. GEOconnexion called in to find out how GIS supports their work

For organisations operating in politically unsettled parts of the world, trying to predict the timing and impact of cross-border conflicts, insurrections or terrorist attack is a fraught business. Reliable local intelligence, coupled with expert analytical skills and a track record of prescience are rare commodities in what some might dismiss as a risky guessing game. But lacking that insight can prove disastrous on a human, material and financial level.

Doubtless, Simon Sole took something of a risk when, in 2003 and based on his career as a professional intelligence analyst, he set up Exclusive Analysis (EA) to offer such a service on a commercial basis. Yet his vision of delivering timely, objective, decision-ready forecasts was clear enough and found a ready market with Lloyd's underwriters in the aftermath of 9/11. Today, the company (www.exclusive-analysis.com) directly employs a team of 50 at its head office in the City of London; has a satellite office in Singapore, and can call upon 1,000 hand-picked intelligence sources and 200 analysts around the world for raw and refined data.

Intelligence-led approach

"While we do a fair amount of historical analysis and open source monitoring, our human intelligence network helps us to make sense of

the vast amounts of information available and to interpret what signals are significant," explains David Hunt, EA's Director of Research & Development.

Incoming data are audited and processed on several levels for conformance with EA's risk models before being compiled into country reports and evaluations, regional forecasts, watchlists and indices. These are made available on a custom or subscription basis to clients that range from industrial, commercial and financial giants to governments, NGOs and media groups. Another strand of EA's operation provides risk management training to both the private and public sector.

Ultimately, everything happens somewhere and Hunt leaves one in no doubt that location is fundamental to EA's business. "Whether it's terrorism, civil unrest or military conflict, risk profiles are all highly differentiated by location and getting those profiles right is what our clients expect." This certainly proved true for those with interests in North Africa and for whom EA predicted, months in advance, that impending civil unrest in Egypt could force the departure of president Mubarak and spill over into neighbouring countries.

GIS found its way into the company's formidable IT arsenal back in 2007 when it collaborated with PBBI to develop TerrorRisk, a MapInfo-based terrorism risk assessment tool. Regular updates are now also sent

to clients in kml format, so that the risk-rated locations, alongside analysis notes and target intelligence, can be viewed in Google Earth or input into any desktop GIS. Today, EA continues to build on the TerrorRisk database... one that has grown to rate risk at more than 9,000 points of interest in 70 cities around the world on a building-by-building basis.

EPOP-making

Although GIS has been exploited by EA since 2007, its value is nowhere more evident than in the company's latest risk assessment product, Every Point on the Planet, or EPOP for short. "As the name suggests, it is based on a global risk model of potential violence, whether war, terrorism or civil unrest," says Hunt, who adds that it is the first credible intelligence-led offering of its type. "Rather than applying a broad brush in saying this or that area is risky, EPOP integrates three of our existing market-tested products to differentiate and score risk down to street and even building-level in any location for the coming 12 months."

In addition to the forward-looking TerrorRisk data, historic 'event' information is processed as a risk hotspot layer – currently delivered to clients in various web-based formats – and finally combined with EA's standard one-year outlook scores on a country or region-wide level. EA's GIS Developer Cathy Wilford takes up the story. "Some clients will load the resulting raster tiles into their own geoprocessing systems, for example to map safe itineraries or evacuation routes, while others will give us the x, y co-ordinates of assets to which we respond with a 0-10 scale risk score for each and every asset."

Built entirely with Python, the ArcGIS-compatible scripting language, EPOP utilises Esri's Desktop tool kit, in particular the spatial-modelling ArcGIS Spatial Analyst extension to automate the geoprocessing of the various inputs from raw data through to standardised, consistent and useful raster layers. The standalone Python scripts are then triggered within Task Scheduler to update the layers as the input data refreshes daily.

24-hour service

In addition to the risk layers themselves, a further service was built to automate the processing of client asset locations against the multiple layers and to return the resulting scores to the client via FTP. Again, Python was used to harness Esri's Spatial Analyst toolkit and to transfer the often very large client data files. "Our very first EPOP client, a major global re-insurer, gave us a portfolio of almost eight million locations, which we were able to turn around in 24 hours – the whole process being completely automated", says Cathy, who adds that the next step is to make EPOP available to clients as a Web Mapping Service, via ArcGIS Server, complete with commentaries.

The road was not an easy one, she admits. "Numerous challenges were overcome in the six-month development phase, not least the sheer amount of time, storage space and processing power it takes to



Pictured: Cathy Wilford and David Hunt



A Yearbook published by Exclusive Analysis makes extensive use of mapping and satellite imagery derived from its country analysis, security planning and TerrorRisk products



Exclusive Analysis insight reports, such as this one, employ GIS to highlight likely targets, outline battle scenarios and visualise risk scores

number-crunch raster layers on a global scale at a minimum 500 meter resolution: a single daily EPOP update can take up to 12 hours to process." The development phase also saw a transition from ArcGIS Desktop 9 to 10, resulting in a complete rewrite of Python code for Arc 10 compatibility.

The remaining challenge was the fine-tuning of the final, all-important Map-Algebraic formula used to combine the layers. David Hunt is careful to stress that while no risk model is foolproof, EPOP risk ratings are globally consistent. "An EPOP score of 2.0 in, say, Cairo, will have the same weight as a score of 2.0 in Jakarta. We've been tweaking and testing the model over the past six months to achieve consistent, and therefore credible output for corporate security teams that need a rapid summary of how risks are spatially distributed."

Needless to say, clients have access to the full spectrum of EA indicators, insight briefs and forecasts that support EPOP scores and from which, if required, they can develop their own violent risk exposure models.

Although a relatively recent development, EPOP has already caught the eye of the insurance sector and was shortlisted for the Risk Management category of this year's British Insurance Awards.