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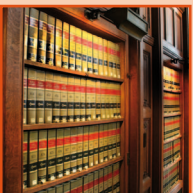
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EVERY MAP TELLS A STORY

You could call them maps with attitude. They're maps with business intelligence information overlaid on them and they can provide rich insights into business performance.

By Phil Parent



If a picture is worth a thousand words, a good map is worth at least a thousand dollars, especially when combined with customer data, demographic profiles, sales region performance and even competitor information.

Until recently, combining business intelligence, customer relationship, enterprise resource planning and related information with spatial information via GIS (geographic information system) was rather difficult – and expensive.

But now, with the advent of more widely available digital base-maps, advances in browser-based and application-based map interfaces, and improved methods for geo-coding, it has become easier to map business activity. As a result, savvy companies are taking advantage of smart maps to give themselves a competitive edge, increase profits, make better decisions and streamline their operations.

But first a little explanation: geo-coding – this is the process of placing point, line and polygon (objects, such as buildings) information accurately on the base-map.

Informed decisions

One industry that has taken this new technology on-board is the contact centre industry. And one company that is taking location intelligence tools very seriously is Jet Interactive. It has an in-house system called Call Tracker to which it has now added geographic intelligence.

“Adding customised maps and the location of in-bound callers to our Call Tracker online dashboard is a significant point of difference between us and our competitors,” says Justin Graham, Jet Interactive’s CEO. The company is one of Australia’s largest in-bound number providers.

“Media companies especially like the ability to see immediately where calls originate, as they’re then able to gauge the effectiveness of advertising campaigns. When our customers can see exactly when and where calls originate from they can make more informed decisions on where to focus their advertising initiatives.”



LAW ENFORCEMENT ANALYTICS: fighting crime with business intelligence

BY ROB MILLS

Ask any field officer what his most important weapon is, and chances are he'll tell you, *information*. Armed with the right information at the right time, police officers can carry out their duties more quickly, effectively, and safely.

Unfortunately, most law enforcement agencies are bogged down by data stored in multiple siloed systems that are difficult to integrate. These organisations are, in effect, data rich but information poor. Law enforcement professionals require intelligent, timely, and complete analysis of data from many sources – including criminal histories, incident reports, crime tips, and emergency calls.

Given that more than 80 per cent of the data analysed by law enforcement agencies have a geographical or spatial component, looking at results in map form makes instant and intuitive sense. This is called *location intelligence*, and in its simplest form, is the marriage of business intelligence and mapping software that attaches spatial relevance to information records.

But simply combining the two disciplines doesn't immediately solve the problem. Effective law enforcement requires much more than filtering spatially based information. That's because crime fighting is as much a predictive science as it is reactive; law enforcement agencies need to go beyond the spatial mapping of information and be able to drill down, analyse and even predict criminal activity from the data.

A number of progressive law enforcement agencies around the world are starting to use a combination of location intelligence and predictive analytics; together called *law enforcement analytics* (LEA).

LEA combines many technologies – including traditional business intelligence concepts such as dashboards and scorecards, ad hoc and predictive analytics, interactive mapping capabilities, data mining, and enterprise search.

This approach is unique not just in its integration of so many technologies, but also in its ability to consolidate, display, and access application data from many source systems in a variety of formats, including dashboards, tabular reports, maps, and even in Google-like searches.

The immediate benefits of LEA include predicting future activity based on past activity; the ability to deploy and track officers to combat specific areas; sending real-time information on past criminal activity to officers in the field; modeling 'what if' scenarios based on key variables; and displaying where to deploy resources using a map interface to reduce crime.

To command and field officers alike this marriage of technologies delivers very compelling results – lower crime levels and greater citizen safety.

Early adopters, such as Richmond PD in Virginia, U.S., have seen very conclusive impacts; LEA is credited with a 40 per cent drop in major crime, moving the city ten places down the list of America's most dangerous.

In New Zealand and Australia we're still in the very early stages of demonstrating and deploying LEA in any meaningful way, but that's not to say the opportunities are any fewer. The technology will stand or fall on the ability of law enforcement agencies' willingness to integrate their information systems to be able to take advantage of the inherent intelligence in their data.

Working with partners that have experience and domain expertise is a good first step in the process, but ultimately all effective technologies should only be viewed as enablers of business outcomes.

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BI and LI users often have a very basic requirement, they want to see where they can sell more stuff. It is up to us, as solution providers, to ensure that they have the tools to help them do just that.

*Glen Rabie
Yellowfin CEO*



The Australian contact centre industry employs 250,000 staff dealing with around 16 million calls per day – with numbers like these, competition is intense and companies have to have a competitive edge to attract and retain clients. Providing clients with business intelligence through the use of call mapping is one tool they can use to do this effectively.

Maps on the dashboard

The new technology works by integrating location intelligence with that staple of business intelligence – the dashboard, making information easier, and quicker, to view by managers, as well as analysts.

Business analysts are used to working with tables and spreadsheets, but many upper-level and line managers don't have the time to spend hours and hours sifting through the numbers to identify patterns and make associations. They want to be able to quickly see, for example, how many sales there have been, which sales people made them, how long it takes to deliver the goods sold and other key performance indicators (KPIs).

Most of these KPIs have a time aspect to them and many have a dollar value assigned to them, but now KPIs are being associated with a location value too. Jet Interactive provides a good example here.

“Our customers can see call volume by exchange, city, state and slice it up by demographic metrics on a map view,” says Graham.

“We have mapped some 5,000 exchanges – which can vary in size from a few city blocks to huge expanses – across Australia. Each time a call comes in it is assigned to an exchange. Then using the Call Tracker Dashboard, users can click on a tab and immediately see from which exchange the calls originated. They can also aggregate up to cities and



states. We have added the capability to look at demographic profiles of the exchanges too – 250 individual categories, licensed from the Australian Bureau of Statistics – so customers can compare the exchange to national averages.”

“Being able to offer location intelligence has given us a clear advantage in the marketplace,” says Graham. “We’ve made the whole process easy to grasp for our users. They can now visualise where their callers are, compare demographics and then make more informed decisions on how best to structure their marketing programmes.”

Jet Interactive’s Call Tracker LI interface has been developed inside Yellowfin’s BI platform.

Ahead of the curve

Melbourne-based Yellowfin is ahead of the curve when it comes to true location intelligence (LI). LI differs from traditional GIS in as much as end-users can access the map-based interface from inside the BI application itself. Advanced GIS capabilities are limited – for instance, LI users can’t create polygons. This has to be undertaken by a third-party and then loaded into the BI solution. However, LI users can take advantage of the many benefits of GIS – without having to become mapping experts.

“BI and LI users often have a very basic requirement,” says Glen Rabie, CEO of Yellowfin. “They want to see where they can sell more stuff. It is up to us, as solution providers, to ensure that they have the tools to help them do just that. Before Google Maps, location intelligence was too obscure a concept. Most people thought of maps as static, paper-based sheets. But once they started to see the possibilities of online mapping, the seed was planted.”

“We can now tap into the available digital maps – Google Maps and Bing Maps – via API (application pro-

MAPPING BI DATA: easier, but you can fall over the cliff

In the old days, mapping data was easy. You bought a wall map and lots of colour-coded pins. Then you stuck them on the map. Fast, easy and cheap. But the information content was superficial at best.

Then came GIS (geographic information systems), it was slow, difficult and expensive, but you could get amazing results. These included brilliant analyses, beautiful cartography and a whole new insight into your data. However to get all this, costly digital base-maps needed to be developed; you had to prepare attribute data and buy complex software and powerful workstations, to process all the points and polygons. You also needed a team of geographers in the back room who could also program.

Then came Google Maps and Digital Earth which offered incredibly detailed online base-maps and GPS (global positioning systems) for capturing location coordinates. PCs also became more powerful and mainstream databases could now store and process spatial data. A whole new world has opened up as a result: mapping data has become faster, cheaper and easier. The challenge now is to ensure you map it right.

It’s rather like driving a high-performance sports car: you have tremendous power to go fast, but one small lapse of attention could send you over a cliff.

Location intelligence is a powerful tool that can significantly enhance decision-making capabilities, but it can also trick users into making bad decisions if maps and data with different levels of accuracy are combined. This question of accuracy is a major focus of research in GIS science and it is no less important in location intelligence.

“From an implementation point of view,” says John Hoffman, CEO of Altis Consulting, an Australian-owned consultancy offering specialist expertise in data-warehousing, business intelligence and data-management, “it is significantly easier to provide ‘location

intelligence’ now because BI vendors provide map integration capabilities in the new versions of their software.

“However, the big issue is still the quality of the information, especially when it comes to GIS coordinates. End-users are excited about the possibility of viewing information and detecting patterns and relationships, via geographic or building maps. But they’re often disappointed because the location data quality is poor. BI vendors have done their part, now we must improve the quality and structure of the data to provide consistent and trustworthy information and insights.”

“The real need is to get the back-end right” says Simon Jellie, managing director of Wellington-based e-Spatial.

“If you get the back-end data correct – accurate location data for your customers or events and a map base that is the appropriate scale and accuracy to support that data – then the front-end will provide a powerful insight into your business,” says Jellie, who is a 25-year veteran of the digital spatial data market.

“If you are going to implement a spatial location solution for your business intelligence data, you have to ensure that your data is clean from the outset. This is our specialty – ensuring that the data is correct before it goes onto the maps. It’s the same old story: garbage in, garbage out. Scrubbing data is a time- and labour-intensive process, but absolutely necessary.”

So, it’s all about the data. In columns and row, a few bad metrics are almost invisible, but any BI user will tell you that as soon as you start showing data in graphs or other visuals the bad data stands out. And, when you map, the errors are magnified. If you are going to add location intelligence to your BI capabilities, start with clean data. Otherwise, the maps you get could steer you in the wrong direction.



Smart maps show traffic patterns

Placing a retail outlet in the optimal location can spell the difference between profitability and loss. Location intelligence helps retailers choose the right site by assembling key metrics – including customer behaviour records, demographics, traffic patterns and competitor information – from various sources. It then processes the data and displays the results in map format.

“Maps give analysts a better insight into the relationships between data sets,” says Jos Kunnen, CEO of Critchlow Limited, a leading provider of location-based technology in NZ.

“Smart maps give analysts the ability to query maps, change parameters and analyse the results. With the high cost of real estate and construction, retailers can’t afford to get the location wrong. Location intelligence gives them the tools they need to make the right decisions.”

The same processes that underlie location intelligence also give analysts greater insight into performance. “You can’t look at turnover alone,” continues Kunnen.

“For instance, if an organisation is retrenching, a store that is close to competitors and in a less wealthy region might have fewer sales

than a sister store in a wealthier neighbourhood closer to another outlet in the same chain. So, rather than closing the first store – which is actually performing better given the circumstances – closing the second store would be the wiser choice. With charts and graphs it’s hard to see the relationships. But, with smart maps and location intelligence the answers are obvious.”

How do you get started in location intelligence for your organisation? “For one-off jobs or special projects, it’s probably best to outsource the project to professionals,” says Kunnen.

“But, if you plan on doing a number of location-based projects and have a smart team of analysts already in place, you can start your location intelligence initiative for as little as \$20,000. It is an investment that will pay increasingly higher dividends as you build expertise and apply the technology to other decision-making operations within your organisation.”

gramming interfaces) and use these as the base for overlaying customer data, continues Rabie. “We can also add demographic data from [say] the Australia Bureau of Statistics, as Jet Interactive have done. Keep in mind, though, that this data is not free. There are licensing arrangements to sort out, depending on how you want to set up your maps. But, once customers start to see their data in a geographic context, they’re invariably impressed.”

Empowering a new class of users

“Location intelligence has the potential to bring the power of spatial analysis to a much broader range of users,” says Francisco Urbina, manager of business development strategy at ESRI Australia, the local office of the world’s leading GIS software and service provider.

“LI provides what people would expect from a mapping solution, with a simplified interface. The average user doesn’t care about metadata, centroids, polygons or any of the other technical features that define GIS. They want to see maps that show them customers, transactions and patterns. And that is what LI delivers.”

LI can provide a number of benefits for users. “You can track your assets from the map,” continues Urbina, “and perform basic geographic analyses. With the capability to display the maps on a hand-held data terminal, your field staff can quickly identify assets in the field and service them as required.”

Integrating LI capabilities into enterprise solutions such as business intelligence has become much easier. “There are a lot of tools available now,” says Urbina. “For instance, most developers have a library of APIs that can link capabilities. Plus web services and SOAP (Simple Object Access Protocol) can be employed to add mapping capabilities to non-mapping solutions. But regardless of the actual techniques employed, the power of smart maps is now becoming more accessible to a whole new class of end-users.”

Clean data

Location intelligence is here and it’s powerful. But, even though the map interface is intuitive and can be called up with a single click, the amount of pre-processing to get to that point is not trivial. Companies like Jet Interactive are already using LI to give them a competitive advantage, but like any advantage it’s not gained without effort.

The investment is likely worth it though. LI can take your company from being an also-ran to a leader. However, it takes vision, commitment and lots and lots of clean data. But, if you want to give your company a jump-start in your field, LI just might be the technology to take your company to the next level. **i**



Sorry folks, the Earth is not round

Location data can be characterised in a number of different ways. Latitude and longitude, expressed in degrees, minutes and seconds. These are well known, for instance 36°51'50"S, 174°45'43'E defines the iStart office in Grafton Auckland as a specific point on the Earth's round surface. However, the Earth is not round. It is an oblate spheroid. Using a sextant and chronometer might have been good enough for Cook to map the South Pacific 225 years ago. But, with today's modern + 2cm accuracies, derived from GPS (global positioning system), the old lat/long system falls short.

GPS uses a more realistic model of the Earth's ellipsoid shape as a standard. Geographers built the model as the distance from the centre of the planet to the surface for a geocentric datum. Called the WGS84 (World Geodetic System – 1984), it is globally consistent within ± 1 m. GPS data consists of multi-digit x,y coordinates – stored as either GEOMETRY data types or GEOGRAPHY data types. In digital GPS terms the coordinate above becomes -36.86397, 174.762005.

You can also use descriptive fields to assign location. For instance, you can take street addresses or postcodes and then 'geo-code' them to assign x,y coordinates. This places them on the map. However, geo-coding has its own set of challenges. Addresses have to be unique. They have to be spelt correctly, and many businesses use a building as their address, say iStart House instead of 44 Khyber Pass Road. Address scrubbing is a major undertaking, especially if databases are large or encompass a wide area. Again, location intelligence gives end-users a powerful tool to analyse information in a geographical context, but setting up the spatially-aware databases in the background can be a laborious and time-consuming task.

Once you have accurate point data (i.e. the exact location of a point, which has no length or surface area), you can build accurate lines. And once you have lines, you can make polygons, or spaces completely enclosed by a series of connected location-aware lines. You can then assign values or attributes to them. Point A could be a customer, complete with sales history. Line B is the road they live on. And Polygon C could be a sales rep region or shopping mall catchment area. As above, it takes specialist knowledge and more advanced technology to create polygons that drive the embedded location intelligence modules. But once the basemaps have been created and the location and attribute data has been scrubbed, the possibilities are endless.

Today's smart databases are being developed with spatial data in mind. Microsoft's SQL Server 2008 is a perfect example. SQL Server has been set up so that you can store location coordinates as well as polygons. These are the basic building blocks of spatial analysis and can now be supported. SQL Server 2008 also supports Geographic Markup Language (GML) and is compatible with Open Geospatial Consortium (OGC) standards for geometric data types. So if you can capture location data as you build your customer or event profiles, you can also build spatial capabilities into your business intelligence applications.

The beauty is that as technology advances, and data sources are consolidated and maintained more efficiently, the majority of us don't need to worry that the earth is, in fact, not round.

Instead we can focus on what the maps are telling us.

Thankfully.