Geospatial Tech Changing Business

Billionaire mapping his path into mainstream

Jack Dangermond's technology already drives global business innovation but he has yet to satisfy all his ambitions, writes **Sue Lappeman**.

Esri Founder and President Jack Dangermond; (below) Dangermond with musician and entrepreneur will.i.am at the Esri User Conference.

No one would describe Jack Dangermond as a household name.

Yet this unassuming global tech billionaire with the largest software company you have never heard of has pioneered a ubiquitous technology that underpins many of the world's latest game-changing business innovations.

For nearly 50 years, the Californian businessman and philanthropist has surfed wave after wave of computing shifts to build one of the most enduring technology platforms of the modern age.

Along the way, this master of reinvention has been part of an elite few who have set the pace for advances in computing technology, from minicomputers and PCs, to the internet, cloud and mobile devices.

Frequently described as "the Bill Gates of GIS", Dangermond has pushed Geographic Information System (GIS) technology further than any of his contemporaries.

Ranked on Forbes' list of billionaires, with a fortune estimated to be in excess of $US3 billion ($4 billion), this son of Dutch immigrants initially trained to be a landscape architect.

But it was while working in a computer graphics lab at Harvard he first discovered the then fledgling digital mapping technology that would become his lifelong passion.

Moving back to his hometown in 1969 armed with a $5000 loan from his mother, Dangermond and wife Laura launched Esri – the Environmental Systems Research Institute – and began developing what would become its flagship GIS application, ArcGIS.

Today, Esri's user base comprises more than 350,000 businesses, government agencies and NGOs, including the White House and United Nations.

Virtually every city and county in the US, every tier of government in Australia plus thousands more private and public organisations world-over use Esri solutions to manage everything from roads and telecommunication networks, to crime, borders, utilities, health services and much more.

The company's longest standing user community – the national security sector – utilises Esri location-based analytics to map and analyse human terrain in global terrorist hot spots; while one of its newer markets – agriculture – leverages the technology to optimise supply chains, predict the effects of variable weather patterns and improve farm yields.

> Observing Dangermond's business strategy, it appears to be one simply geared towards world domination.

From tracking shifting flood waters and fire fronts in real-time to designing intuitive public transport systems, the applications of Esri technology are virtually unlimited.

Friends in high places

Observing Dangermond's business strategy, it appears to be one simply geared towards world domination.

An extraordinarily high rate of investment in R&D has made it near impossible for would-be competitors – including Google who bowed out of the global GIS market in 2015 after a brief dabble – to get ahead of Esri's market-leading position.

Furthermore, Dangermond has made it his mission to get spatial sciences on the agenda of the world's most influential leaders.

A case in point is when US President Barack Obama launched a Climate Data Initiative to help communities prepare for climate change — Esri provided the map-based planning tools and collaboration platforms.

No doubt Dangermond's $US1 billion donation of software to American schools and ringing endorsements from pop culture icons like will.i.am has also helped to keep GIS front of mind for his and other country's leaders.

The Bill and Melinda Gates Foundation has also used Esri to help lead campaigns against malaria and Ebola in Africa.

"One of the areas of technology that has gone further than I ever expected is mapping," Microsoft cofounder Bill Gates recently told Forbes.

"And we have Jack Dangermond to thank, in large part, for his pioneering efforts of almost 50 years," Gates said. "He's one of a kind."

'Democratisation of GIS'

Certainly Dangermond's Napoleonic style has earned him cult status among millions of ArcGIS users worldwide.

Esri's annual week-long User Conference in San Diego eclipses similar events held by Apple and Google with 16,500 GIS enthusiasts from around the globe attending to hear Dangermond's passionate dissertations on all things geographic.

And while there is no denying Dangermond has won the lion's share of the world's diehard spatial technology enthusiasts, it now appears he is making significant inroads into markets once exclusively owned by traditional Big Data Analytics (BDA) technologies.

Dangermond attributes the growing interest from non-traditional users to "the democratisation of GIS".

Esri Australia managing director Brett Bundock said Dangermond's vision to have GIS become more mainstream has been a key part of the company's distribution strategy since 2011.

"Prior to recent years, GIS was solely the domain of highly skilled spatial professionals," Bundock said. "Now it's being leveraged by boards, CEOs and other business leaders in their planning and day-to-day decision-making.

"With investments in the extended Big Data ecosystem tipped to hit $194 billion globally within the next year, I think we're well past the point of assessing whether there is value in adopting advanced analytics.

"Business leaders should be turning their focus to quantifying the tangible returns generated from their BDA investments.

"GIS has an amplifying effect on Big Data ROI which is why it's becoming more mainstream."

Meet the man

Australian audiences will have a rare chance to see Dangermond when he takes the stage at the Sydney Opera House in October. Dangermond's appearance is expected to attract significant attention not only from local technology users but also business strategists and community leaders from the region.

For more information visit: esriaustralia.com.au/events

Geospatial Tech Changing Business

Brett Bundock – managing director of the Boustead Geospatial Technology group, which includes GIS heavy-weight Esri Australia.
PHOTO: VINCENT L LONG

The new geography of big data analytics

RAQUEL JACKSON

Ask the Asia Pacific's most dominating figure in spatial about the mass disruptions caused by the Amazon outage earlier this month and he'll tell you – it's a geographic issue.

As managing director of the Boustead Geospatial Technology group, which includes GIS heavy-weight Esri Australia, Brett Bundock is at the forefront of the region's multi-billion dollar location-based analytics industry.

Bundock asserts if Amazon had added the element of 'location' to their network risk modelling, they would have clearly understood the extent of their East Coast exposure.

"Put simply, diagrammatic or tabular representations of risk show only a fraction of the overall picture," Bundock said.

"By highlighting the geographic elements in business data, you can instantly see the information that matters to your operation – such as which part of your company infrastructure is susceptible to large scale natural disasters."

Analysing company data against the backdrop of a specific territory or geographic area is not a new practice. For more than four decades government agencies, commercial enterprises and NGOs have utilised location-based analytics to equip decision-makers with actionable business intelligence.

In Australia, location-based analytics software – more commonly referred to as Geographic Information System technology (GIS) – was traditionally the domain of land management agencies and the military.

But following the 2011 Brisbane floods, GIS made its first significant move into mainstream data analytics. The key component of the technology that caught the imagination of BI and Big Data professionals was its predictive capabilities.

In the case of the Brisbane floods, GIS technology was used to map the likely path of the rising waters – before the disaster fully unfolded. It was a watershed moment for the spatial industry.

Beyond its predictive capabilities, the technology's capacity to work with real-time data to provide decision-makers with a live view of their business was considered game changing.

These two capabilities alone had moved GIS from its long standing back-of-house role to be viewed as one of the most exciting developments in Big Data analytics since the democratisation of BI.

Bundock asserts the irony of the technology's new found rock star status was not lost on him or the industry, especially as GIS has been used to perform military-grade analytics for more than 40 years.

"GIS technology is often mistaken for the more Google-esque type of mapping. It's important to discern here – we're not working with simple dots on maps," Bundock said.

"Advanced location-based analytics has the ability to process and analyse multiple, large and complex data sets to produce the sort of business insights that will shift a share price.

"The good news for those organisations who have yet to invest in advanced analytics or who have made substantial investments in other technologies, is there are no rules for adopting this capability.

"Location-based analytics can be implemented as either a standalone or complementary system".

Australian utility sets global benchmark

One of Australia's largest water retailers has secured an international award for an innovative project that has seen the time required to identify faults in their network drop from minutes to just seconds.

Queensland Urban Utilities (QUU) has won the renowned Esri Special Achievement in GIS Award for Q-Hub, a technology system which provides a real-time location-based view of the utility's entire business and water network.

QUU was selected from more than 350,000 organisations worldwide to receive the honour, which recognises the creative use of Geographic Information System (GIS) technology to solve business challenges.

QUU chief information officer Nina Du Thaler said the solution, which seamlessly combines data from stand-alone systems into one intelligent platform, has brought business efficiencies to a new high.

"There is no doubt Q-Hub has bound the organisation together," said Du Thaler.

"GIS technology has been used since QUU was formed in 2010, but until Q-Hub's implementation we hadn't harnessed location analytics to the full potential to drive innovation and decision-making.

"The real value of the system is that it brings together different data sources via one integration hub to provide a dynamic and geographic representation of the business that many departments can view at the same time.

"Whether it's a field worker using their tablet to view a map of the network, a control room operator co-ordinating our maintenance crews or a customer service representative delivering emergency updates – they can all access the same up-to-date information and speak the same language."

Du Thaler said the technology allows staff to make better decisions than when they only had access to static spreadsheets and databases.

Queensland Urban Utilities CIO and iTnews' Utilities/Media CIO of the Year, Nina Du Thaler.

> "Now our customer service centre has instantaneous access to real-time information and can communicate with affected customers immediately."
> Du Thaler

"For example, staff can easily see and identify network hot spots: areas where multiple jobs are affecting multiple customers, indicating a potentially wider issue requiring further action," Du Thaler said.

"They can then also visualise the most suitable crew to dispatch based on proximity, skillset and equipment on board.

"Having information available in real-time is a crucial leap forward. In the past, week-long lags between events occurring in the field and details becoming widely accessible back in the office weren't unusual.

"Now our customer service centre has instantaneous access to real-time information and can communicate with affected customers immediately."

Du Thaler also received the individual honour of being named iTnews' Utilities/Media CIO of the Year, edging out several highly rated contemporaries – including those involved with the Telstra Air Wi-Fi network and a $20 million asset management system replacement at Melbourne Water.

The success of the multi award-winning system reflects a growing trend among utilities worldwide moving from traditional legacy software to more integrated and responsive solutions backed by real-time location-based analytics.

The shift, driven by a need to drive operational efficiencies and cut costs, has led to industry forecasts of the global utility location-based analytics market growing by 9.27 per cent over the period 2014-2018.

Du Thaler certainly sees an increasing role for GIS technology.

"The use of location-based analytics to drive our strategic planning is certainly on the radar," she said.

"In fact, I can see it playing a crucial role in planning new infrastructure and developing and delivering services in the future."

ALICIA KOUPARITSAS

Geospatial Tech Changing Business

Real-time technology mines more profits

GIS technology is increasingly being used to guide operational decision making, writes **Matt Mullens**.

Trevor Smales says Australian top and mid-tier mining companies are using GIS technology to save millions of dollars in fuel costs.

A new approach to a technology already widely used in mining exploration and environmental management is generating millions of dollars in productivity gains for top and mid-tier resources companies.

In the case of US based gold, silver and copper producer Freeport McMoRan, Geographic Information System (GIS) technology is predicted to generate $14 million in savings per year by providing real-time feeds of the movements of the company's oil trucks.

The mining giant uses GIS to undertake predictive analysis to identify adverse road conditions and direct drivers on how best to navigate particular routes to reduce wear and tear and fuel costs.

Trevor Smales, a GIS mining expert with Esri Australia, has worked with many of Australia's leading resources companies on developing programs that have generated results similar to the Freeport McMoRan case.

"GIS has been widely used in the sector for decades in areas such as exploration and environmental management," Smales said.

"But more recently Australian top and mid-tier mining companies are using the technology to guide operational decision-making and deliver significant dollar savings.

"For some companies, light vehicle tracking and analysis is helping lower costs dramatically. For example, companies are now able to devise the percentage of a vehicle's travel on private roads compared to public roads and use that information to maximise Fuel Tax credits."

Smales cited a recent report from one of Australia's leading professional services firms, PwC, that recommends resources firms invest in GIS to remain competitive during periods of low commodity prices and capital constraints.

"The PwC report encourages companies to apply predictive analytics to their business and operations planning to make it through the downturn," Smales said.

"It also indicated the use of mobile digital solutions to improve the performance and safety of mines is on the rise – so if you aren't doing it, chances are your competitor is."

GIS is also becoming an increasingly important tool in OH&S compliance, with natural gas producer QGC using the technology to develop a solution for real-time staff safety monitoring.

The world-first system consolidates real-time data about QGC personnel that was previously held in several systems, enabling the organisation to rapidly locate and communicate with staff working in remote locations during an emergency.

Information, including staff and vehicle locations and threat alerts, is integrated into a central operational dashboard that can pinpoint the whereabouts of staff within seconds.

When a staff member or contractor crosses a 'geofence' – a virtual parameter set up around a defined area – system operators receive notification that someone is leaving or entering a high-risk area. This function is particularly valuable during bushfire season as it instantly identifies who is in a fire-affected area, and provides intuitive warnings and advice on evacuation routes.

"This project is at the forefront of safety standards in the resources sector," said Smales.

Banks hunt down credit card fraudsters

The world's leading banks are using location-based analytics to rapidly sort through millions of live financial transactions, isolating suspicious behaviour and detecting fraudulent activities in near real time.

With credit card fraud at record levels in Australia, the innovative solution, which uses multi-dimensional relationship analysis to identify dubious activity, is providing local institutions with a much-needed weapon.

According to data from the Australian Bureau of Statistics, credit card fraud has doubled since 2011, costing Australians $2.1 billion last year and affecting 1.1 million people.

Esri Australia financial industries specialist Neale Walsh said large data sets involving millions of transactions in Australia can now be culled down to focus on suspicious patterns.

"Identifying a pattern is the first step to understanding the data in front of you," Walsh said.

"By analysing a transaction's origin, timing, amount and recipient, we can detect hotspots for further investigation.

"For example, a series of money transfers originating from neighbouring locations and being sent to multiple recipients in a small area acts a strong predictor of transfer fraud."

While using location-based analytics – also known as location intelligence – to identify fraudulent activity is a relatively new concept for banks, the approach has been widely used by the sector to make sense of business information for more than a decade.

Walsh said a bank's transaction data alone offers a rich trove of customer insights.

"Advanced location intelligence tools transform vast and varied data into compelling visualisations, instantly highlighting patterns and trends that would otherwise remain hidden," he said.

The Bank of America has used location-based analytics to cut annual expenses by $US800m and add $US1 to its individual share price.

"Distribution networks can be measured and refined based on customer behaviour and usage, products can be designed according to location and channel preferences, and competitor intelligence integrated."

Walsh cited the Bank of America (BOA) as an example of using location intelligence to effectively determine the value of its bricks-and-mortar assets.

"Following the global financial crisis, BOA was forced to re-evaluate its entire network of 12,000 branches and ATMs," Walsh said.

"By analysing billions of transactions, BOA was able to identify previously hidden customer trends to put in place a network optimisation strategy that reduced its annual expenses by $US800 million, adding an estimated $US1 rise to its individual share price."

SUE LAPPEMAN

To hear Bank of America senior vice-president of retail distribution Jon Voorhees discuss how the company is successfully leveraging location-based analytics, visit: www.esriaustralia.com.au

Geospatial Tech Changing Business

Saving retail's poor little rich kids

The new breed of location-based analytics is a much more powerful marketing tool than traditional business intelligence, writes **Raquel Jackson**.

GIS technology underpins Starbucks' network expansion program, seeing its empire of 20,000-plus coffee stores growing sustainably at a rate of one new outlet a day.

Ask any CEO who has invested big dollars in Big Data what they believe their ROI is and nine out of 10 will say "not enough".

For Australian retailers in particular, whose transaction data alone offers a treasury of customer insights, the challenge continues to be sorting the good from the bad – and from the downright ugly data.

Leading location-based analytics specialist Gary Johnson says cutting-edge data visualisation and mapping technology have changed the fortunes of many of the world's data-rich – but information-poor – retailers.

"What this new breed of advanced analytics tools offers over the more-traditional solutions is an ability to resolve data blind spots," Johnson said.

"The most disabling blind spots harboured in traditional BI tools sit with a lack of real-time data integration, limited or absent predictive capabilities and the inability to clearly identify patterns and trends.

"Location-based analytics technology addresses these blind spots by connecting data to the real world and using geographic context to provide actionable business insights."

Starbucks has been using location-based analytics to undertake market planning and store development, with the aim of ensuring its global network of 20,000-plus coffee outlets continues to grow responsibly.

Working on the principle that "one size does not fit all", Starbucks has been able to ensure the success of its network expansion program.

Decisions on the siting of new stores are determined by analysis of local trade areas, demographics, traffic and transport routes and new commercial developments.

"Starbucks uses Geographic Information System (GIS) technology – which underpins advanced location-based analytics – to equip more than 700 of its mobile location scouts with the ability to conduct analysis in the field," said Johnson.

"Intel is fed back into Starbucks' market planning and BI systems instantly, saving on time and administrative costs."

Starbucks' site selection activities are only a small component of the company's highly-effective GIS technology deployment strategy.

Today Starbucks uses GIS technology to leverage the millions of data records captured each day for global safety and security planning, facilities management and the planning of new product rollouts – such as the introduction of alcoholic beverages with their evening menus.

IBM estimates more than 2.5 quintillion bytes of data are created each day, with 90 per cent of data having been created in the last two years alone.

Johnson asserts that retailers' loyalty, stock, online and point-of-sale data has created vast, almost unmanageable information reserves.

"Using traditional data mining techniques to deal with Big Data is like trying to bag a quality bargain three days after the Boxing Day sales – most likely, you'll expend a lot of time and energy and only walk out with other more diligent shoppers' cast-offs," Johnson said.

"The digital age is forcing retailers to leverage their Big Data in a more sophisticated manner. Consumers are determining what the customer experience needs to look like and smart retailers are keeping across these ever-changing preferences by mobilising advanced analytics.

"GIS technology allows retailers to get ahead of the curve, to see patterns in consumer sentiment as they unfold.

"By visualising these insights against a backdrop of trade territories, CEOs and BI professionals alike can instantly see a far greater return from their Big Data."

To hear Starbucks manager of strategy Patrick O'Hagan explain how the company is successfully leveraging location-based analytics, visit: www.esriaustralia.com.au

Telcos sitting on data goldmine

Telecommunications companies are sitting on an untapped goldmine of data that could generate millions of dollars in new revenue streams, according to a regional expert.

Esri Australia utility lead Mark Billing said government and private organisations in global innovation hotspots like Singapore are already leveraging telcos' data to support the development of smarter traffic solutions.

"With global telecommunications networks forecast to connect with more than 50 billion Internet of Things (IoT) sensors by the year 2020, the amount of data collected by telcos will increase exponentially," Mr Billing said.

"This represents a lucrative opportunity for telco providers to start monetising the data they already have access to through smart devices, satellites, GPS and IoT sensors in vehicles.

"When this data is mapped and analysed in near real-time, it generates a compelling picture of how and why consumers move through certain areas at certain times – which has powerful ramifications in areas such as smart city design.

"Governments and commercial groups can understand how entire city traffic networks are affected by adjustments in a specific intersection and make systematic changes to improve traffic flow.

"Abnormal traffic patterns will indicate when and where accidents are blocking the road. Integrated emergency responder systems, such as police and ambulance services, would automatically dispatch vehicles, all without the need for human intervention.

"Traffic management is only the beginning – the insights generated from this data offer vast commercial value in everything from mobile advertising to home security."

Mr Billing said for many telcos, the challenge is how to move forward with translating their data into commercially viable insights.

"Big Data is often unusable in its raw form – which is why location-based analytics is critical to this approach," said Mr Billing.

"Location-based analytics technology brings order to data, by literally mapping undetected trends to present valuable insights in real-time.

"Additionally, the technology can assist in ensuring privacy laws are adhered to by aggregating and 'anonymising' the data – cleaning it of any personal identifiers.

"The data and technology required to monetise these commercial insights exists today – the sky is really the limit for how Australian telecommunications providers, transport departments and other businesses intend to exploit the possibilities."

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