

ISSUE 1 • MARCH 2018

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OPEN SOURCE LOCATION  
INTELLIGENCE AND  
PERFORMANCE ANALYSIS:  
A SUCCESS STORY IN AIR  
TRAFFIC MONITORING

HOW THE LATEST  
LOCATION-BASED  
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SITE SUCCESS

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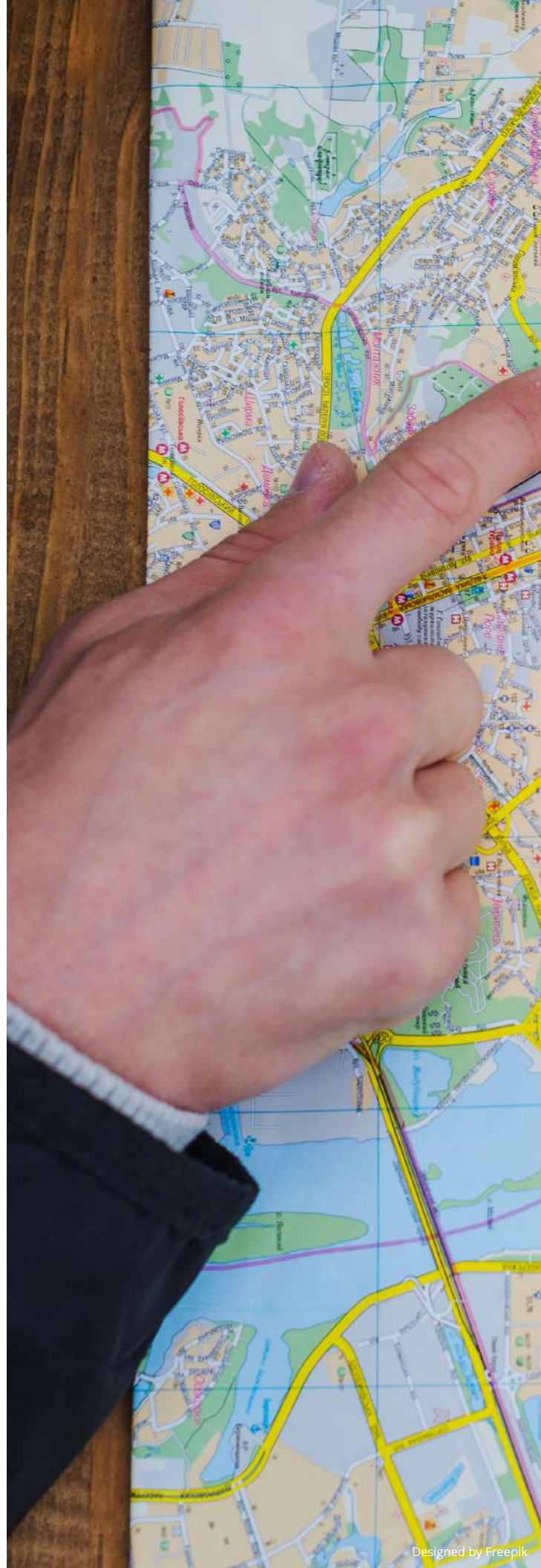
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# editor's note

## INTERPRETATION OF LOCATION INTELLIGENT FOR THE BETTERMENT OF HUMANKIND

All knew about human intelligence. Recently with the advent of Artificial Intelligence being associated with machine development & deployment, a new concept of location intelligence has evolved.

A location or position has an x, y and/or z coordinate. That's it. But what is interesting about the location is that it is intrinsically linked with all human activity and has gained significance with its association with nearly all aspects of a developmental activity.

For long we have a qualified location with 'attributes' that gave information about specific objects and entities. An attribute gives us a better understating about a location. Say, a position from which the slope of a canal changes or the height of a hilltop suitable as a site for a power pylon. More attributes could be attached to a specific location to provide more information for its optimum use.

So what is it that has prompted us to use the term 'location intelligence'?

The proliferation of data has made it possible to analyse & understand processes taking place at a location. Rainfall data collected from rain gauges located in a certain region provide a rainfall pattern. Combine this with data from these rain gauges for over a decade and you have a better understanding of the rainfall pattern over a region which planners put to use in optimising agricultural produce or flood mitigation. Heatsinks for urban development, hot spots for crime prevention, estimation of crop failure etc are all aspects of location intelligence being put to use not only for planning & development but also for better and more efficient delivery of services.

Carefully combined with Artificial Intelligence and we have a powerful tool for sustainable development. Interpretation of location intelligent data with suitable boundary conditions can lead to meaningful solutions for the betterment of humankind.

**Ashok Prim**  
Editor



# OPEN SOURCE LOCATION INTELLIGENCE AND PERFORMANCE ANALYSIS: A SUCCESS STORY IN AIR TRAFFIC MONITORING

Easy and intuitive interface, as well as meta-models and profiling, makes Knowage a modern BI solution.

by Emanuele Ristatore & Elena Marchisa



Knowage suite provides different products, each one focused on a specific domain but mutually combinable to build a tailored product for your each analytical scope.

## 2018 Scenario

Currently, every company or organization access to a large amount of data, coming both from its own activities and from external sources and the capability to exploit these data is a crucial business driver. Data need to be collected, organized and made available in an efficient and effective way, optimizing available resources and making analysis understandable and easily accessible by different users within the company or organization. Among all data, according to Gartner's 2018 forecast, georeferenced information's are becoming increasingly critical, both as macro location and as micro-location. Data visualization through maps, schema or vectorial pictures will be a more and more requested feature for a business analytics tool.

### Business Localization and Graphical Exploration with Knowage LI

Knowage is the open source suite for business analytics that combines traditional and big data sources into valuable and meaningful information. Easy and intuitive interface, as well as meta-models and profiling, makes Knowage a modern BI solution. Knowage suite provides different products, each one focused on a specific domain but mutually combinable to build a tailored product for each analytical scope. Knowage **Location Intelligence (LI)** is the module that allows the user to plot business data over a map, a schema, a vectorial picture, producing immediate insights with mash-up techniques and not being forced to move data between GIS

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and DWH environments.

Technically speaking, the Location Intelligence bounds geometries (dots, lines, polygons, solids) to equivalent points on Earth, using a coordinates reference system including, but not limited to, latitude and longitude.

**Location:** Geometries can be described using files (e.g. shapefiles or geojson) or a database: such geometrical information is easy to retrieve thanks to Open Data availability. The next step is the transformation of this information into easily understandable, like an image. Setting a source and a reference system, products like GeoServer can create the image that represents the desired geospatial data: Knowage LI uses this image to build its own map layers.

**Intelligence:** Knowage LI can easily bind datasets and layers, modifying geometries attributes (e.g. colour) according to the value of the related measures. The services Knowage LI can connect to our WMS, WFS and TMS that, being part of a standard, are independent of the publisher. Once the connection is created and saved in a layer, the service can be queried to get only the needed information. For example, on a layer with all the countries boundaries, setting a filter over the "continent" attribute allows to display only the European boundaries and their related measures.

From a functional point of view, performing Location Intelligence analysis with Knowage is really intuitive for the business user. He can customize map look&feel, choosing indicators, layers and formats. He can navigate the map, performing geographical selection and filters, and calculate distances. For instance, a user can correlate the area of various US States imported via geojson to one or more measures and choose whether he wants to display them through a colour gradient (single measure) based

on quantiles/even distribution or a simple bar graph (multiple measures).

Finally, within Knowage suite is possible to relate different types of analysis and show them in a single view. Through dashboards, in fact, a map can be bounded to a chart or a report and any selection made on one of these analysis will affect all the others.

### Air Traffic Evaluation with Knowage LI

A very interesting application of Knowage LI capabilities is the AIDA project. This project, started in May 2015, has been required by the Italian air navigation service provider (ENAV) to analyze and optimize the air traffic flow over the Italian airspace and carrying out the operational performance monitoring.

Being the "flight object" (FO) the center of analysis, all the measures are FO-related. The database used for this project is Oracle DB, with spatial option, used to query and filter georeferenced data. The amount of data from heterogeneous sources has been a challenge, both to normalize and to manage. From different "dashboards" is now possible to navigate through the data to a specific flight, the causes of its delay, the reasons behind its flown route, etc.

Within seconds, a single flight out of 1.8 million flown every year, can be found and the LI component shows a map with the three routes (and the specific points) of that single FO:

- **Planned route:** the one passing through several FIX points along the sky highways, also known as airways;
- **Actual route:** the real trajectory that the flight has flown, made true through the frequent surveillance systems' pieces of information;
- **Actualized route:** the aircraft position derived from the surveillance systems snipped to the closest FIX points.

The huge amount of points and trajectories made mandatory the use of a GeoServer, publishing a different layer for each geometry in WMS EPSG:4326, Knowage LI then takes those layers to build a map, with trajectories and points, and all their attributes. Importing each time all those data, would have been pretty heavy, so Knowage LI filters them by itself, sending a query to the GeoServer with the mandatory parameters to retrieve the geometries of the right flights.

The reporting includes many maps, some stand-alone, others integrated in composite documents that control the trajectories shown. For example,

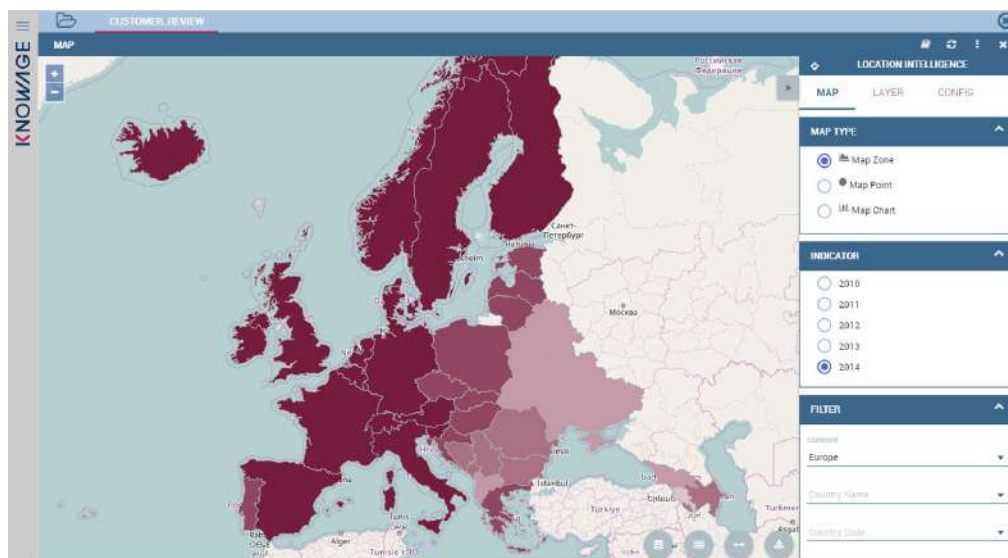


Figure 1. End user can easily modify the map and interact with it, choosing the right indicators and visualization options



selecting a specific flight from a list showing the 10 slowest flight for a city-pair, the map refreshes showing its three trajectories, giving potential useful information at a glance.

Most of the metrics in a current period are compared with historical values, up to ten years in the past. Those metrics include, but are not limited to:

- Airspace capacity (number of flight in a time span that passed through the Italian airspace)
- Airspace efficiency (number and weight of the deviations from the average flight time and distance for a city-pair)
- FO flight time and duration
- FO route analysis (vertical and horizontal)

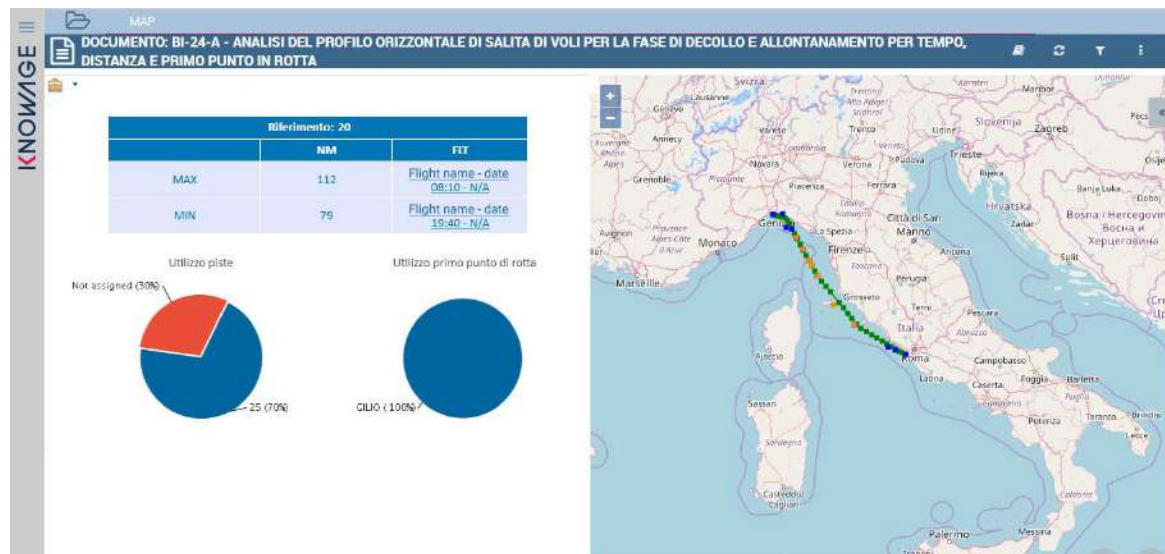


Figure 2. A map can be shown with other documents, using them as drivers to pick the correct geometry

- Airport hierarchization and PIs (e.g. average taxi time)
- Analysis of events that could have changed the average flight time (e.g. NOTAM)

#### Open Source Commitment

Knowage, the open source suite for business analytics, can be freely downloaded from Knowage website

and used in compliance with Affero GPL v3 licence with no restrictions. Knowage source code is available on GitHub, benefitting from the contribution of a wide open source community. Support over Knowage is freely provided by the community itself or through the professional services offered by Knowage Labs. For more information visit: [www.knowage-suite.com](http://www.knowage-suite.com)



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# HOW THE LATEST LOCATION-BASED MODELING PUTS YOU IN COMPLETE CONTROL FOR SITE SUCCESS

With new A.I. and machine learning entering the retail landscape, brands are empowering themselves with tools like SiteZeus, to make more informed location-based decisions.

by Keenan Baldwin



**T**he battle for brick-and-mortar success is fierce and unrelenting: Retailers and brands have to compete for customer loyalty and pocketbooks; grapple with growing e-commerce dominance; deal with industry-disrupting apps; and keep a laser focus on a margin-challenged bottom line. Not surprisingly, real estate and franchise professionals evaluating the right physical locations are under tremendous pressure to discover those sites that offer the least risk and greatest potential return on investment — to help their company **seize a clear market advantage in a highly competitive landscape.**

Of course, predicting site success has

long been a conundrum for multi-location businesses with potentially millions of dollars on the line. Evaluating and selecting the right sites is one of the most critical strategies to help attract, serve and retain customers, but it is a highly-complex dilemma, with a variety of criteria to consider, and a long-term investment that is costly to change.

**Historically**, a commercial real estate broker's gut intuition might have been the only thing standing between a location that rakes in revenue and an under-performing site that drags the rest of the company down and leads to turnover.

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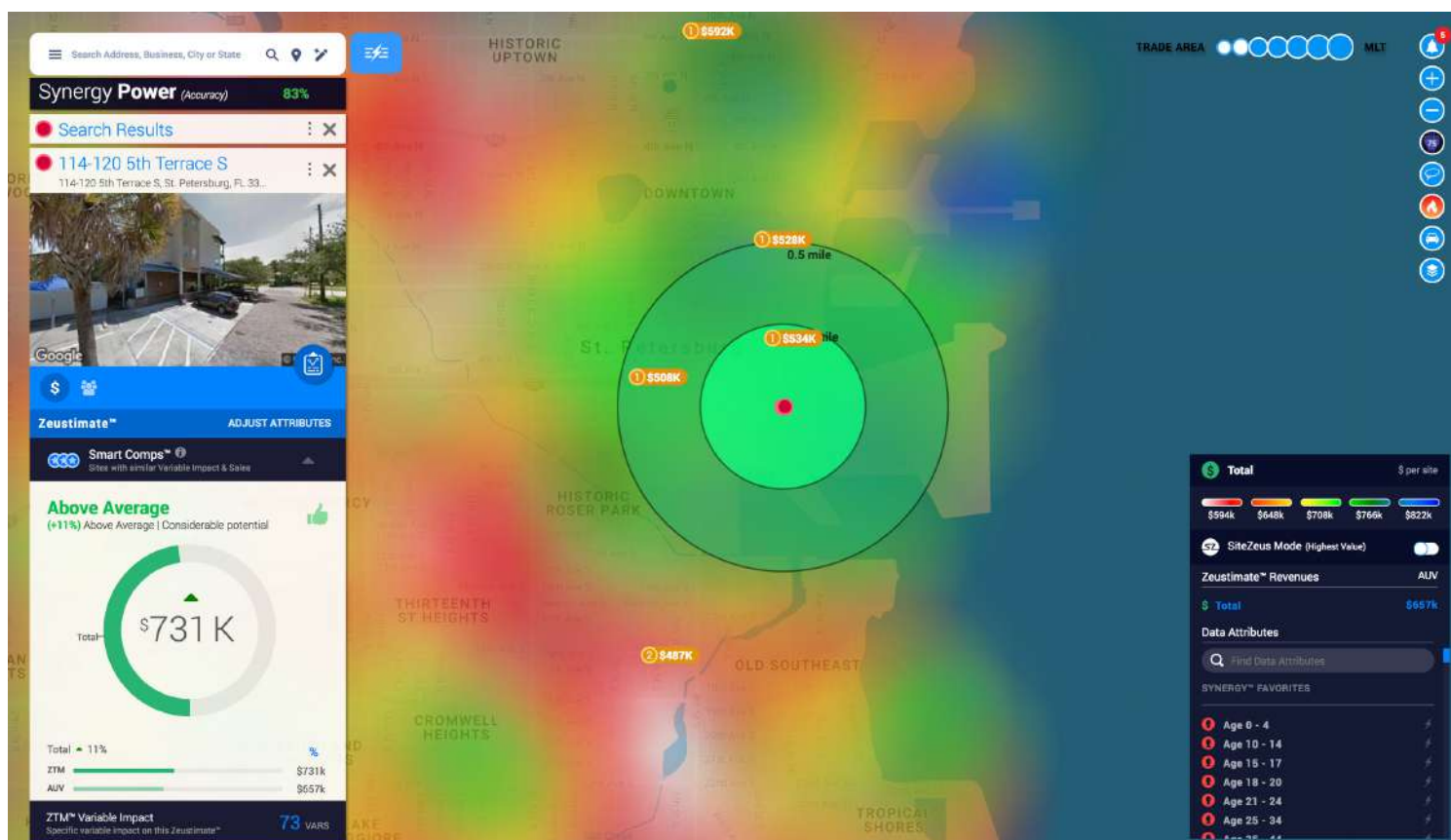


Figure 1. Zeustimate™: Sales forecasting made easy. With the drop of a pin, the Zeustimate provides real-time sales projections that aggregate in seconds by location.

In recent decades, however, location-based predictive data modeling has vastly improved the process of choosing locations. Many companies are already leveraging a predictive model, whether internally or through a third-party provider.

### But are these predictive models really setting retailers up for site selection success?

The fact is, those tasked with finding the next, best sites have often struggled to get the best predictions with these legacy, consultative offerings, which are typically based on linear regression predictive models that manually analyze a small number of fixed variables and require “ivory tower” experts to decipher.

There are several ways that these legacy models are keeping retailers behind the curve:

#### 4 THINGS LEGACY MODELS LACK

##### SPEED

Legacy, consultant-based models are project-oriented options that require a **manual, laborious, time-consuming** process to engage with them. It can take months for the consultant to manipulate data and build the model. By the time you get the results? They are already stale.

##### TRANSPARENCY

Want to know the “why” or the “how” behind your model? That’s hard to come by with legacy, consultant-based offerings. **You may not even know what variables are being used**, and if you don’t like the results, you’ve already paid for them. If you want to get new data into your model, or test a new scenario or thesis, you don’t have the ability to do that.

##### CONTROL

Legacy models require handing over all data and control to the consultant, who manipulates the data by building a **regression-type model in a “black box” environment**. You’ll have no idea what happened with your data, or exactly what type of model it is, even though money has been put down upfront and a multi-year deal signed.

##### FLEXIBILITY

With current models, **a fixed number of variables are used across any projection with the same weightings**, creating a rigid and concrete approach. Legacy solutions might consist of as few as 5-10 variables, all chosen based on some correlation and used across the entire model. This doesn’t reflect the reality of different conditions in varied geographies, for example.

## Modern Machine Learning

### CHANGING SITE SELECTION...FOR GOOD

Introducing A.I. and machine learning into the location intelligence space is a game-changer for all of the above issues. A SaaS LI (Location Intelligence) solution, based on a proprietary ML (machine learning) model, puts end users in complete control by offering them the ability to build and create a fast, accurate predictive model from scratch by themselves. It leverages an intuitive, elegant user experience and design that walks the user step-by-step through the process. **The model can constantly be updated and refined at any point, in a matter of minutes - offering not only predictability, but interpretability.**

### THE RESULT

Site selection that meets the needs of today's competitive retail landscape.

- **Fast Instead of Time-Consuming**  
Today's users expect responses in real-time, not weeks or months. They want to get the site selection answers they need in the field, on the go, and up to date. Machine learning and automation is the only way to do this, by consuming and synthesizing hundreds, or thousands, of data points — more than any human could possibly do in a short amount of time.
- **Dynamic Instead of Stale**  
The end user is in complete control with the latest machine learning-based LI solution - able to constantly update, refine, iterate and test different scenarios. This is starkly different than providers that deliver project-oriented, stale deliverables that only get refreshed annually or upon the request of the client, at which point the consultant has to update the model and redeliver the platform.
- **Transparent Instead of "Black Box"**  
Transparency equals trust. And trusting the data is key to the

success of any predictive model. The latest machine learning-based LI tool visually shows, in real time, how accurate your predictive model is at any given time, even as you update. The end user has the ability to see all of the variables and the frequency at which they get used across all of the locations. The tool also shows which variables were used for any new projection and the impact that each of them has on an individual site.

- **Iterative Instead of Static**  
Data is growing exponentially everyday, so why isn't your model? This new approach allows you the ability to constantly update and iterate. The latest machine-learning model allows users to do this by creating inputs called "Site Attributes," typically location-oriented characteristics such as square footage, number of parking spaces, whether there is a drive-thru or not, but also operating metrics such as Yelp ratings and social ratings. This is an iterative process that works over time and can be updated constantly to improve the health of the model.
- **Infinite Variables Instead of Fixed**  
Legacy methods may only use a half-dozen variables no matter where the location is. Leveraging cutting-edge machine learning means not only being able to handle an infinite number of variables, but how all of those attributes impact each other based on the reality on the ground at individual locations.

### From Reactive to Proactive Decision-Making

With this pioneering level of intelligence in today's machine learning-powered, location-based predictive modeling, retailers are in control. They can be armed with the right insights before a real-estate broker even comes into the picture. Now, a development team can even drive by a location and, in seconds,

get an immediate prediction of how a specific location on a map will perform.

Previously, a retailer might have simply hired a real estate broker to source and vet possible locations. Today, from a laptop thousands of miles away at the home office or while driving around in the field, the business can forecast and understand the entire market before even setting foot at a potential site. And in a world where every data point matters to an increasingly-demanding executive team, the proof for predictions is right in the platform — with a cloud-based, user-friendly interface powered by a machine learning engine, with an ever-growing data stack on the back end.

In addition, complex predictions are now simple to present and understand. In the past, the more complex a predictive model became, the less explainable and interpretable it became as well. So, sometimes it was easier to keep analysis simpler in order to make it easier to explain and prove. But now, higher-complexity doesn't have to mean less-transparent. Retailers can enjoy the best of both.

### Predictive Power at Your Fingertips

These days, retailers and brands are navigating treacherous waters in an age of e-commerce, disruptive apps and increasingly-demanding customers. As they get squeezed from every corner of the industry, they want and need a better way to determine which brick-and-mortar locations will perform best.

Businesses with multiple locations need to be efficient and effective, nimble and flexible - whether that means growing, renovating, or even downsizing. The key is to be able to have people on the ground getting real-time forecasts in the field, with instant access to a vast swath of data that takes advantage of revenue-generating opportunities.



## TRADITIONAL

Location-Based  
Predictive Models

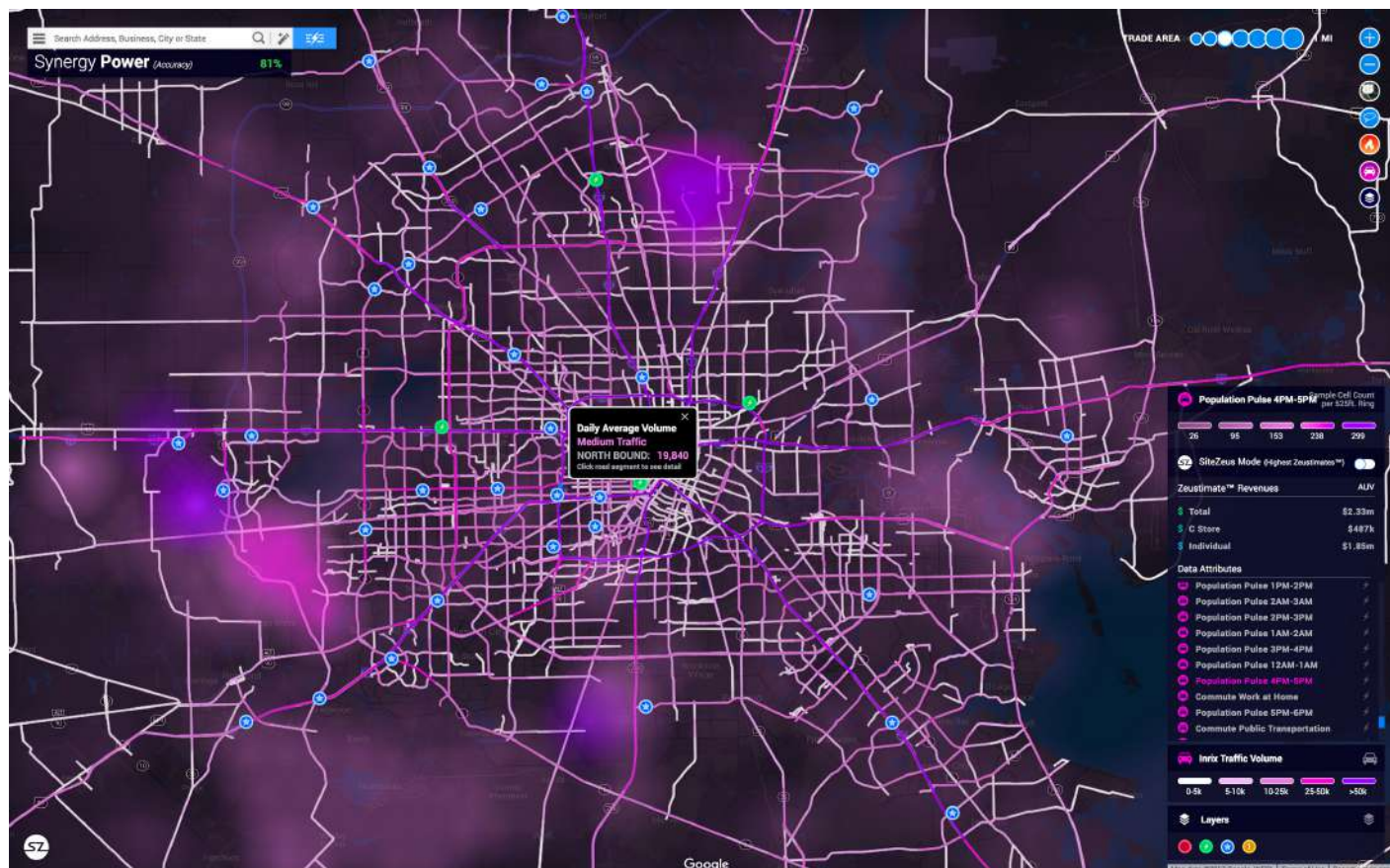
- ✗ Limited to handful of fixed variables
- ✗ Cannot expand by adding data
- ✗ Lacks transparency, requires ivory-tower experts
- ✗ Explainable, but only with increasing simplicity
- ✗ Data may need to be “massaged” to get the desired result

## TODAY'S

A.I. & Machine  
Learning-Powered Model

- ✓ Can expand to dozens or hundreds of variables
- ✓ Flexible technology that automatically evolves as you add data
- ✓ Transparent and user-friendly
- ✓ Explainable while maintaining complexity
- ✓ Data does not need to be “massaged” – with just one algorithm, all of the data agrees.

**Figure 2. Traditional location-based predictive models vs. Modern A.I. and Machine Learning-based predictive modeling.**



**Figure 3. The Olympus Data Exchange offers retailers an abundance of data, from traffic data to mobile data.**

With new machine learning-based LI tools, the empowerment that comes with machine-learning predictive models is at your fingertips, offering the kind of real-time accuracy, transparency, interpretability and usability that site selection decision-makers have never

enjoyed before. Retailers can now get a wide-open window into their data, to provide supporting evidence that predictions are correct, and putting in a far more powerful position to grow, renovate, relocate or even downsize with confidence.

Want to find out more about how A.I. and machine learning can take your location-based predictive modeling soaring to site selection success?

For more information go to [www.sitezeus.com](http://www.sitezeus.com)

# WHAT CAN LOCATION INTELLIGENCE TELL US ABOUT AN AREA?

Understand the key factors to optimise and expand your business network

by Ángela del Carmen Fuentes



Location Intelligence provides information and insights to reduce the uncertainty of opening in a new location.

geoblink

An indispensable factor for any business is the location. A factor that is crucial to the retailers to foresee a profitable site, real estate specialists to make informed decisions before choosing a space for commercial activities, and FMCG companies to manage and optimise their sales force and their product release, among others.

As an example, this article revolves around Oxford street; a popular street in the City of Westminster that stretches from Marble Arch to Tottenham Court Road. For our analysis, we are focusing on a 5-min. walking distance commute from the selected point.

## To begin with, who are the main players in Oxford street?

According to the data extracted from Geoblink, Oxford street bustles with **455 commercial markers** which include the automotive, leisure, fashion, health, food and grocery industries. As a whole, the fashion industry bags up to 36% of the viable markets with 164 stores. The notable brand **Warehouse** has a strong presence, with 5 stores within our area of study. The fashion outlets of this street is four times more to the number of stores in England that hits a low at 8%.

Following the fashion industry are

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food and service industries at 24% and 22% respectively.

Concentrating only on cafes, three Starbucks outlets are present within the region and another exists at a 49m distance from the selected point. Also, the area is home to two Italian restaurants (out of the 90 present in the UK): Bella Italia and Carluccios. Moving on to the service industry and focusing on the banking front, NatWest, Lloyds bank, Barclays and RBS are the top players among the 38 other banks in the area.

Thus, as we can see from the data, fashion, food and service sectors are the top 3 prominent players among the other commercial markets in the selected region.

### What is the socio-demographic pattern?

The presence of top tier brands combined with the high commercial scene on Oxford Street paves way for an interesting socio-demographic analysis of the area. Below are six examples of data regarding the 560 inhabitants residing on the Oxford Street.

Knowledge on the indicators presented Table 1 is needed for a retailer looking to expand his/her business in Oxford street. Why?

We will discuss three indicators drawn from our analysis below:

- Firstly, the high disposable **income** of the population under study signals high spending and purchasing capabilities. Also, within the same bracket, the educated population is high (3 times higher than the average of the country). This data could be of importance to a retailer looking to set up a luxury fashion store in the locality because people will be interested in the high quality products in such stores and will have the necessary purchasing power.

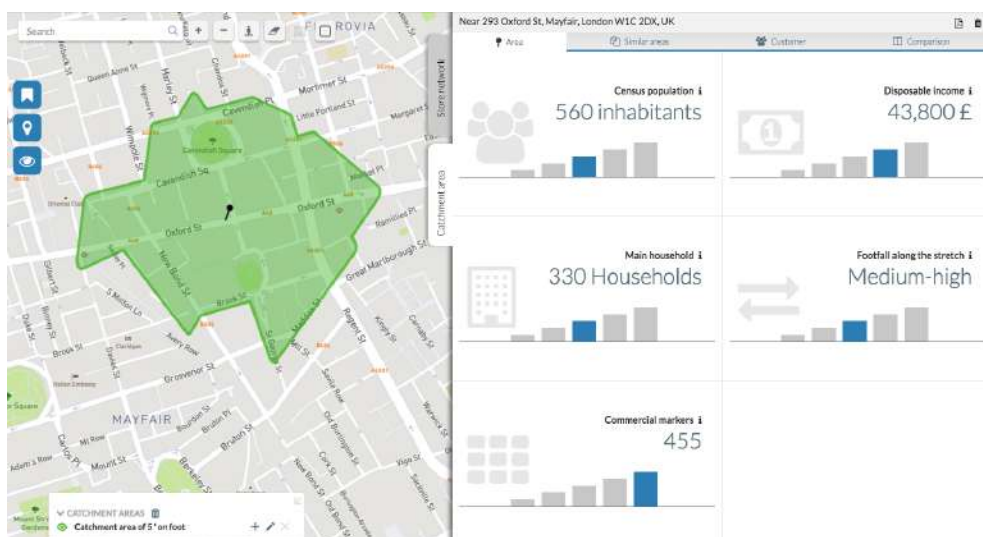


Figure 1. Near 293 Oxford Street, Mayfair, London, W1C 2DX, United Kingdom

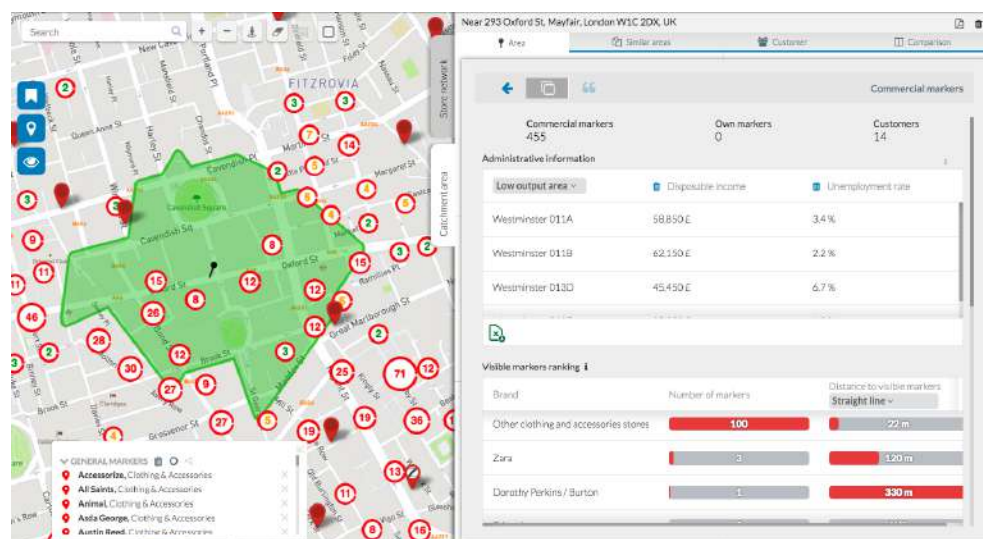


Figure 2. Near 293 Oxford Street, Mayfair, London, W1C 2DX, United Kingdom

Indicator	Data
<b>Average Age</b>	39
<b>Gender (Population in Target)</b>	Male: 150 Female: 120
<b>Average Disposable Income</b>	4.175 GBP (Nearly Twice the Average Income of The Country)
<b>Resident Genres</b>	Married: 180 Single: 260 Caucasian British: 260
<b>Educational Level</b>	Degree Holders: 60.16% No Qualification: 7%
<b>Pedestrian Traffics</b>	Very High

Table 1. Knowledge on the socio-demographic indicators is needed for a retailer looking to expand his/her business in Oxford street

- Secondly, **pedestrian traffic**. The commercial traffic in the selected region is extremely high. This is of no surprise as Oxford Street is internationally known for its great tourist attraction. Surprisingly, despite the high traffic coming from commercial stores, fashion stores and malls, a considerable amount of traffic comes from the education and health sectors in the area. However, high traffic can be detected in Baker street and Beak street located within a 5-minute distance by foot, so what makes Oxford Street special?
- What lies on the other side of “very high” pedestrian traffic? In short, the fact that people stroll, flock and frequent a specific area in abundance boils down to two factors:
  - The popularity of area**
  - Presence of noteworthy shops (fashion, service and food).

Opening a store in a locality that bears high pedestrian traffic brightens the visibility of the store by magnetising more people, increasing sales and ultimately accelerating revenue with considerable leverage over other indicators.

The **population** is another indicator that fuels our analysis (here the average age is 39 years). This could be one of the critical indicators for a retailer thinking about the kind of bespoke store to bring to Oxford Street. Here, the percentage of single inhabitants is 51% compared to the 35% in a married/civil partnership. As there is a minimal difference between these percentages, it will be valuable for a retailer to establish stores that target both the groups of inhabitants.

Take Warehouse for example. The British clothing retail chain, has 5 stores on Oxford street. Placing the brand amid the analysed demographics, we can say the retail brand works well with the statistics as it comfortably houses apparel for customers aged between 15 and 39. Furthermore, having five stores within the selected area allows the

customers to encounter the brand repeatedly during their shopping spree thus inflating visibility. This was all thanks to this Location Intelligence software as it provided us with pedestrian traffic and tourist data.

The feasibility of reaching a store by either car or on foot as well as the availability of an efficient transport system in a specific area is another

actor considered by businesses. That being said, few well-known fashion stores such as Warehouse, Zara, French Connection or Lk Bennett are located at a 5-minute distance by foot while few others are situated at a distance that could be reached by tube. The area under study has two underground stations, Bond Street and Oxford Circus; making it easily accessible.

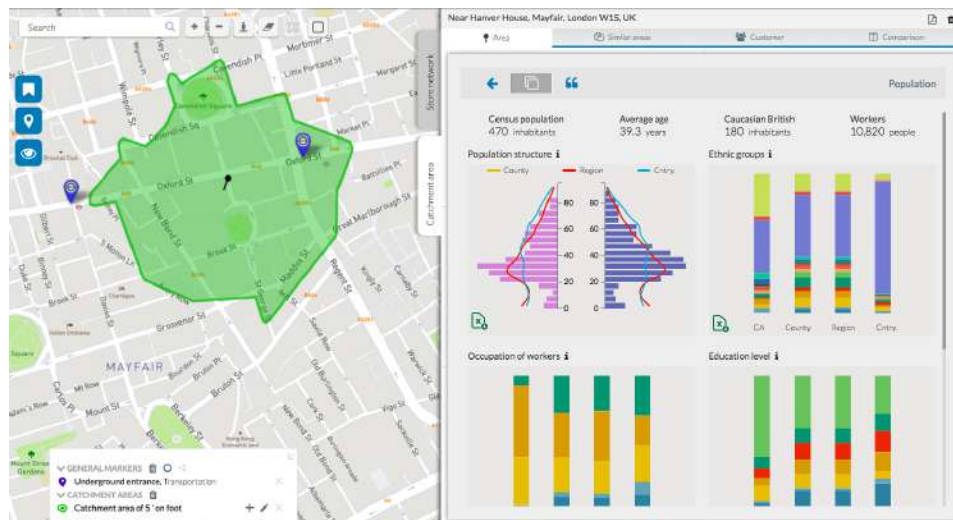


Figure 3. Transportation and drive time kindles business conscience

### How can demographics empower marketing strategies?

By knowing the prominent players and the rich socio-demographic data of Oxford Street, you have gained the first piece of your puzzle. What is the next dot to connect? Marketing strategies based on data. For example, using the indicators we have analysed, the following Table 2 gives you a basic idea of how to fuel your marketing strategies.

Marketing	
<b>Average Age</b>	The average age of 39 years calls for marketing through internet, prints and television.
<b>Ethnic Group</b>	With a mere dispersion of ethnic population an expansion director can either design a bespoke marketing strategy or utilize the existing.
<b>Gender</b>	With 150 male inhabitants and 120 female inhabitants, one can put in place a common marketing strategy targeting both the groups.

Table 2. Basic idea of how to fuel your marketing strategies based on previous information

### The Location Intelligence software for your business needs

With Location Intelligence, we completed a 360-degree analysis of London's most enthralling street hassle free. This is much more convenient than the traditional business expansion practices which require an executive to frequent the location multiple times to record the above discussed indicators, wasting both time and money. Our software provides a solution for Retailers, SME owners, Franchises, FMCG and other business owners alike looking for an effective solution to expand their business with an appreciable Return on Investment (ROI).

Geoblink's Location Intelligence solution helps companies (in sectors such as Retail, Real Estate and FMCG) make informed business decisions that concern location.

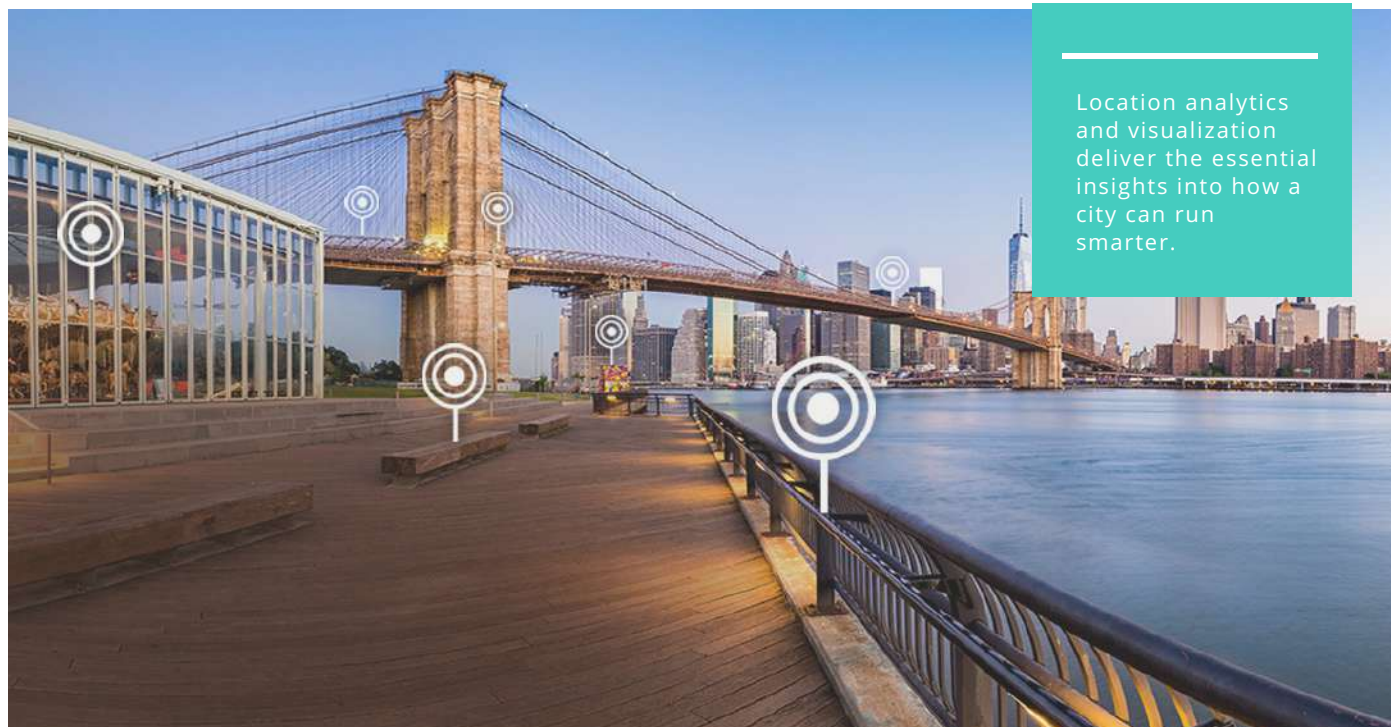
Learn more: [www.geoblink.com](http://www.geoblink.com)



# IF ONLY YOUR ROAD COULD TALK

If your road could talk, would it tell you that repairs completed today would save three lives and \$500,000 tomorrow?

by Joe Francica



Location analytics and visualization deliver the essential insights into how a city can run smarter.

If your road could talk, would it tell you that repairs completed today would save three lives and \$500,000 tomorrow? Would it estimate repairs over multiple time horizons as a function of net present value? Would it tell you that installing a traffic light at a busy intersection could improve urban traffic flow during rush-hour and substantially reduce your carbon footprint?

And, what if your car could talk to the road? Would it say that the road is experiencing shifting substrate with insufficient subsurface support? Would it tell you that conditions are changing from merely wet to icy? Would it provide a report on the

degrading asphalt that would indicate that a pothole is sure to open shortly?

In a world of sensors, mobile devices and IoT technologies, every government authority – whether a city or state department of transportation – is on a path to becoming smarter and more connected. Intelligent infrastructure management attempts to integrate sensor technology and data with traditional asset management operations. This empowers public entities – and those serving public entities – with the insight to make informed decisions on repair, maintenance and investment for

## About Author



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critical public infrastructure assets.

While it's interesting to discuss the possibilities of a smart city – interconnecting various city services into a single IT platform – the bottom line for mayors, city administrators or department managers is to fix roads, keep traffic moving and securing a safe, livable environment.

The key is to deploy an intelligent infrastructure management solution capable of not only fulfilling the needs of city administrators but one that leverages all possible means to connect with an existing network of sensors, traffic signals and pavement management systems. It starts with an asset register that records the location, physical condition, financial status and operational data for all infrastructure assets in a single, secure data store. It should include

scheduled and reactive maintenance programs, incorporating work priorities, schedules, tasks, contract documentation, bill of quantities; contractor bid evaluation; and cost forecasting. Finally, it should be designed for the mobile workforce allowing inspectors, surveyors and work crews to spend more time in the field carrying out asset evaluation and repair activities.

However, the solution must also comply with new legislative guidelines to secure the necessary funding for repair, maintenance and future investment. These guidelines are particularly important for sustaining critical infrastructure if unforeseen events or impediments occur. The objective, therefore, is safeguarding the regional economic development and viability of the community.

A fundamental underlying element for an intelligent infrastructure management solution is geographic information because government is a fundamentally geographic business. Whether its infrastructure or tax information, location-based data is essential. As such, GIS lies at the heart of a solution, taking account of the geospatial characteristics of proximity, distance and time.

Tech-savvy mayors and State DOT managers are now running their local government using GIS. As sensors are used to monitor highway traffic, utility efficiency and the location of field service teams, the ability to get a citywide view of its infrastructure is vital to maintaining city and statewide services. As a result, location analytics and visualization deliver the essential insights into how a city can run smarter.

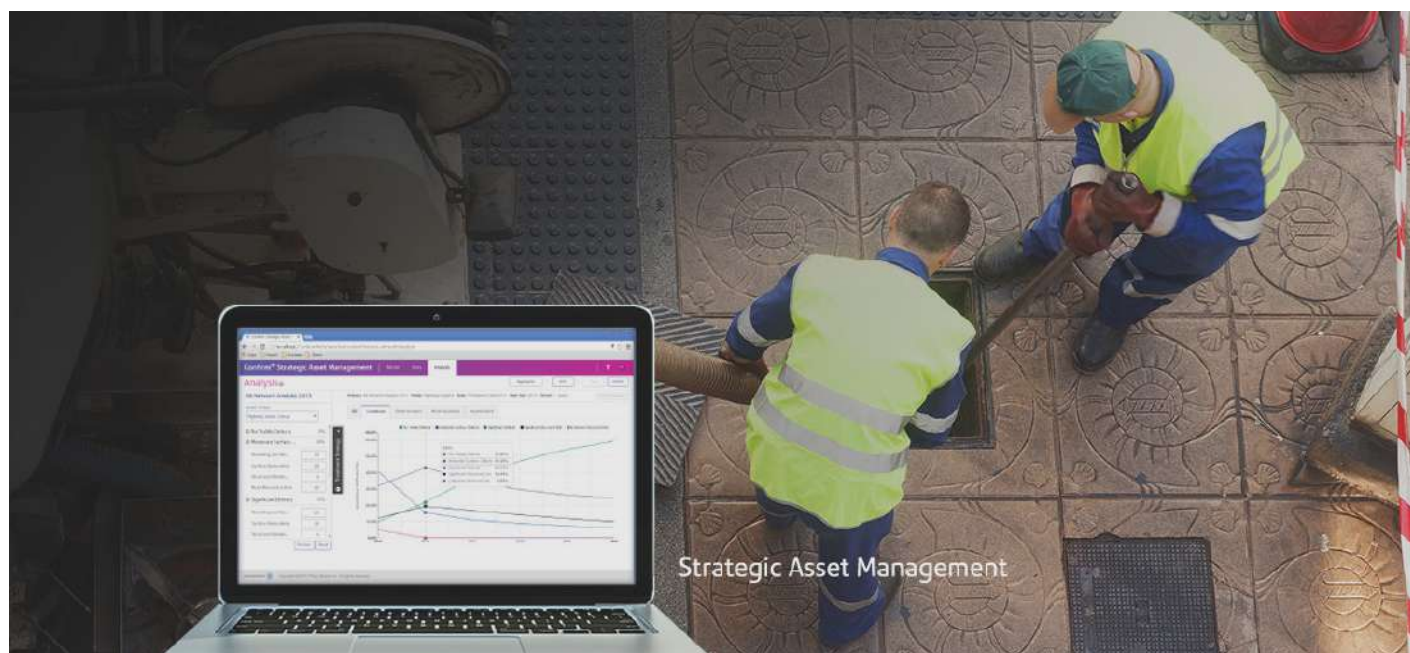


Figure 1. Strategic Asset Management



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# ANALYTIC IMAGERY SOLUTIONS BROADEN POSSIBILITIES IN ANTARCTIC MONITORING AND EXPLORATION

Satellite data is an easy-to-use and cost-efficient monitoring tool that allows to measure and detect changes in our planet at a global scale.

by Ana Isabel Martínez



Satellite imagery is a key tool for timely, reliable monitoring of remote areas with extreme weather, without the costs associated with having people on the ground.

Encompassing over 5 million square miles, the Antarctic continent is the world's largest wilderness area and the only continent without a native human population on the Earth. Antarctica is currently claimed by seven nations, but 53 countries have signed the Antarctic Treaty System (ATC) since it opened for signature in 1959. This treaty sets aside Antarctica as a scientific preserve, establishing freedom of scientific investigation and banning military activity on the continent. Thus, scientific research is the main activity in this frozen continent, and the population residing there is comprised mainly of scientific research staff.

The Antarctic continent, like the North Pole, is one of the regions in the world most affected by global warming. It is also an ideal location to study how the climate is changing, since it experiences the least amount of human influence. However, given Antarctica's remoteness and extreme weather, monitoring this vast territory can be challenging and expensive.

Satellite imagery is a key tool for timely, reliable monitoring of remote areas with extreme weather, without the costs associated with having people on the ground. One company leading the field in the imaging of high-latitude territories such as

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Antarctica, is Deimos Imaging, an UrtheCast company.

East View Geospatial (EVG) and Deimos Imaging recently performed a joint campaign for monitoring and change detection of research activity in Antarctica. Tasking the Deimos-2 satellite, EVG was able to monitor areas of known activity, including multiple research stations, at superior resolution.

Figure 1 shows the Larsemann Hills antarctic oasis on the shore of Prydz Bay, where three research stations are based: Russia's Progress Station, Romania's Law-Racoviță Station and China's Zhongshan Station. This image was captured by Deimos-2 on December, 27, 2017.

Leveraging in-house analytic capabilities, EVG identified recent activity at the stations, as well as a suspected grounded DC-3 transport aircraft located not far from Russia's Progress Station and China's Zhongshan Station.

Figure 2 shows a camp and what seems a DC-3 transport aircraft grounded near Progress and Zhongshan Stations and captured by Deimos-2 on December 27, 2017.

Figure 3 shows a multitemporal comparison of two images showcased on Google Earth and captured on January 3, 2011 and January 17, 2011, and the image captured by Deimos-2 on December 27, 2017. There are no signs of the aircraft on the left image, captured on January 3, 2011, while it appears on the other two, suggesting it has likely been there since January 17, 2011 to date.

This study proved the value of geospatial information for monitoring and change detection, especially in remote areas where it is difficult to get up to date information otherwise. Satellite data is an easy-to-use and cost-efficient monitoring tool that allows to measure and detect changes in our planet at a global scale and thus, a key tool for decision making.

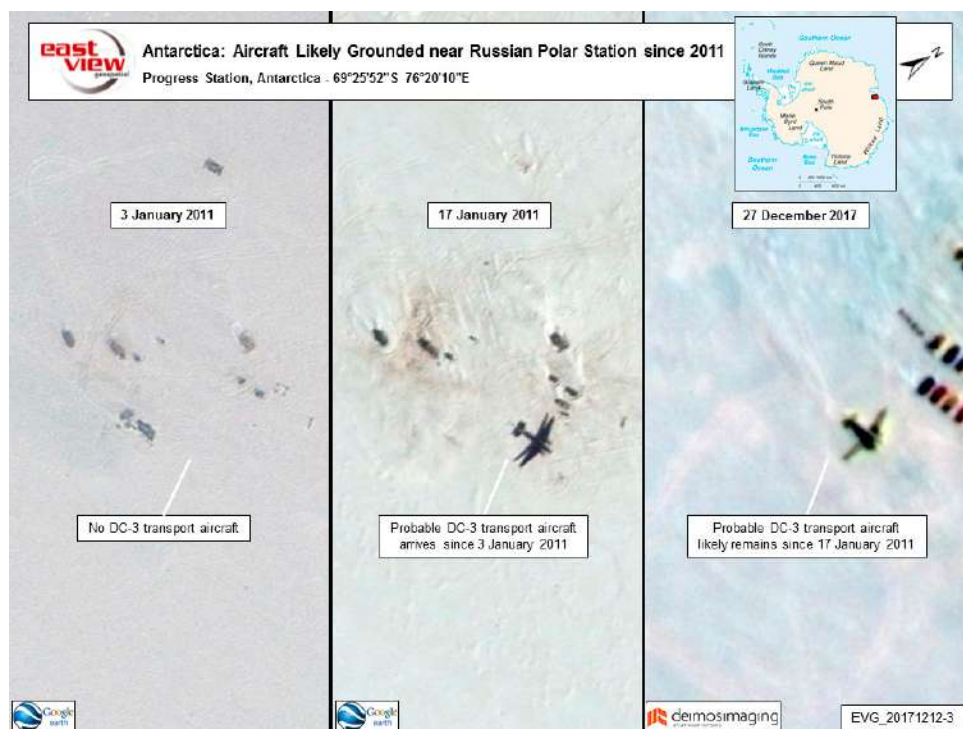
East View Geospatial and Deimos Imaging announced their partnership in November 2017. This agreement enables customers to get an extraordinary level of insights, by complementing East View Geospatial's technical innovation in analysis with the reliable monitoring capabilities of Deimos Imaging. In addition, it is expected to create a valuable benefit for several applications such as topographic mapping, digital elevation modelling and surveying.



**Figure 1. Research stations at Larsemann Hills, Antarctica**



**Figure 2. Aircraft grounded near Progress Station and Zhongshan Station**



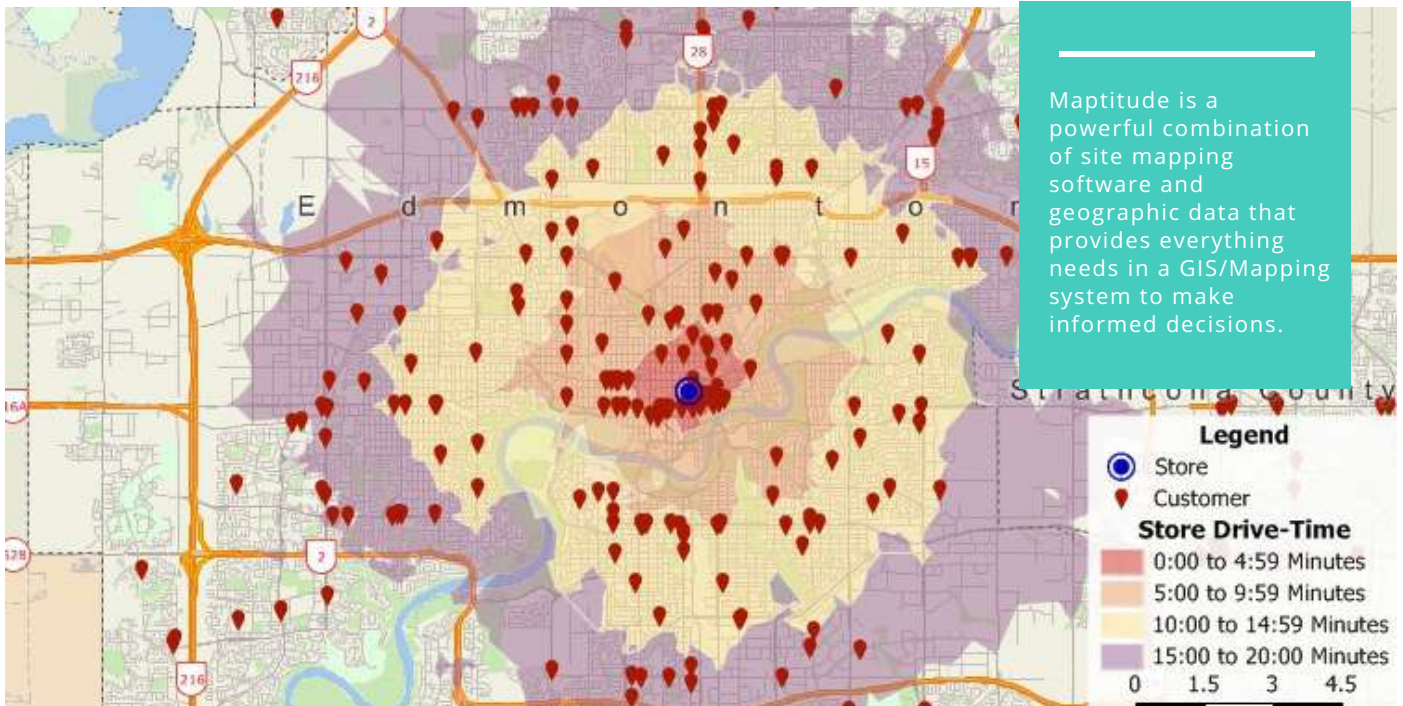
**Figure 3. Overtime comparison of aircraft grounded near Progress Station camp**



# HOW CKE GREW THEIR BUSINESS WITH MAPTITUDE LOCATION INTELLIGENCE TOOLS

Maptitude is a cost-effective and comprehensive mapping and data product.

by Stewart Berry



Caliper's software applications are being used around the globe and are making businesses and governments more efficient and effective. Founded in 1983, Caliper is recognized worldwide as a leader and innovator in the development of transportation analysis and GIS software.

Caliper is the developer of TransCAD® Transportation Planning Software, TransModeler® Traffic Simulation Software, and Maptitude® Geographic Information System Software packages.

Maptitude is a professional Location Intelligence mapping tool for business, government, and education. Maptitude provides ways

for you to use the maps you create to analyze and understand how geography affects you and your business.

As the CKE Restaurant Holdings, Inc.'s two popular restaurant brands, Carl's Jr. and Hardee's, grow in the U.S. and in several international markets, managing franchise territories has become more complex, while the need to integrate disparate sources of business data has escalated. To overcome this, CKE relies on Maptitude to simplify territory identification and allocation, as well as to improve franchisee satisfaction through providing insightful market intelligence thereby increasing opportunities for success.

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## Business Challenge: Franchisee Trade Areas

One of the major issues that franchise businesses encounter is territory disputes whereby one franchisee's business is positioned too close to another's, resulting in cannibalization. In order to prevent the adverse effects of this phenomenon, a franchisee is typically awarded an exclusive area where no other franchisees of the same brand can set up shop. This practice helps to limit the risk of cannibalization.

CKE uses a sophisticated method of assigning franchise territories and scoring of potential trade areas that is based on a variety of factors including demographics, competition, and other socio-economic data. When a franchisee invests in one of CKE's brands, their Development Agreement will reflect the territory and trade area potential based upon this data. To minimize risk of franchise overlap, CKE uses these geographic tools to properly target trade areas that are a sufficient distance away from one another.

CKE deploys Maptitude to delineate its franchise territories, as well as providing its franchisees with market maps highlighting existing restaurant proximities, competitor locations, and target areas for future growth. It has become a critical tool for CKE's franchisees, who can easily comprehend the complex and dynamic components of their specific markets, allowing them to focus on the development landscape.

Previously, when evaluating trade areas for a new franchise, CKE relied on individual variables such as basic Census characteristics, competition, and activity generators. The data were sourced across various platforms and software products throughout the organization, and came in a variety of unintegrated file formats. It was difficult to get a clear picture of those market areas with the highest probability for success,

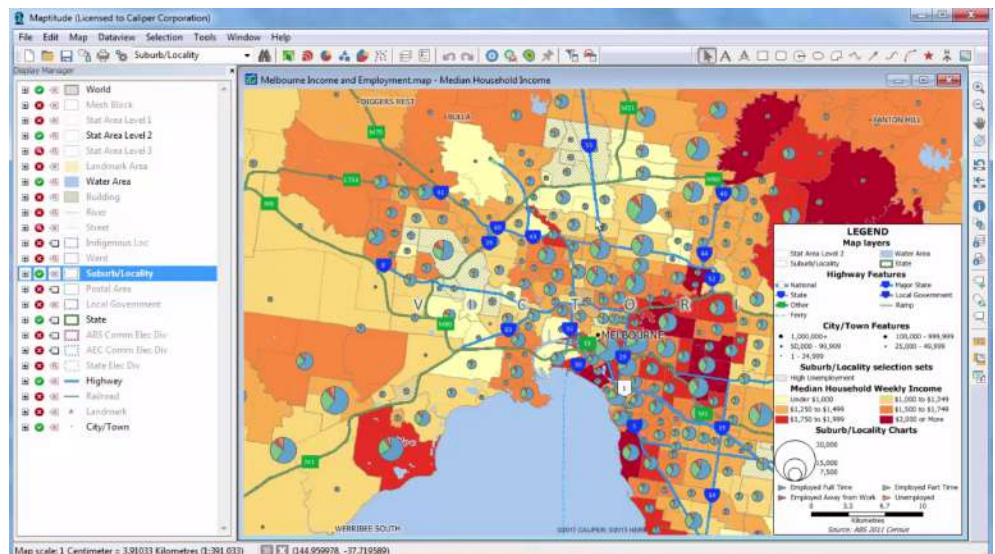


Figure 1. Income market analysis

even though CKE knew the key variables associated with their highest performing locations.

### The Solution

Caliper Corporation provided Maptitude as the solution, allowing CKE to efficiently unify their location-based data and to display that information in a single map. Maptitude supports quick and easy territory management, allowing CKE to achieve 3 key objectives:

- Determine market capacity for any given franchisee territory
- Highlight and prioritize target trade areas for franchisees
- Conduct accurate and meaningful site evaluations

In summary, CKE uses Maptitude to create a development “blueprint” for future restaurant development.

### Results & Benefits

#### Highlighting and prioritizing target trade areas for franchisees

Maptitude mapping software provides CKE with the suite of tools they need to create franchise territories, including extensive demographics, consumer segmentation data, and address/postal geocoding and validation.

Often a territory is an area that is made up of several smaller areas merged together.

### Technology Used

CKE chose to use Maptitude mapping software because of its extensive location intelligence capabilities, broad range of relevant socio-economic demographic data, and user-friendly design ethos.

Maptitude is a cost-effective and comprehensive mapping and data product. Maptitude enables organizations such as CKE to leverage their location-based information to improve decision making and planning, while minimizing expenditures. Maptitude includes everything CKE required for geographic market analysis, is regarded as an easy-to-use professional mapping product, and costs only \$695.

**“Maptitude helps us optimize franchise territories enhancing our ability to develop successful, sustainable restaurant locations. It enables us to evaluate multiple variables simultaneously so that we have a better opportunity to minimize risks associated with development and maximize chances for success based on our unique criteria.”**

Mike Sawyer  
Director of Market Planning, CKE



For example, franchise territories might be made up of groups of postal zones, neighborhoods, or other regions.

Maptitude can build the franchise territories and compute the attributes and demographics of each one, helping CKE to determine the optimal territory for its franchisees.

Maptitude is used to provide market maps to CKE franchisees that show the trade areas that are most desirable versus least desirable. This helps maximize store revenue through enhanced site placement, reduces risks associated with territory 'overlap,' and improves market penetration.

### Future restaurant locations

Maptitude makes it easy to use maps to analyze and understand the best locations for franchise site selection. Maptitude is a powerful combination of site mapping software and geographic data that provides everything CKE needs in a GIS/Mapping system to make informed decisions.

CKE uses Maptitude to:

- Ensure that future restaurant locations are in areas that are appropriate to develop and in targeted growth markets
- Delineate franchise territory boundaries awarded to their franchisees
- Match up franchisee capabilities and the development interests with the restaurant potential of a market area

Maptitude is also used to optimize development within the territories. When a new restaurant location is proposed, CKE use Maptitude to make sure that the site falls within the assigned territory, and is not too close to an existing location, thereby reducing the risk of sales cannibalization.

### Real estate analytical tool

Maptitude empowers property researchers with fundamental mapping and geographic analysis tools needed for commercial real estate applications. With Maptitude, CKE can visualize locations and evaluate them based upon desirable characteristics that are unique to CKE and its 2 brands.

CKE use the Maptitude analytical tools to assess lists of available real estate properties in terms of their local demographic data and proximity characteristics in



Figure 2. Maptitude mapping software running on a mobile tablet device.

order determine the efficacy of acquisition/conversion strategies. For example, when competitor units are closed and made available for conversion, CKE can analyze the surrounding trade areas to determine which sites synch up with the preferred characteristics that CKE knows are consistent with its successful locations. Once feasibility is established, CKE conducts proximity analysis and communicates availability of desired property to appropriate franchisees.

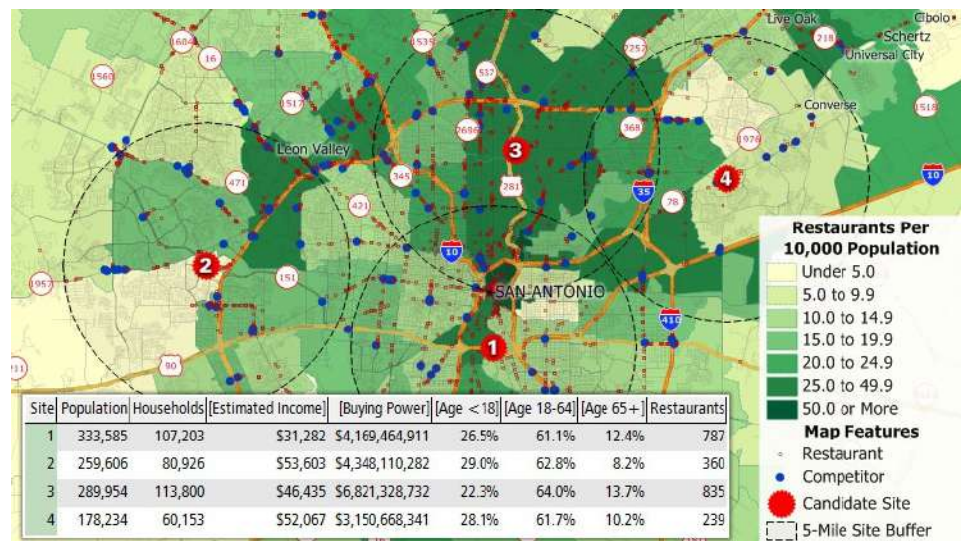


Figure 3. Use Maptitude business location software to map your customer data, identify markets, and more.

### Customer Profile



CKE Restaurants Holdings, Inc. owns, operates and franchises some of the most popular brands in the quick-service restaurant industry, including the Carl's Jr.®, Hardee's®, Green Burrito® and Red Burrito® restaurant brands. The CKE system includes more than 3,300 restaurant locations in 42 states and in 28 countries. CKE is headquartered in Franklin, Tennessee.

**"Mapitude helps our franchisees navigate through the clutter, and focuses them on areas where there is the greatest likelihood for success."**

Mike Sawyer  
Director of Market Planning, CKE

# LOCATION INTELLIGENCE; BEGINNING OF USER-BASED GIS

Location Intelligence is a requirement for today's business, organizations, local government, policy makers, Entrepreneurs.

by Manas Kumar Jha



Location Intelligence is a map based and data-rich intelligent system, which provides information about a geography or target area.

Designed by yanalya / Freepik

**A**nalysis of Primary to secondary data, Journey from Paper Map to digital form, GIS industry has come a long way. Spatial and Non-spatial Data acquisition and its analysis was part of GIS-based studies. However, now a day's availability of location data is more common due to the usage of GPS enabled Mobile Phones. There is a huge location data available which is being utilised now a day for various analysis purposes. These real-time databases help in resolving various issues that were found impossible earlier. As a best practice location intelligence is being replicated with more user-friendly technologies that can be effective and analyse the

real-time spatial data with valuable business insight.

## What is Location Intelligence?

When Internet-based geographical search engine return with rich and analytical data as per user requirement, the system can be called intelligent. Location Intelligence is a map based and data-rich intelligent system, which provides information about a geography or target area. It perhaps helps policymakers, young entrepreneur largely in taking decisions that need logical and rich data analysis results. Now a day the available open source search engine or map service providers have

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enough data that can be linked with a coordinate for geographical analysis.

However, in the growing digital world enormous information or data sources is still untouched which can be linked or made available for public usages. One of the best examples of location intelligence is identifying options of Hotels through various online service providers who have enormous information available for hotels that are linked with geographical maps. A user must identify the coordinate and do smart analysis as per their requirement. Here it is to be noted that amongst all information available for hotels, geographic/location-based information play a major role in effective decision making for users.

It was rightly quoted by Robert Williams that 80% of the information needs for local government and policymakers are related to geographic locations only. As compared with temporal analysis of data for research work, location intelligence is using the same GIS methodology to analyse the temporal data along with real-time information from various sources. These sources are Internet-based search engines, navigational devices, sensors etc. In the coming future GIS analysis will be more intelligent and user based where a user will perform smart analysis of geographical data for day-to-day usage. It will limit the role of GIS professionals to prepare and arrange the primary GIS data into the required format. Developers and analyst will link all these information into a readily available format that can be used by the end user for day-to-day decision-making. This intelligent system will not restrict the users to understand GIS and usage of traditional software before analyzing the data.

In the growing digital world analyzing data with a location context can change it to information and can be linked with various

location-based analysis. Hence, Location Intelligence is a requirement for today's business, organizations, local government, policy makers, Entrepreneurs.

Next section will explain the details about usage of location intelligence which overcomes major challenges while making a location-based geographical analysis.

### **Location Intelligence and End of GIS; A Myth**

Environmental Impact analysis is one of the major studies that is being done before citation of the industry to understand the potential impact on the environment, population, a nearby area, Flora and Fauna. This analysis has various segments and requires a site visit and generation of various primary data. When all these primary data analyzed in a context of Impact on Environment, it becomes important information's, which is utilized for decision-making. Here all acquired information and its impact is associated with a particular location or geographic area only. Changes in location may require repetition of effort in generating primary data to make it readily available for impact analysis.

Likewise, for EIA as mentioned above, formulating any business ideas or prior impact analysis may require rich sources of accurate spatial data and authenticated source of non-spatial data. The concept of location intelligence is based on readily available primary sources of data that may or may not be coming from a homogenous system for analysis.

Intelligent analysis requires a good and authentic source of Primary data. Until the system is linked with rich sources of accurate spatial and non-spatial data the analysis result may not be useful. In absence of the accurate spatial data and authenticated non-spatial data, the result may be spurious. Hence to produce such good quality of spatial data and linking the same

with the authenticated information sources GIS-based analysis is very much required. This information can be linked and used for preparing user-friendly location intelligence system. In coming era, more need of user-friendly location intelligence interface will explore various other GIS-based analysis, which is limited up to the research and academics only. Growing need of location intelligence in parallel open the opportunity for GIS professionals to generate more primary data and make it ready for usage in Intelligent systems as a secondary data.

### **Usage of Location Intelligence**

There is no limitation on the usage of an information. Based on interpretation and context it can be used in various decision making. Likewise, usage of Location Intelligence cannot be limited to the certain area of interest and based on the context it can be used in various decision making. One of the best examples of effective decision-making is in the inception of business idea where decision makers can have a preliminary study about the feasibility of business, possible challenges and mitigation strategy before landing up in deep study.

#### **a) In Research and higher studies**

Availability of various primary data linked with intelligent analysis system can help students largely in their higher studies. Predictive analysis of climate changes, temporal studies of natural disaster and correlating the same with a current real-time environmental parameter can be used for preparing environmental alarm system for the disaster-prone area. The real-time data in combination with streaming of temporal data can be used in multiple ways in higher studies.

#### **b) Health Sector**

Health care system in Developing countries is facing major challenges such as providing better health services, Physical health infrastructure, skilled workforce, surveillance of disease etc.

Here location intelligence can be used to understand the availability of health services with reference to population. Real-time data and map can help decision makers to understand and surveillance of disease that is affecting a particular area. Based on the real-time information adequate material, infrastructure or skilled workforce can be deployed in such area before the disease became epidemic.

### c) Real Estate

Site selection requires preliminary analysis of site via physical presence, however, using the real-time data and various thematic maps can help the decision makers to analyse the potential sites to develop it for real estate. Here rich sources of accurate spatial data and accurate sources of non-spatial information plays a major role.

### d) Agriculture

In developing countries like India, the major reason behind the failure for the participation of private players for crop insurance is lack of real-time agriculture database and intelligent system to analyze the same. By Location intelligence the participation of Private players may get increased for crop insurance, agricultural loan based on the analysis of geography, the pattern of farming, real-time market database

etc. GIS-based decision support system can be required across the country where each panchayat will participate by providing the information of expected agricultural productivity. The input of this information can be then utilized by the intelligent interface for spatial and non-spatial query building. Here Location intelligence can help decision makers in;

- Analysis of the type of crop, Agriculture products.
- Analysis of location of agriculture products across the country.
- Analysis of probable quantity of products.
- Analysis of estimated quantity vs produced quantity.
- Analysis of root cause analysis for low productivity.
- Analysis of high productivity and preparation of case study for awareness among other farmers at different location.
- Analyzing the demand and supply curved (Based on the temporal study).
- Analyzing the quantity that can be exported by maintaining demand and supply in country.
- Analyzing the selection of crop in next season.

### e) Government and Policy Makers

Data used by Government and policy makers contains 80% of the information's that belongs to a location and hence location

intelligence plays a vital role for policymakers in effective decision-making. Currently, in developing countries, spatial and non-spatial data available for government agencies are based on their sectors and in segments. Even the real-time data that is being generated for environmental information, transportation etc. has no mechanism of linking the same with each other. Every segment needs separate analysis and hence not user-friendly for predictive analysis. Location Intelligence, if applied shall use all the information available, link it with the real-time information, and provide an intelligent interface for the user to analyse the same.

### Conclusion

GIS professionals for various analysis used spatial Information or Geographic data extensively. Majority of the studies is having dependencies on highly expert GIS professionals who were utilizing the dedicated software to study and analyze the same. Now a day for location intelligence the available primary data i.e. spatial and non-spatial information's available on various open sources website, dedicated sector wise website along with the real-time data is being linked with an intelligent user-based interface where a user can perform predictive analysis using the same. These user-friendly interfaces will restrict the dependency on GIS experts and professionals to perform various analysis and help decision makers to have quick inputs on decision-making information.

There is a huge possibility where dependency of a user on location intelligence will grow in near future. In parallel, it will also create demand for accurate spatial data to be produced by GIS professionals. As the accurate spatial data and authenticated Non-spatial data is the key for future location intelligence.

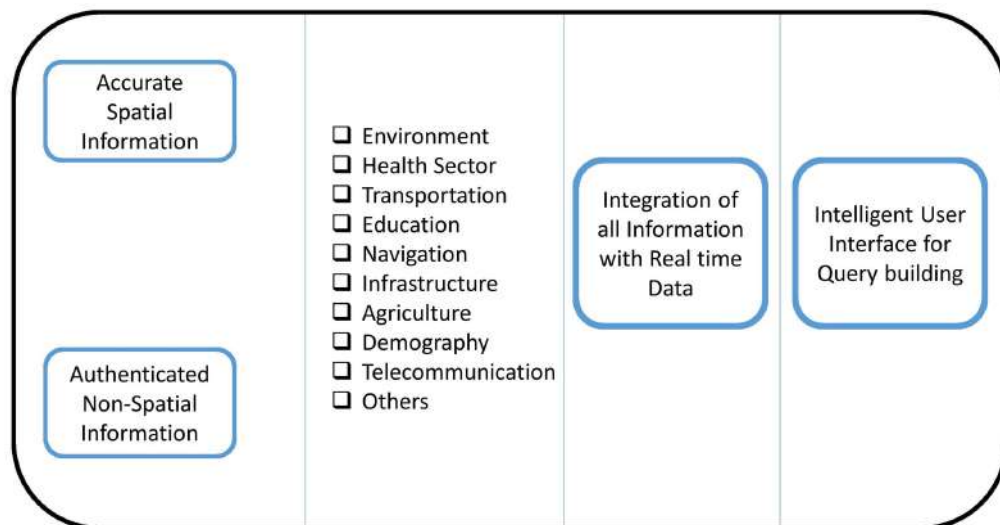


Figure 1: Usage of Location Intelligence



# LOCATION-BASED SERVICES – THE WAY FORWARD

The concept of LBS is based on years of development and convergence of different technologies: GIS, GNSS, new information and communication technologies.

by G.K.Tripathy and T. Ranga Vital



LBS refers to a wide range of services-based information about the physical location of a user and device. It is a software level service that uses location data to control features.

Image Credit: Shutterstock

**A**ccurate location is a critical factor in location-based services (LBS) and which is used for analysis and finding out the insightful inferences for businesses as well as government. The spatial patterns that location-related data and services can provide are one of its most powerful and useful aspect where the location is a common denominator in all these activities and can be leveraged to better understand patterns and relationships. LBS refers to a wide range of services-based information about the physical location of a user and device. LBS is a software level service that uses location data to control features. As such LBS is an information service and has several uses in social networking today. For the past few years, one could observe the transformation in

location-based technologies and geospatial information. Due to the popularity of geographic layer in everyday activities, people are getting more cognizant of the geospatial aspect of life. LBS application provides services based on the current physical location or a known location depending upon the proximity of the user. The user proximity can be determined by using mobile communication network or Global Navigation Satellite System (GNSS), Geographic Information System and Wireless Communication technologies.

## Concept and Components

The concept of LBS is based on years of development and convergence of different technologies as well as an evolution of information society

## About Author

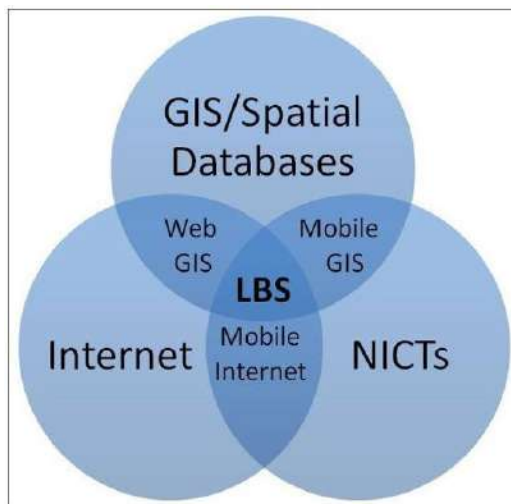


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where context and customization of information is one of the first priorities for users. Looking at the technological background of LBS it can be presented as the intersection of several technologies: GIS and other spatial and positioning technologies, the Internet and the Web, and new information and communication technologies (NICTs).



**Figure 1. Concept of location-based services**

Source: <http://geoawesomeness.com/>

The 'Web GIS' reflects development of Web mapping services that started operating in the mid-1990's (e.x. Mapquest.com) and were widely popularized all over the world by Google Maps launched in 2005 and other companies like MapMyIndia, SatNav Technologies etc.

This part reflects the evolution of many GIS Web as well based analytical tools including ArcGIS Online. The 'Mobile GIS' reflects the convergence of traditional GIS software and mobile devices (handheld computers, palmtops, tablets) that enabled field-based personnel to capture, store, update, manipulate, analyze, and display geographic information. Most of these solutions required downloading data to the mobile device. The 'mobile internet' presents the development of two technologies: wireless internet and modern mobile devices. The resultant of these technologies is LBS which is utilizing all parts of this equation. Taking into consideration growing progress in all those fields

including increasing computing power of mobile devices, the accuracy of positioning technologies, fast wireless internet connection and cloud computing, the LBS is playing a significant role among all the technologies.

### Components of LBS

LBS architecture is only one of the challenges, the other one is providing a service, which will reflect user needs or create a demand for such needs and will allow service providers to make a return on their investment. Otherwise, the business is unlikely to be sustainable. Most of Location Based Services require several components, as is here the model of "5+1" components of LBS – 5 technological and 1 human-related is described.

- **Positioning systems** – allow geographically localizing the mobile device both outdoor and indoor using: satellite-based systems, Cell-ID, RFID, Bluetooth, WiMax, Wireless LANs.
- **Communication Network** – the wireless network that allows for the transfer of data between the user (thought mobile device) and server (service provider).

Nowadays it is in most cases wireless internet.

- **Service and Application Provider** – the LBS provider, including the software (e.g. GIS) and other distributed services and components that are used to resolve the query and provide the tailored response to the user.
- **Data and Content Provider** – service providers will usually not store and maintain all the information, which can be requested by users. Therefore geographic base data and location information data will be usually requested from the maintaining authority (e.g. mapping agencies) or business and industry partners (e.g. yellow pages, traffic companies).
- **Mobile Devices** – any portable device that has capabilities to utilize stated above components of LBS, for example, mobile phones (including smartphones), tablets, palmtops, personal navigation devices, laptops etc.
- **User** – operator of the mobile device and the person that is utilizing the potential of modern mobile device and infrastructures to get value-added information or entertainment.



**Figure 2. Components of location-based services**

Source: <http://geoawesomeness.com/>

'Service and Application Provider' and 'Data and Content Provider' might be the same actor in the LBS architecture. For example, in the LBS application 3D World Gaze, Nokia is a provider of both the data and the application. The majority of smartphone LBS applications developed by using geographic data of one of the mapping services e.g. Google Maps, Yahoo Maps, Bing Maps, Open Street Maps.



## Applications of LBS

It is almost impossible to catalogue all the applications of Location Based Services. In order to provide more useful, attractive and engaging social networks, apps and services, location-components have been added to new innovative projects. LBS applications are Navigation, Emergency, Tracking, Travel Information, Sports, and Information Services.

- **Navigation** - The Navigation services allow locating the exact geolocation of a mobile device using one of the available positioning systems and get direction and/or navigate a user to required location including vehicles, crafts, and pedestrians. The LBS approach to navigation gives a advantage over mobile navigation software using data stored on the memory of a mobile device because it potentially gives a user the access to the real-time data. The limitation of large volumes of data needed to be transferred over the wireless network is decreasing as many network operators offer unlimited or reasonably priced data transfer.

One of the examples of LBS navigation is mobile application Google Maps that can be accessed via multiple mobile platforms (Android, BlackBerry, iPhone, Palm, Symbian S60, and Windows Mobile). According to the study by market research Company Nielsen made in July 2011, 76% of adult Smartphone users operating on the Android OS in the U.S. have used Google Maps during last 30 days (Nielsen Blog, 2011). From the results presented in the other report made by The Pew Research Center's Internet & American Life Project one can learn that 55% of adult smartphone users in the United States use their devices to "get location-based directions and recommendations".

- **Emergency** - One of the fundamental application of LBS is utilizing the ability to locate an individual calling to emergency

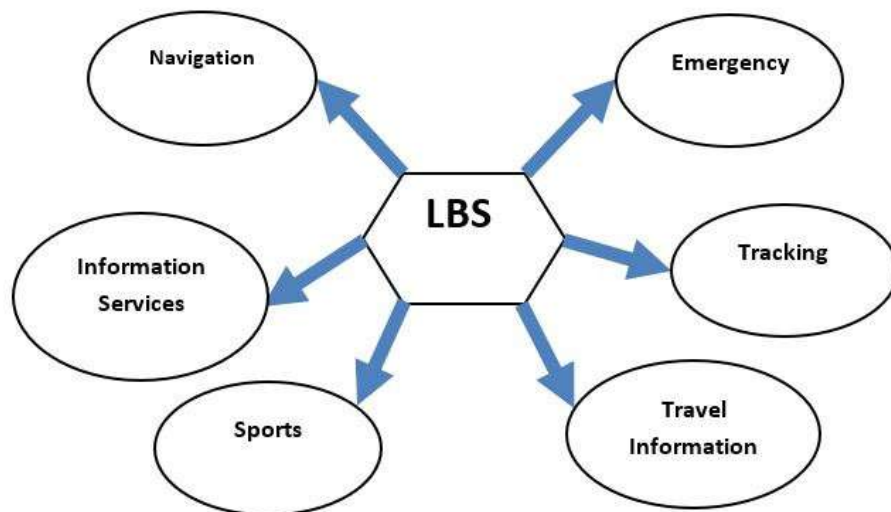


Figure 3. Application areas of LBS

response agency (100 for Police and 108 for Ambulance in India) as in Figure 4 who is either unaware of his/her exact location or is not able to reveal it because of an emergency. Based on this Geospatial information emergency response agency (e.g. ambulance, firefighters, and police) can provide help in a quick and efficient way.

- **Tracking** - Real-time tracking is one of the most useful applications of LBS. It can be used for people tracking: children, patients with dementia, prisoners, and employers to track their workers. LBS tracking solutions are used as well for animal tracking etc. Vehicle tracking is another broad application of LBS. UPS one of the World's biggest shipping

companies uses own location-based systems for management and logistics thousands of tracks. With fleet of over 60 000 vehicles, even one saved mile by every track per day means millions of dollars savings.

- **Travel Information** - LBS can deliver real-time travel information, such as traffic updates or weather reports, to the Smartphone, so the user can plan accordingly. Delivering services based on a traveler's location is a critical part of the mobile travel ecosystem, but using location alone misses the true opportunity for LBS. To deliver more effective location-based services, travel applications must combine location with context and relevance. LBS is evolving as part of general mobile trends and within a travel context. Competing entities, both within and outside the travel industry, are vying for a share of the lucrative location-based services market. The four primary functions of LBS for the traveler are:

- localization of persons, objects, and places,
- routing between them,
- search for objects in proximity such as restaurants, shops, hotels, or sights, and
- information about traveling conditions, such as traffic-related data.



Figure 4. Application of LBS in emergency Response

Source: <http://www.althos.com/>

Some of India's most popular mobile app for transportation, integrates city transportation for customers and driver partners onto a mobile technology platforms are:

- Google Trips : for travel planning, Oyo Rooms: for budget hotel booking, trivago: For hotel booking, Tripadvisor: Hotels and flights, MakemyTrip: Flight booking, Redbus: Bus booking, Ola/Uber/Meru: Online taxi booking.

- **Sports** - The potential of LBS and modern mobile devices can be used as well to monitor sports activities. Location-based application including Nokia Sports Tracker, Nike, Endomondo etc. has millions of users. The functionality of those applications allows a user to automatically collect and to visualize real-time his/her workout data, such as location, distance, speed, duration, or burned calories and store them on the server via Smartphone using Google Maps.

Mobile Location Based Gaming (MLBG) is a growing trend among LBS. MLBG is linking elements of traditional open-air field games (e.g. Hide-and-seek, Paper Chase) with new technologies available on mobile devices including positioning technologies, wireless fast speed internet, image recognition and augmented reality among others. MLBG can be defined as a location-based game that can run on a mobile device and by using a communication channel the game exchange information with a game server or other players.

- **Information Services** - Location-based information services refer mostly to the digital distribution of information based on device location, time specificity and user behavior. This is one of the most widespread and earliest implemented types of LBS utilizing both pull and/or push services. Nowadays the information is commonly delivered by external



Figure 5. Various technologies and components of LBS tracking system

Source: <http://nexttechnosolutions.com>

providers with wireless internet via Smartphone apps (e.g. Yellow Pages, & JustDail). The scope of data and information offered by a service provider is very comprehensive and it includes local street map, a wide variety of points of interests (restaurants, gas stations, cafes, stores, pharmacies, hospitals, touristic attractions etc.), weather forecast, real-time traffic information etc.

**Social Media** - Social media has been widespread on the Internet and have become craved research topic. Social networks like Facebook, Google plus and Twitter changed the way how people communicate and maintain relations with friends, colleagues, peers or even a family. The development of location-aware mobile devices gave social media possibility to integrate location with content created users.

**Geotagging** - Geotagging is defined as adding geospatial metadata to digital media such as photographs, videos, messages, blogs, web pages and GeoRSS. Especially photo-sharing sites enabling geotagging are popular among users of LBS.

**Geofencing** - Geofencing is one of the key technologies used in Location Based Marketing. It refers to a virtual boundary created around a specified physical location or point on a map. It is used to test whether presence inside the area is true or false to trigger some sort of predefined

action, which in case of marketing refers to sending a targeted message.

## Conclusion

Clearly, the evolution of LBS and the growing accessibility of mobile technologies have dramatically expanded the opportunities to use geospatial technologies. LBS Technologies such as wireless web, mobile internet enabled devices, mobile positioning, 4G and GIS solutions for wireless (data and application) plays an important role in the Navigation, emergency services, Tracking Services, Travel Information, Sports and Information Services.

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**EARTH-i Receives £2.7 Million from UK Government to Improve Crop Yield for African Coffee Farmers**

EARTH-i, one of Europe's most prominent New Space companies, has been awarded a grant of £2.7 million from the UK Space Agency's International Partnership Programme, which supports UK space firms tackling global challenges. The grant will enable Earth-i to launch the ACCORD programme in Kenya and Rwanda. ACCORD has been specifically developed to help smallholder coffee farmers in Africa improve crop quality and yield.

**Drone Delivery Canada Receives \$7 Million from Warrant Acceleration**

Drone Delivery Canada 'DDC or the Company', has reported that the Company has received \$7.0 Million from the exercise of warrants which the expiry was accelerated to February 23, 2018 as previously announced on January 24, 2018. DDC now has approximately \$23.5 Million in its treasury and has no warrants currently outstanding" commented Richard Buzbuzian.

**PrecisionHawk Secures \$75 Million to Foster Global Adoption of Commercial Drone Technology**

PrecisionHawk, Inc. – a leading provider of drone technology for the enterprise – has recently announced that it has raised a \$75 million round of funding from a group of venture and strategic investors. This investment brings PrecisionHawk's total funding to more than \$100 million since being founded in 2010, making it the world's most well-capitalized commercial drone company.

**Rolta Wins Prestigious Digital Transformation Projects Totalling Rs. 365 Crores in India**

Rolta India Limited (Rolta), has recently announced that it has recently been awarded various large contracts worth Rs. 365 crores in total by large and prestigious organisations from varied industries to fulfil their ambitions for Digital Transformation. Digital transformation has emerged as the #1 driver for sweeping change in the world around us.

**MAPPS Geospatial Excellence Award for RIEGL miniVUX-1UAV LiDAR Sensor**

RIEGL became the proud recipient of the 2017 MAPPS Geospatial Products and Services Excellence Award. This prestigious award was bestowed upon the RIEGL miniVUX-1UAV miniaturized LiDAR sensor for unmanned laser scanning in the Technology Innovation category at the 2018 MAPPS Winter Conference!

**Teledyne Optech Announces Michael Perdue as new Director of Customer Service**

Teledyne Optech has recently announced that Mr. Michael Perdue has joined the company as Director of Customer Service starting February 1, 2018. Mr. Perdue's arrival is part of Teledyne Optech's drive to provide top-notch service to our clients and demonstrate our commitment to their success.

**EarthSense Appoints Thomas Hall as Managing Director**

EarthSense Systems, the air quality monitoring, measuring and modelling specialist, has appointed Thomas Hall as Managing Director. A remote sensing specialist with over 19 years' experience in the geospatial industry, Hall has a proven track record of developing emerging technology for wide market adoption and commercialisation.

**Woolpert's Jeff Lovin Elected ASPRS Vice-President**

Jeff Lovin, Woolpert senior vice president and director of Government Solutions, has been elected vice-president of the American Society for Photogrammetry and Remote Sensing (ASPRS). ASPRS, also known as The Imaging and Geospatial Information Society, was founded in 1934 and serves more than 7,000 professional members around the world. Lovin, who has served on ASPRS committees and as president of the Eastern Great Lakes Chapter, will serve as vice-president in 2018, president-elect in 2019 and president in 2020.

**Trimble Appoints New Board Member**

Trimble has recently announced the appointment of Johan Wibergh to its Board of Directors. Wibergh is the group technology officer and CIO of Vodafone, one of the world's largest

telecommunications companies. In this capacity, he is responsible for Vodafone's network and IT strategy, architecture, operation and product development. He is also responsible for technology security and customer data protection strategy. Wibergh holds a Masters in Computer Science from Linköping University in Sweden.

**Woolpert Awarded Part of \$610M FEMA Contract to Support Disaster Relief**

Woolpert will provide technical engineering and architecture resources under a five-year, indefinite delivery, indefinite quantity Federal Emergency Management Agency (FEMA) Public Assistance Technical Assistance Contract (PA TAC) IV, which has a ceiling value of \$610 million. Serco Inc., the prime contractor, is a professional, technology and management services provider. Serco has partnered with Woolpert to evaluate and assess damage and needed repairs to public infrastructure after a presidentially declared natural disaster or emergency.

**Trimble Acquires Stabiplan to Expand its European MEP Engineering Solutions**

Trimble has recently announced that it has acquired Stabiplan B.V. based in Bodegraven, Netherlands, a 3D Computer Aided Design and Engineering (CAD/CAE) software and Building Information Modeling (BIM) content provider for the Mechanical, Electrical and Plumbing (MEP) industries in Europe. The Stabiplan acquisition broadens Trimble's existing construction solutions for MEP contractors and engineers that enable automated estimating, project management, modeling, detailing, layout and construction. Financial terms were not disclosed.

**HERE to Acquire Global Indoor Maps Provider Micello**

HERE Technologies has announced that it has signed a definitive agreement to acquire Micello. The planned acquisition supports HERE's strategy to provide world-class mapping and advanced location services both indoors and outdoors. In combination with HERE's unique tracking technologies, indoor maps will enable new and innovative market solutions such as the tracking of parts on a factory floor, the optimization of workspace usage, etc.



### OGC Announces Disasters Interoperability Concept Development Study

The Open Geospatial Consortium (OGC) has announced the Disasters Interoperability Concept Development Study (CDS). The CDS will assess the current state of data and product exchange technologies as used in disaster planning, response, and recovery. The information gained in the CDS will aid in developing a series of future pilots that will in turn advance the state of Spatial Data Infrastructures (SDIs) that support disaster risk reduction across the globe.

### Popular URISA Program – GIS Leadership Academy to be Offered Twice in 2018

URISA has announced that its GIS Leadership Academy will be offered twice in 2018. The success of any GIS program is largely tied to the capabilities of its leader. Strong leadership is necessary to establish a solid GIS program, operate efficiently and effectively, coordinate participants, adapt to change, and move a program forward. Leadership, however, is a skill that must be developed.

### UNSW Will Produce 3D Digital Maps of Sydney's Buildings and Infrastructure

Geospatial scientist Sisi Zlatanova, a leading expert in 3D mapping of public space, will join UNSW's Faculty of Built Environment in January to set up the University's first Geospatial Information Centre. She will investigate the production and management of 3D digital models for large public buildings at UNSW and in Sydney's CBD, with the aim to improve accessibility, safety and emergency response procedures.

### Uzbekistan Will Apply International Geodetic Coordinate Systems on Its Territory

According to the recent press release by the State Committee of the Republic of Uzbekistan for Land Resources, Geodesy, Cartography and State Cadastre, there is no open coordinate system in Uzbekistan, which is one of the factors hampering the development in the country of works on the creation of an information system for

cadastral registration and state registration of rights to real estate, as well as the National Geoinformation System aimed at the open and qualitative provision of state, including electronic, services to the population, business entities. Until now, in the Republic of Uzbekistan, as the state system of geodetic coordinates, the 1942 Coordinate System (SK-42), which covers the whole territory of the country, was used.

### Indonesian Peat Prize Announces 1 Million US Dollar Competition Winner

The Geospatial Information Agency (BIG), has announced the International Peat Mapping Team, which consists of scientists from Remote Sensing Solutions GmbH, Agency for Assessment and Application of Technology, and Sriwijaya University, as winners of the \$ 1 million Indonesian Peat Prize competition. The two-year competition aims to find the best method to map the extent and thickness of peatlands.

### India: Government Added Nine New Names in Smart Cities

Urban Development Minister Hardeep Singh Puri has recently announced the name of nine more smart cities, taking the total to 99. The mission of hundred smart cities was announced by Prime Minister Narendra Modi in June 2015.

Silvassa in Union Territory of Dadra and Nagar Haveli has topped the list of winning cities in this round of competition. The other cities include Erode in Tamil Nadu, Diu in Union Territory of Daman and Diu, Biharsharif in Bihar, Bareilly, Saharanpur and Moradabad in Uttar Pradesh, Itanagar in Arunachal Pradesh and Kavaratti in Lakshadweep.

The minister said, the nine cities have proposed an investment of 12 thousand 824 crore rupees to develop 409 projects. He said, with the selection of these nine cities, the total proposed investment in 99 smart cities will be Rs. 2,03,979 crore.

**Microsoft India Using Artificial Intelligence to Help Indian Farmers**  
New technologies such as Artificial Intelligence (AI), Cloud Machine Learning, Satellite Imagery and advanced analytics are empowering small-holder farmers in

India to increase their income through higher crop yield and greater price control. In collaboration with ICRIASAT, Microsoft has developed an AI-Sowing App powered by Microsoft Cortana Intelligence Suite including Machine Learning and Power BI. Microsoft has developed a multivariate agricultural commodity price forecasting model to predict future commodity arrival and the corresponding prices.

### UK Space Agency Announces New Funding for Industry

The grants of €200,000 have been organised by the UK Space Agency and ESA as a new way of applying for funding for technology developments under ESA's General Support Technology Programme (GSTP) which has existed for nearly 25 years. This new route to GSTP funding allows those interested in the programme to propose a project for development in their area of interest directly to UK Space Agency and ESA.

### Satellite Data for Spatial Mapping of Marine Fisheries

Kochi, India - The Central Marine Fisheries Research Institute (CMFRI) will make use of remote sensing satellite data for the spatial mapping of marine fisheries and mangrove resources. The spatial mapping of marine fisheries resources would help in locating fishing areas, navigational channels, and protected areas distinctively in open sea waters. Besides, CMFRI has inked a pact with the National Remote Sensing Centre (NRSC), Hyderabad, of the Indian Space Research Organisation (ISRO), for conducting a collaborative study to assess blue carbon emissions and their sequestration.

### China Plans to Launch 60 High-resolution Video Satellites by 2020

China plans to launch 60 high-resolution Jilin-1 video satellites by 2020. The high-resolution optical remote sensing satellites were independently developed by Chang Guang Satellite Technology Co. Ltd. for commercial use. Currently, China has launched 10 Jilin-1 satellites into space. In October 2015, four Jilin-1 commercial satellites were sent into space. In January 2018, Jilin-1 Video 07 and 08 were launched into orbit to provide remote sensing data for government and industry users.



### **Copernicus Incubation Programme to Develop Your Business**

The Copernicus Incubation was launched by the European Commission to assist start-ups and scale-ups in using the opportunities brought by the Copernicus full, free and open data. The Programme will award 50,000 EUR equity-free funding to 20 start-ups every year to boost EO data-based businesses. The selected applicants will also have access to a new network, tools and opportunities that can help early-stage start-ups as well as already operating businesses that aim to further grow. Detailed information is available on the Copernicus Incubator website: <http://copernicus-incubation.eu>

### **PAZ Earth Observation Satellite Successfully Launched**

The Spanish Earth observation satellite PAZ was successfully launched on 22 February 2018 at 15:17 CET from Vandenberg Air Force Base in California, United States, on board a Falcon 9 rocket. Interestingly, PAZ is being positioned on the same orbit as the German TerraSAR-X and TanDEM-X radar satellites. PAZ will use it to deliver the same radar products as TerraSAR-X and TanDEM-X, with resolutions ranging from 18 metres to approximately one metre, regardless of the time of day or cloud cover.

### **Earth-i Launches Prototype of World's First Full-colour, Full-motion Video Satellite Constellation**

British 'New Space' pioneer Earth-i has confirmed that the pre-production prototype satellite of its upcoming satellite constellation was successfully launched early on January 18, 2018. The new commercial constellation – which the company announced is called Vivid-i – will be the first of its kind to provide full-colour video; and the first European-owned constellation able to provide both video and still images. The multiple satellites within the Vivid-i Constellation will significantly increase the ability of companies and institutions to monitor, track and analyse activities, patterns of life and changes at any location on earth. Footage will be available for analysis within minutes of being captured and will improve decision-making and response times in a wide variety of scenarios.

### **ISRO Successfully Launches Cartosat-2 Series Remote Sensing Satellite Along with 30 Co-passenger Satellites in a Single Flight**

ISRO's Polar Satellite Launch Vehicle, in its forty second flight, successfully launched the 710 kg Cartosat-2 Series Remote Sensing Satellite along with 30 co-passenger satellites today (January 12, 2018) from Satish Dhawan Space Centre SHAR, Sriharikota. This flight is designated as PSLV-C40. The 11 kg INS-1C and the 100 kg class Microsat, the two Indian co-passenger satellites of Cartosat-2, are also being monitored and controlled from ISTRAC, Bengaluru. The 28 international customer satellites belong to Canada, Finland, France, Republic of Korea, UK and the USA. So far, PSLV has successfully launched 51 Indian satellites and 237 customer satellites from abroad.

### **Japan Successfully Launches Small Radar Imaging Satellite "ASNARO-2"**

On January 18, 2018, JAXA successfully launched Epsilon-3, the third Epsilon launch vehicle which encapsulates NEC Small radar satellite "ASNARO-2", from the JAXA Uchinoura Space Center. The launch occurred on time. The launch and flight of Epsilon-3 took place normally. Approximately 52 minutes 35 seconds into the flight, the separation of ASNARO-2 proceeded, with confirmation as successful. The spacecraft carries XSAR, a synthetic aperture radar (SAR) payload operating in the X band. This can be operated in three different observation modes: spotlight, strip mapping and scanning. The spotlight mode, where the instrument focusses on a small area of the Earth's surface, offers the highest resolution – one meter (3 feet) or better – with a swath width of 10 kilometers (6.2 miles, 5.4 nautical miles). In strip mapping mode, the satellite can image a longer strip of the Earth's surface in the direction of travel.

### **First ICEYE-X1 Radar Image from Space Published**

ICEYE, the leader in synthetic-aperture radar (SAR) technology for microsatellites providing expanded access to reliable and timely earth observation data, has published the first radar image obtained with the ICEYE-X1 SAR satellite on January 17, 2018. The image depicts

Noatak National Preserve, Alaska, on Jan. 15, 2018. ICEYE-X1 is the world's first SAR satellite under 100 kg, launched on Jan. 12, 2018 on ISRO's PSLV-C40 from Satish Dhawan Space Center in India. The full image transmitted to the ground from ICEYE-X1 exceeded 1.2GB of raw data and spans an area of roughly 80 x 40 km on the ground. ICEYE-X1 obtained the image in the span of ten seconds, traveling at a speed of more than 7.5 km/s and at an altitude exceeding 500 km. Matching what ICEYE simulated prior to the launch, the final data resolution from the first satellite reaches 10 x 10 meters.

### **China Launches Two SuperView-1 Remote Sensing Satellites**

Xinhua - China launches SuperView-1 03/04, a pair of 0.5-meter high-resolution remote sensing satellites, from the Taiyuan Satellite Launch Center in north China's Shanxi Province, Jan. 9, 2018. The satellites blasted off on the back of a Long March 2D rocket. The mission aims to promote the country's commercial use of high-resolution remote sensing satellites. The satellites are equipped with two 0.5m panchromatic and 2m multispectral, covering an area of 12km in diameter and are expected to offer remote sensing data to customers worldwide and provide services to land and resource surveys, mapping, environmental monitoring, finance and insurance as well as the Internet industry.

### **Tata Power Delhi Distribution Ltd Implemented GPS Mapping Technology for Speedy Location and Repair of Faults**

In a first for India, Tata Power Delhi Distribution Ltd (TPDDL) has implemented GPS mapping and Radio Frequency Identification Detector (RFID) Marker installation for speedy location and repair of faults in the grid. TPDDL has already carried out mapping of around 1,200 cable routes using GPS technology and installation of 1,000 RFID Markers in the first phase of the project and plans to expand it to the remaining cable routes soon. The company said the technology has allowed it to reduce the effective time to locate a cable fault from an average 90 minutes to average 45 minutes.



## LiDAR

January - March 15, 2018

### The Environment Agency to Map England's Entire Landscape with 3D Laser Mapping

The Environment Agency has announced plans to map England's entire landscape by 2020, using the data to assess flood risk and inform conservation work. Using aircraft equipped with laser scanners, the Environment Agency will map all 130,000 sq. km of the country, including rivers, fields and national parks – equivalent to 32 million football pitches. Currently about 75 per cent of the country is mapped but with only sporadic coverage of upland areas.

### Teledyne Optech Titan LiDAR Enables Discovery of Extended Mayan Ruins in Guatemala

Teledyne Optech's Titan sensor was used by the University of Houston's National Center for Airborne Laser Mapping (NCALM) to reveal extensive Mayan ruins in Guatemala. Lidar technology was able to identify hundreds of previously unknown structures, including raised highways, and

complex irrigation and terracing systems. After the collapse of the Mayan civilization, their cities and monuments were quickly covered by dense and thick rainforest. Flying high above the rainforest, Titan's lasers penetrated the canopy to collect almost a million data points per second from the thick rainforest forest floor, giving archaeologists a "bare earth" view of the structures underneath. Having rapidly covered 2,100 sq. km, Titan's data revealed massive amounts of ruins hidden below the forest, showing that their urban centers were significantly larger than archaeologists had previously thought. Optech Titan is the first commercial multispectral lidar sensor to incorporate 3 independent laser wavelengths into a single sensor design, with beams at 532, 1064, and 1550 nm (0.5/1.0/1.5 microns) and a ground sampling rate of 300 kHz per beam.

### Bangalore Started Rooftop Solar Energy Potential Mapping Using Aerial LiDAR

Bescom has commissioned the mapping in a bid to meet its target of generation of 1,000 MW of rooftop solar energy by 2022 from Bengaluru alone. The aircraft will cover an approximate area of 1,100 sq. km,

generating high-resolution images of rooftops of buildings in the city. The mapping will be carried out by CSTEP and the data generated will be submitted to the Energy Department. Once the data is collated and presented to the Energy Department, residents of the city will be able to check the capacity of solar power generation of the rooftops of their respective buildings, when they log in to the Bescom website to pay electricity bill.

### TetraVue Partners with CVedia and AGC/Wideye at CES 2018 to Demonstrate 4D LIDAR Superiority for Autonomous Vehicles

TetraVue, the leader in high definition 4D LIDAR™ technology, today announced partnerships with NVIDIA, CVedia and AGC/Wideye to highlight the benefits of TetraVue's groundbreaking high-resolution LIDAR for next generation ADAS and self-driving applications. The four companies will demonstrate the impact of TetraVue's 4D LIDAR 100x resolution advantage for the development of advanced autonomous vehicle systems at TetraVue's booth #6619 in the automotive North Hall at CES 2018.

## GNSS & SURVEYING

January - March 15, 2018

### Helix Technologies Wins ESA Contract to Develop Multi-frequency GNSS Antenna Optimised For Galileo

Helix Technologies Ltd has been awarded a significant contract by the European Space Agency (ESA) to develop its NEXTGEN GNSS antenna – a next-generation, multi-frequency GNSS antenna optimised for the advanced Galileo E1 Alt-BOC and wide-band E5 Alt-BOC waveforms for use in driverless cars. The antenna, to be developed under the ESA's Navigation Innovation and Support Programme, will provide enhanced performance due to its dielectric, multi-filar construction. It will also be optimised to take maximum advantage of the Galileo E5 Alt-BOC waveform, which enables significantly improved measurement accuracy, precision and multi-path suppression over conventional GNSS signals.

### NASA Engineers Demonstrated X-ray Navigation in Space

A team of NASA engineers has demonstrated fully autonomous X-ray navigation in space — a capability that could revolutionize NASA's ability in the future to pilot robotic spacecraft to the far reaches of the solar system and beyond. The demonstration, which the team carried out with an experiment called Station Explorer for X-ray Timing and Navigation Technology, or SEXTANT, showed that millisecond pulsars could be used to accurately determine the location of an object moving at thousands of miles per hour in space — similar to how the Global Positioning System, widely known as GPS, provides positioning, navigation, and timing services to users on Earth with its constellation of 24 operating satellites.

### HERE Supports Baidu With Indoor Maps

HERE Technologies, a global leader in mapping and location services, has announced that it will broaden its

collaboration with Baidu to power Baidu Maps with indoor map data for outside of China. Enriched with HERE Venue Maps, Baidu Maps will give people access to maps of venues with 2D and 3D floor plans.

### IIT-Roorkee Professor Develops New Technology for Aerial Survey

Professor Kamal Jain at the civil engineering department of the IIT used a drone for taking videos with an interactive web map to demonstrate the technology that records data, including the place and time on a computer screen. Using a drone over a particular area to take video images which are tagged with a web map that enables the user to know the accurate geospatial information like latitude or longitude of each point. With the help of Google map, the system is quite useful for infrastructure and defence sectors. Elaborating on the use of the system for Uttarakhand, where landslides, flood and armed forces troop movement takes place, Jain said he has conducted successful tests.



## GIS & EO

### Esri

- Esri Releases Survey123 for ArcGIS with New Spike Integration
- Esri Releases World's First Complete Utility GIS Platform

### Mapbox

- Mapbox Launches Global Reality-Grade AR Location Platform

### Teledyne CARIS

- Teledyne CARIS™ Launches CARIS Onboard™ 2.0.

### Avenza Systems Inc.

- Avenza Releases MAPublisher 10.1 For Adobe Illustrator

### Caliper Corporation

- Maptitude 2018 is Now Available

### Boundless

- Boundless Launches Massively Scalable Geospatial Server for the Enterprise

### HP Inc.

- HP Launches World's Most Secure Large Format Printers for GIS Mapping

### Blue Marble Geographics

- Global Mapper v19.1 Now Available

## LiDAR

### Hexagon

- Hexagon Announces Next Generation Leica Rugby Lasers – The First Upgradable Lasers for Construction
- Leica Geosystems Introduces Latest in Linear Mode LiDAR: Leica TerrainMapper Provides Industry-Leading Performance for Mapping Complex Terrain.
- Leica Geosystems Introduces New Leica Pegasus:Two - A Multipurpose Mobile Mapping Platform Increases Smart City Applications.

### PDF3D

- PDF3D's V2.15 Brings New Tech, Panoramic 360 and Patented Point Cloud Simplification along with Highest Performing 3D PDF Conversion SDK.

### Trimble

- Trimble Announces New MX9 Mobile Mapping System for Surveying, Engineering and Geospatial Professionals

### Orbit GT

- Orbit GT Releases 3D Mapping Content Manager V18

## GNSS & SURVEYING

### Trimble

- Trimble Introduces Trimble® Alloy™ A Next Generation GNSS Reference Receiver

### Topcon

- Topcon Announces New GM-100 Manual Total Station with Advanced Performance And Accuracy
- Topcon Announces Upcoming MAGNET Enterprise Release Including Autodesk BIM 360 Integration
- Topcon Announces New Online Courses For myTopcon Support Site

## DRONE/UAV

### DroneDeploy

- DroneDeploy Launches Real-Time Mapping for Instant Aerial Data and Analysis

### Delair

- Delair Introduces Industry's Most Advanced Fixed-Wing UAV for LiDAR-Based Aerial Surveying and 3D Mapping

### YellowScan

- YellowScan Unveils "Surveyor Ultra" Its New UAV-LiDAR System

## NEW DATA RESOURCES

### DLR

- DLR Spin-off EOMAP Launches an Online Portal for UNESCO Programme on Global Indicator of Water Quality

### EuroGeographics

- EuroGeographics Announces New Additions to Open Data for 2018

## GEO EVENTS

**March 26 – 28, 2018**

**Sixth International Conference On Remote Sensing and Geo-Information of the Environment, RSCy2018**

Paphos, Cyprus

<http://www.cyprusremotesensing.com/rscy2018/>

**April 10 -12, 2018**

**Commercial UAV Expo Europe**

Amsterdam, The Netherlands

<https://www.expouav.com/europe/>

**April 24 -25, 2018**

**12th International Navigation Forum**

Moscow

<http://www.glonass-forum.com>

**April 26 -27, 2018**

**EnerGIS 2018 – GIS for Energy!**

Canonsburg, PA, USA

<https://energis.us>

**May 07 -10, 2018**

**ISPRS Symposium 2018 on "Developments, Technologies and Applications in Remote Sensing"**

Beijing, China

<http://www.isprs-tc3.tianditu.com>

**May 14 -16, 2018**

**FOSS4G North America 2018**

St. Louis, MO, USA

<https://2018.foss4g-na.org>

**May 22 - 23, 2018**

**GEO Business 2018**

London, England, UK

<http://www.geobusinessshow.com>

**June 25 - 29, 2018**

**Geomappica 2018**

Syros – Mukonos Islands, Greece

<http://2018.geomappica.eu>

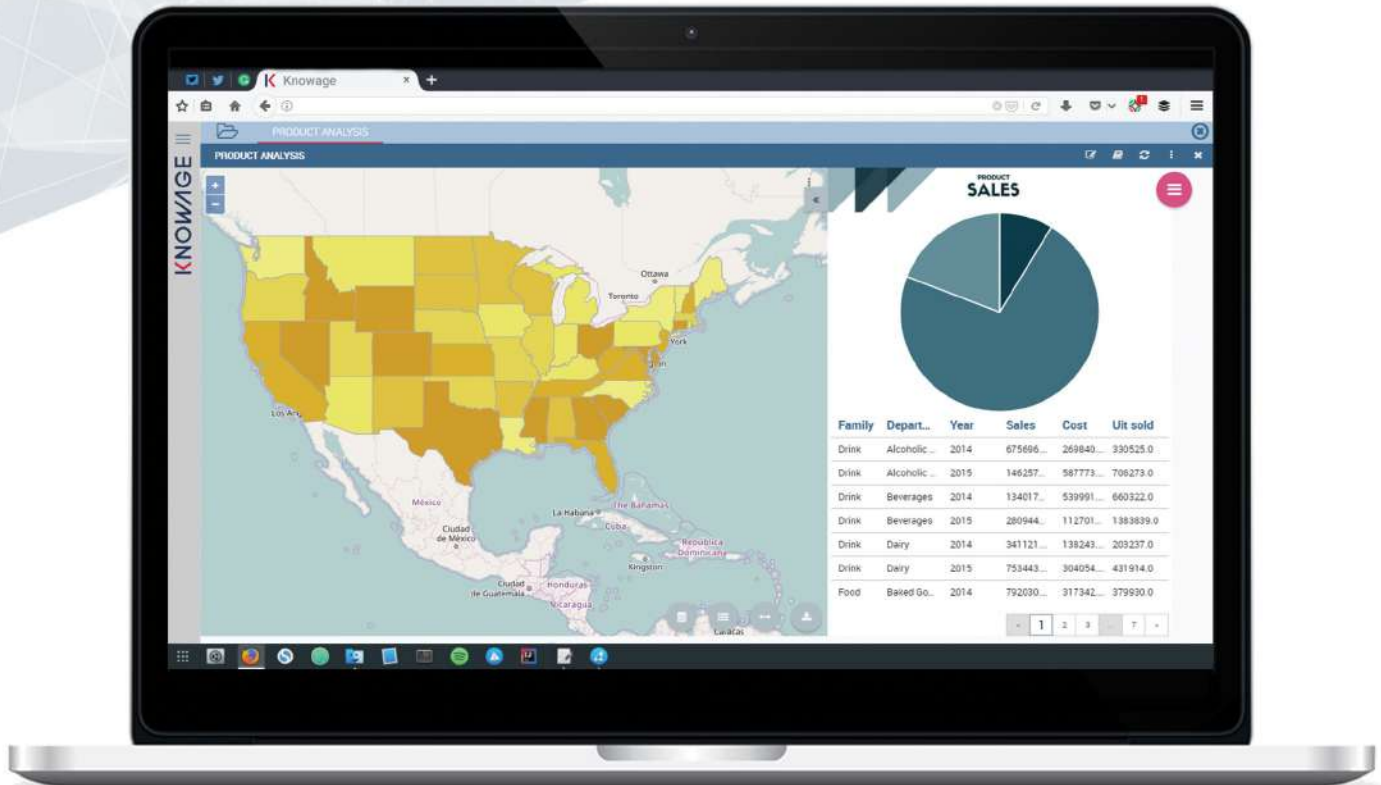
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Knowage LI allows to get immediate insights over data, also thanks to mash-up techniques, without the need for moving data between **GIS systems** and **data warehouse** environments. Knowage LI gives the opportunity to work with traditional data sources and spatial data with a live relation between them, in order to produce **dynamic maps** via WMS/WFS standards or static maps and pictures in SVG format.

Connect LI with other Knowage modules to create wider analysis taking benefits from a full set of features such as **big data** federation, **dashboard** and **report** creation, **KPI** monitoring and **data/text mining**.



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