

By the way, we have our IoT newsletter going out on June 28th to 134,000+ people. It would be great, time allowing at your end, if we can include this. Otherwise I can of course include in the next one which is at the end of July. And it will go on [Inform](#) and social media as soon as we finalise it.

1. ESRI has been looking at geo-analytics data for a long time. Its application is now getting much wider with the growth of the IoT. What does geo-location data bring to the IoT?

Geolocation provides context to sensor data collected in the IoT ecosystem, transforming the raw data into useful information and ultimately actionable intelligence. As an example on how this works, Volvo recently announced a program to build 1000 smart cars that would share information with other vehicles to warn them about slippery road conditions. Location is not important to the car initially sensing the slippery conditions. The internal traction system could make adjustments without this information. However, warning other cars of the road hazard requires knowledge of the location of the initial incidence and the proximity of other vehicles to that location. The actionable intelligence is then deciding if alternative routes are available to avoid the hazardous area. This complete process requires geo-analytics.

to their vehicles and the location of the sensing car and only by understanding the location of the problem and can other vehicles determine the relevance of the warning to their planned routes.

2. Clearly, GIS is not just about the production of maps and X/Y coordinates. What do you see as some of the most common applications for using GIS and Geo-analytics in the IoT space?

We are already seeing applications in connected car, smart home, smart cities, supply chain management, to name just a few. Some of these applications are still in their infancy and will be revolutionized by the use of GIS. Many people have a smart thermostat in their homes but it is closed system that doesn't interact with other devices. The thermostat monitors the temperature and compares it with the time and setting you preprogrammed, but assume you decide to come home early one day. The thermostat has no advanced warning and the temperature upon arrival will be less than optimal. Now image it is an open system connected to a mobile device like your phone. You use GIS to erect a geofence around your place of work. If you leave early, the phone triggers the geofence and sends an alert to your home thermostat. Let's open the system a bit more. What if thousands of people left work early and were heading home. Don't you think the utility company would like advanced knowledge of the anticipated surge in usage. Image the efficiencies that could be realized by a very common application that has as now become revolutionary.

3. Are there any surprising/unusual uses you have seen?

I can think of an example of applying readily available mobile devices and communications networks to deliver a unique application during Super Storm Sandy. Using GIS and twitter, we were able to collect and analyze geotagged tweets that referenced power outages. By normalizing the frequency of tweets against population density, we were able to map the power failure across Manhattan. Instead of building a system of dedicated sensors or smart meters we were able to use common devices, existing communications networks and a GIS to track the outage. This demonstrates the potential future of IoT where you use an existing ecosystem of

interconnected devices, add geo-analytics and then build an application to create a valuable new solution with very little incremental investment.

4. While the opportunities for using location technology and analytics to enhance IoT applications seem to be enormous, service providers face challenges in harnessing the full potential. What do you see as the main challenges?

I believe the biggest challenge they face is determining how to leverage the full capabilities of a location platform. Most applications today only tap a limited number of spatial tools like location or proximity analysis. As the IoT ecosystem expands it will create opportunities for integrating data from billions of multipurpose devices using a myriad of communications technologies and support applications that are only limited by our collective imaginations. These new applications will require tapping into the full stack of GIS capabilities –geocoding, routing, geofencing and spatial analytics, along with a full complement of geoenriched data.

5. What's next for geo-analytics in your opinion?

The use of geo-analytics has the potential to make our lives infinitely simpler and safer with no limit on the potential applications. Many of today's uses of GIS are reactive. The technology as in the previous slippery road example alerts other drivers or maintenance crews of hazardous conditions. Why wait for problems to occur. Once systems like this have been deployed, we can leverage GIS capabilities to move from reactive to predictive, where historical data collected from thousands or millions of vehicles are collected and compared over time and then integrated with weather data(another IoT input) to predict where these conditions will occur in advance of the first car skidding. Advancing to the next level sophisticated GIS spatial models can move beyond predictions and actually prescribe corrective action to eliminate hazards. Once you move to the prescriptive world, the potential applications of geo-analytics are limitless.