

USE CASE

Operation Convergent Response 2017



Real-time anomaly detection gives early warning of impending disasters

By Liz Derr, CEO, Similarity

[Aegex Technologies](#) teamed up with [Verizon](#), [Nokia](#), [SensorInsight](#), [Similarity](#), and some 40 other technology providers to orchestrate “[Operation Convergent Response](#)” (#OCR2017). This interactive event showcased the single largest, real-world IoT test environment at the Guardian Centers’ 800-acre facility in Perry, GA, USA. Operation Convergent Response was as close as you can get to real-life hazardous locations and real large-scale emergency scenes without being in an actual oil refinery, chemical plant, or disaster area.

OCR was an opportunity to witness firsthand the power of emerging IoT technologies, including IoT sensors, advanced communications, robotics, artificial intelligence and more, and to discover how technology and innovation investments can bring big data to life while offering value for daily operations, as well as in extreme situations.

The Scenario: Chemical Plant Leak and Collapse

In one of the disaster scenarios at OCR, a “chemical plant” was outfitted by SensorInsight with a variety of intrinsically safe air quality sensors from Aegex.

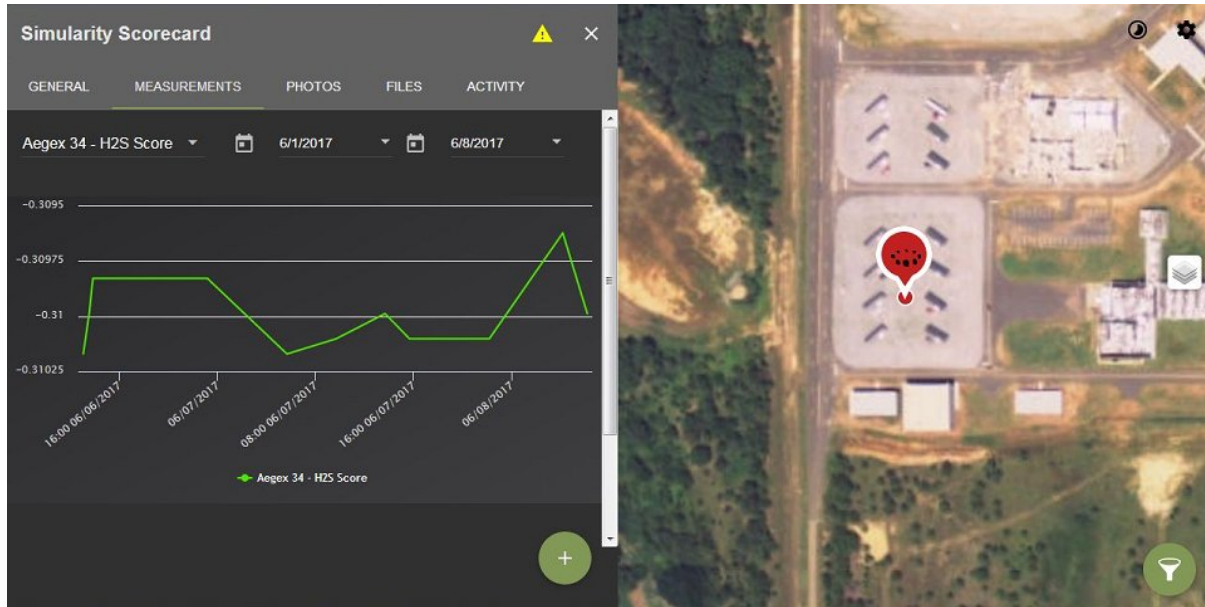


Data from these sensors was collected by SensorInsight’s Integrate, a middleware platform. The data was fed to Similarity’s Artificial Intelligence (AI) for anomaly detection. The sensor readings and anomaly scores were displayed on SensorInsight’s application dashboard and viewed by first responders on Aegex’s intrinsically safe tablets.

When the “chemical leak” that preceded the collapse of the building happened, Similarity’s AI detected the anomalous readings and, based on those, SensorInsight’s application issued an alert.

This complete end-to-end solution enables industrial facility owners to spot and deal with small leaks before they become big problems, avoiding costly and dangerous situations.





SensorInsight's dashboard shows the anomalous readings for hydrogen sulfide and displays the sensor location

Testing the Solution

For the chemical plant scenario at OCR2017, real-time anomaly alerts about the leak could have been noticed by building management when it first happened, before deadly amounts of the chemicals built up and led to the collapse of the building. However, in this exercise, we also demonstrated the use of this complete end-to-end hazardous area solution for managing disasters that were not prevented.



In this case, a hydrogen sulfide leak was detected. When this happens, the space should be ventilated. If the gas cannot be removed, first responders need to use appropriate respiratory protection and any other necessary personal protective equipment (PPE), rescue equipment and communication equipment. Atmospheres containing high concentrations (greater than 100 ppm) are considered immediately dangerous to life and health

(IDLH), and a self-contained breathing apparatus (SCBA) is required. In such a case, with dangerous flammable gases, only intrinsically safe electronics, which are incapable of producing enough heat or energy to cause a spark, should be used.

As the disaster unfolded, first responders were able to monitor the levels of chemical hazard using the Aegex tablets. This helped them properly prepare for and locate the source of the toxic leak.

Deployment in Days

The nature of this mock emergency demonstration meant that end-to-end deployment needed to be completed within a few days. Several days before OCR started, the SensorInsight team installed a variety of Aegex sensors in the “chemical factory”. The streaming data was integrated with Similarity’s SAM (Smart Asset Monitor), and the SAM built anomaly models for all sensors based on one day’s worth of data. The anomaly models were deployed and integrated with SensorInsight’s Foundation dashboard in less than 24 hours.

When OCR started, the entire monitoring system, complete with a handful of predictive anomaly detectors, was live and ready to go.

Solution Components

Aegex Intrinsically Safe Sensors

Specially designed hazardous area sensors by Aegex Technologies provided data that detected the leak. Aegex sensors are certified intrinsically safe, meaning they will not cause a spark that could ignite combustible atmospheres.



Aegex Intrinsically Safe Tablets

Aegex10 Intrinsically Safe Tablets were used by personnel onsite near the hazardous area to provide the ability to receive and view predictive user notifications. The Aegex10 was used to:

- Record video of the scenario
- Use Exchange/Outlook to email photos
- Upload information to SensorInsight Foundation
- Check maintenance records

Bringing people with decision-making and problem-solving skills into hazardous areas remotely or on-site with the Aegex tablet can speed up time to resolution and ensure proper functionality.

SensorInsight Foundation



SensorInsight® Foundation is a SaaS built for anytime, anywhere connectivity and is the core application service of the platform providing three base services: a big data store, analytics services, and visualization. The SensorInsight Foundation product suite elevates businesses by integrating disparate data, analyzing info in real time and visualizing insights to improve decision making and process optimization.

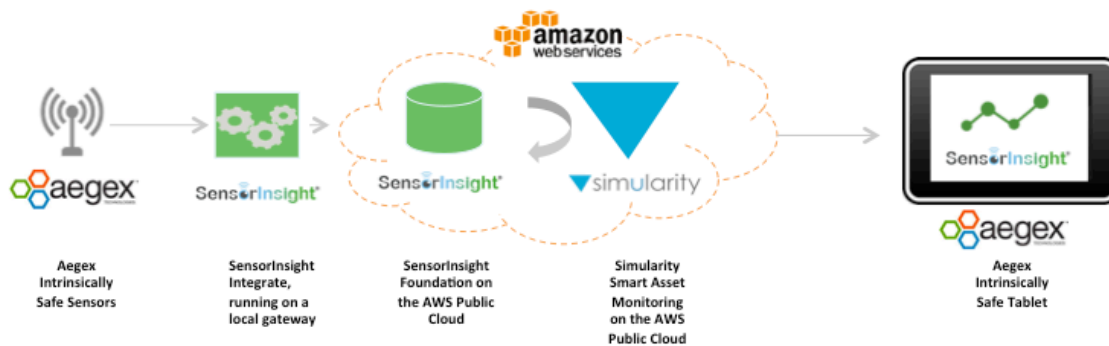
SensorInsight Integrate is a big-data collection engine designed from the ground up to connect, monitor, and transform if necessary to ensure you see your whole environment. Real-time data on each of your assets or external systems can be pumped into the platform allowing you to gather large volumes of cross-domain data in a scalable and secure manner.

Similarity's Smart Asset Monitoring (SAM)

Similarity has developed innovative software that can analyze large volumes of time-series data in real time at the edges of the network. By capturing real-time data from multiple sources, the artificial intelligence software can 'learn' what's normal and predict incidents **before they happen.**

Similarity's AI, running in the AWS public cloud, analyzed the data for each sensor and used predictive anomaly detection to determine when chemical levels were out of the normal range.

Conclusion



By using a combination of Aegex, Similarity and SensorInsight products, this team was able to demonstrate an end-to-end solution for hazardous area monitoring and disaster response. Deployment was completed in less than one week.

With predictive analytics and AI that is accessible anywhere in a hazardous location via intrinsically safe sensors and mobile devices, decisions can be made in real time to resolve impending problems and ensure the safety and operational efficiency of the organization.

Installing a system to radically increase safety in hazardous areas doesn't have to be complicated. This end-to-end solution, with intuitive user interfaces, is available as a complete package, with installation, service, training, and support included.

Contact Aegex, SensorInsight or Similarity to learn more.

About Similarity: Similarity helps customers eliminate unplanned downtime with AI-driven analytics for connected assets. <http://www.similarity.com>.

About SensorInsight: Headquartered in Houston, Texas, SensorInsight® creates and markets an Industrial Internet of Things (IIoT) platform designed to provide

insight across specific domains, including energy and utilities, transportation, manufacturing, healthcare, and smarter cities. The platform works by providing deep analytics and complete access to data systems in real-time. Plus, SensorInsight takes care of the software, hardware, and upkeep so you don't have to, providing a complete IIoT Solution. <http://sensorinsight.io/>

About Aegex: A technology engineering and design company that provides intrinsically safe Industrial Internet of Things (IIoT) and mobile solutions for hazardous industries. Our globally certified intrinsically safe Windows 10 tablet, sensors and partner monitoring systems, form an IoT platform that manages big data to improve efficiency, safety and productivity in hazardous industrial environments in oil & gas, chemical, pharmaceutical, utilities, public safety, defense and other industries with potentially explosive atmospheres.

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