

OIL & ENERGY

Leak Detection & Repair Company Monitors Gas Leaks 24/7 by Automating its Gas Emission Monitoring System with MS Azure IoT

The Client

Our client provides line clearing services and equipment for the protection and damage prevention of utilities including gas, electric, water, and municipal utilities. Founded 86 years ago, the company's primary focus is conducting leak detection. They also offer corrosion testing and engineering, meter reading, instrument repairing, and one-call locating services. Headquartered in Houston, Texas with locations worldwide, they employ 1,500 people across 44 states.

Business impact delivered



Cost



Revenue



Speed-to-Value



Risk



Innovation

The Challenge

The case for automating gas leak detection with IoT

Our client is a leader in the oil and gas industry, from mobile platforms, unmanned aerial vehicles (UAV) to smart sensor technologies, their business model is focused on next-gen technologies and innovation.

“Gas leak detection services are highly competitive, and operational efficiency is critical. We have partnered with Infogain on the sensor-based technology that enables our company to monitor leaks 24/7. We have deployed IoT automation technologies to support our business goals of future product licensing, scalability, analytical insights and government compliance,” said the CEO at the leak and repair company”.

Forward thinking companies share a vision of improving operational efficiencies and increasing customer satisfaction. Our client wanted to explore automation with laser gas detection products for integration of their devices, remote troubleshooting, and the conversion of huge amounts of big data into insightful and valuable information.

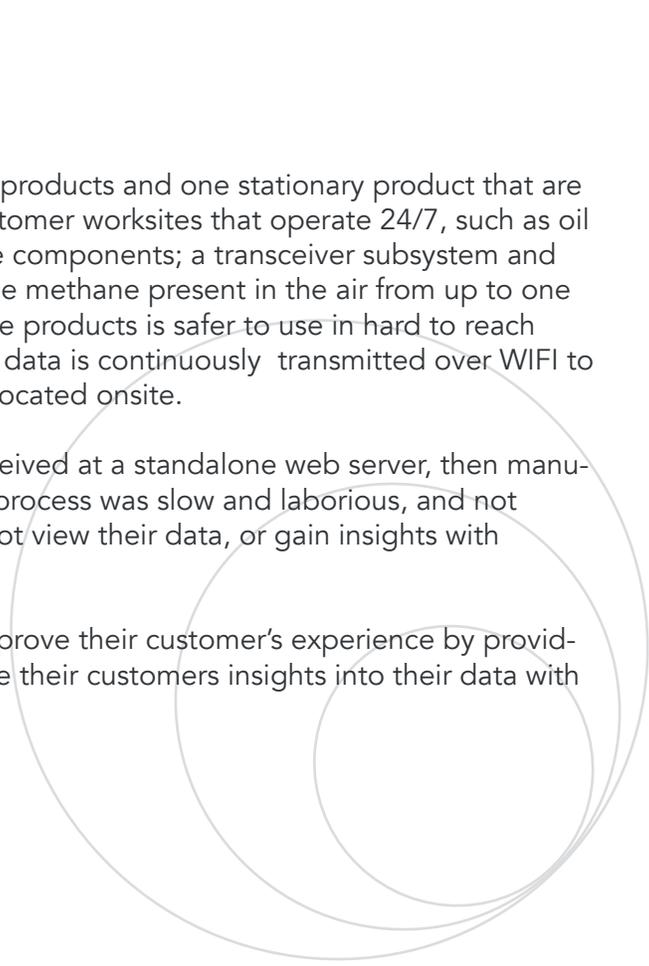
Solution Approach

Customer information that resides in a ‘silo’

Our client monitors methane gas with several laser-based products and one stationary product that are critical for detecting potential dangerous gas levels at customer worksites that operate 24/7, such as oil rigs and gas stations. The products contain two interactive components; a transceiver subsystem and signal processing/user interface controller that measure the methane present in the air from up to one hundred feet away. Surveying for gas leaks with the remote products is safer to use in hard to reach areas, such as busy roadways and offshore platforms. This data is continuously transmitted over WIFI to an Application Programming Interface (API) based portal located onsite.

The incoming data received from mobile surveys were received at a standalone web server, then manually retrieved, and reports sent to customers. The current process was slow and laborious, and not scalable to meet business needs. Their customers could not view their data, or gain insights with reports with charts or trends.

The company had a larger vision to add automation to improve their customer’s experience by providing leak information in real-time. They also wanted to give their customers insights into their data with business intelligence/analytics.



Innovative IoT Hub built by Infogain and powered by Microsoft Azure

Infogain implemented the MS Azure IoT platform automation solution to their existing device management system. The client's existing REM devices were onboarded onto the NET based RMLD-Remote

Emissions Monitor (RMLD-REM) IoT hub built by Infogain and powered by Microsoft Azure. The Azure IoT hub was leveraged as the central location for telemetry and data collection from the client's stationary and remote devices. The hub was designed for web-scale, and capable of handling millions of messages.

In the IoT process, data streams are continuously received from the sensors from the remote devices and received into the IoT hub. Certain data is considered "hot," providing the real-time information, while other data is considered "cold," providing historical data (i.e. time, temperature). Algorithms and functions perform the required calculations that answer the question, "Is there a leak?" When certain conditions are met, the notification hub sends information to customers in a real time alert indicating that a gas leak has been detected, so that immediate action can be taken.

The core Azure IoT solution, all in-built by Infogain included customer management, users, organization, authentication, customized reporting, and architecture to support future automation. Additional solutions included analytics, platform security and compliance framework configuration, solution testing and quality assurance.

Employees and customers now have a robust automated customer management system that includes customer administration, logins, dashboards, real time and historical reporting. Other benefits include analyzing charts for insights and trends.

The platform has proven so successful that our client presented the solution at the World Gas Conference in Washington DC. The company is currently evaluating the feasibility of a subscription based license for their customers.

Real time evaluation with Azure Analytics

Moving beyond how methane readings and pipe quality information is acquired and stored, the addition of analytics has given our client the ability to evaluate gas and pipeline leak information, providing their customers with an exact location of the leak.

Leak surveys are conducted by employees either walking or in their vehicles. This data is fed into a Leak Survey Analytic that contains the data from thousands of surveys. With one click, they can review every detail of the survey.

Solution Architecture

The Azure stream analytics component was used to process the significant amounts of data flowing through the Azure IoT hub, and take real time actions, or move them to a back-end Mongo DB 3.0 database. Push notifications from the platform were implemented through Sendgrid Email and Plivo SMS.

For robust wireless connectivity, MQ Telemetry Transport, or MQTT protocol, a machine-to-machine (M2M)/"Internet of Things" connectivity protocol was implemented. MQTT was designed as an extremely lightweight publish/subscribe messaging transport. MQTT was used to connect with remote locations where a small code footprint is required, or network bandwidth is at a premium.

Advanced Message Queuing Protocol (AMQP) was used for message orientation, queuing, routing (including point-to-point and publish-and-subscribe), reliability and security.

Existing IT Environment

- Standard API portal located on-site for collecting data
- Human intervention required to retrieve the data received
- No customer management system in place
- Legacy systems which required an “in-between” integration

Key Goals & Objectives

- Design and develop the MS Azure platform with a goal of future licensing to their customers
- Match the competition by placing data in the Cloud
- Offer customers the ability to review and utilize critical data on pipe or gas leaks in real time
- Scale the platform to meet enterprise business needs in the future

Key Business Benefits

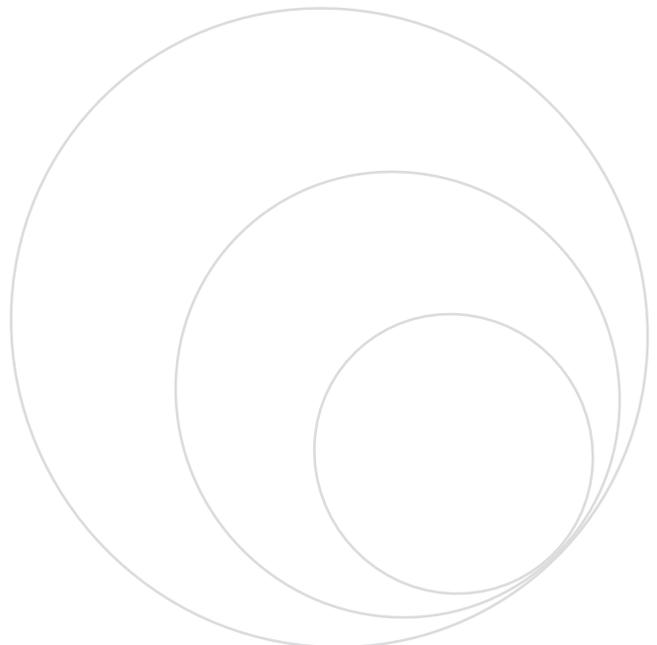
- Insights into valuable data for reports and trends
- Increased productivity and reduced costs with automation solution
- Increased revenues with future plans to license the product
- Real-time Notifications for gas leak detections sent to customers
- Scalability and flexibility offered by Azure supports key growth and business needs

MS Azure Features

- Easily and reliably connect and manage millions of devices
- End-to-end set of tools and components to jumpstart IoT solution development
- Gain insights into the client’s data and reports in real time
- Strong built-in security features
- Support for integration with existing systems and applications
- Technologies available for application development, big data & analytics, including cloud hosting and deployment

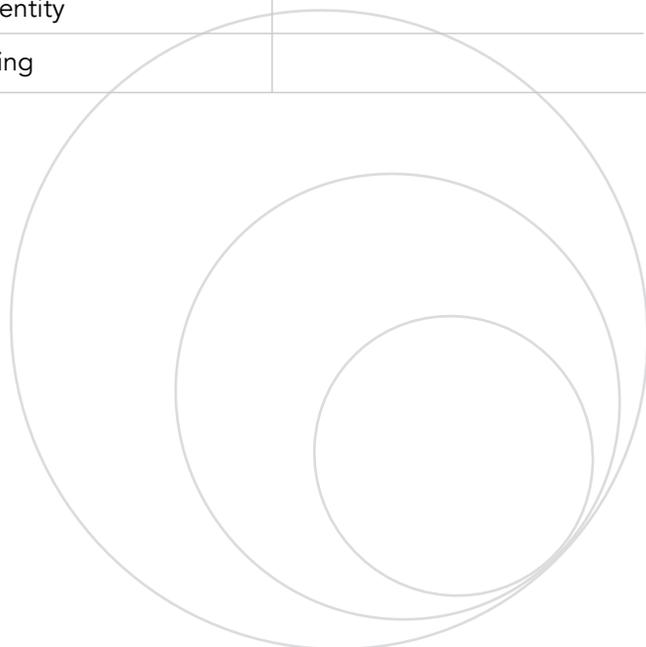
Technology Stack

- **Database:** SQL server 2017, Mongo DB 3.0, Mongo Atlas
- **Development Environment:** Visual Studio 2017
- **Version Control System:** TFS – Git
- **Task/Issue Tracking System:** VSTS
- **Framework:** MVC 6, .NET Core 2.1, Angular5, Node JS



MICROSOFT AZURE IOT COMPONENTS USED

Cloud Service	Service Category	Provider
Azure Key Vault	Security + Identity	Microsoft Azure
Storage (Blob)	Storage	Microsoft Azure
Mongo DB Atlas	Databases	MongoDB
Redis Cache	Databases	Microsoft Azure
Stream Analytics	Data + Analytics	Microsoft Azure
Azure App Service	Internet of Things	Microsoft Azure
(Web Apps)	Web	Microsoft Azure
API Management	Web	Microsoft Azure
Azure IoT Hub	Internet of Things	Microsoft Azure
Azure Functions	Compute	Microsoft Azure
Visual Studio Team Services	Developer Tools	Microsoft Azure
Azure Application Insights	Developer Tools	SendGrid
Sendgrid Email	Monitoring + Management	Plivo
Plivo SMS	Notifications	Entrust Datacard
Security Certificate & Code Sign	Notifications	Highchart
Highchart	Security + Identity	
	Data + charting	



Disclaimer: This project was delivered by an organization subsequently acquired by Infogain