Improving Remote Monitoring of Water Utilities

GeoViewer

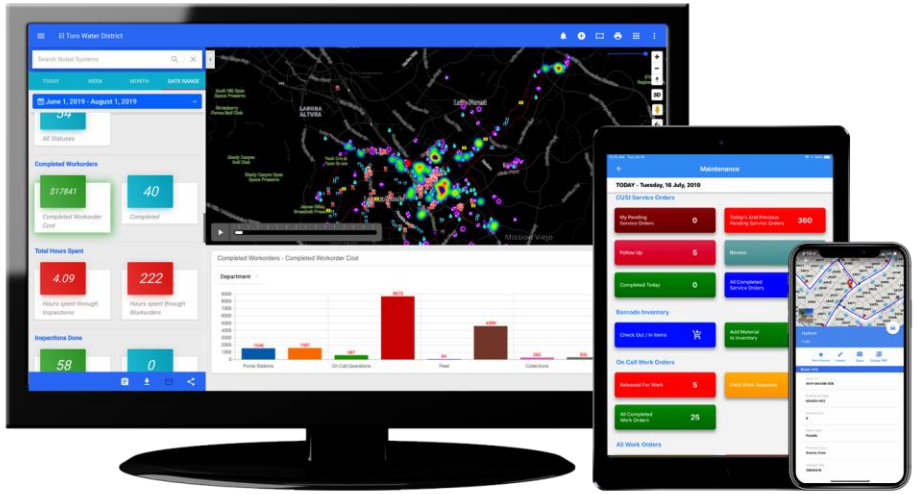
Revolutionizes remote monitoring of water utilities through a proven solution

Benefits customers worldwide

Provides a DIGITAL TWIN Asset Management and Operational Maintenance Solution

Company Overview

Nobel Systems, Inc.



Cloud-hosted Enterprise Geographic Information System (GIS)

A subscription-based mapping system for dynamic visualization, geospatial data management and analysis.

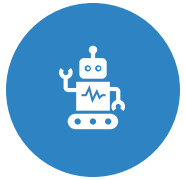
Founded in 1992, and headquartered in San Bernardino, California, Nobel Systems Inc. has enjoyed relationships with its clients across the world and encompassing thousands of users. Many of our relationships with our customers have lasted over decades.

With more than 25 years working in the water industry, Nobel Systems' continues to deliver real-world solutions that integrate with your existing network and devices, enabling the collection and sharing of data.

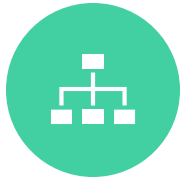
We pride ourselves in being a leader in technology within the water industry and are constantly innovating and inventing new ways to improve the way organizations manage their operations. We deliver a Smart Water Management concept.

Solution Overview

Solution must:



Monitor water level and condition (through pressure sensors, among others)



Forecast Demand and monitor consumption to help manage the pressure and speed of water throughout system

Be an Asset management solution, detect leaks and enable predictive maintenance

Enable Staff safety and track operational performance including workforce capacity and work orders

Must provide for customer service, for example, real-time updates on closures and disruptions, hourly consumption, leak detection, and customer feedback

What is GeoViewer?

- GeoViewer is a **Real-Time, Total Operations Management solution** for Utilities. It isn't just an Asset Management System.
- It creates a **DIGITAL TWIN model** of the network by utilizing:
  - **IoT Sensor Data**
  - **Calibrated Hydraulic Models and Machine Learning Algorithms to forecast System Demand and Pressures**
  - **Maintenance Data easily gathered from GeoViewer mobile and web apps**
- It allows for remote management of staff
- Proven solution with customers in United States and Philippines

Included in the GeoViewer solution are also water loss consultants to help reduce NRW (Non-Revenue Water Loss) for utilities

Create a computer mapping system (GIS)

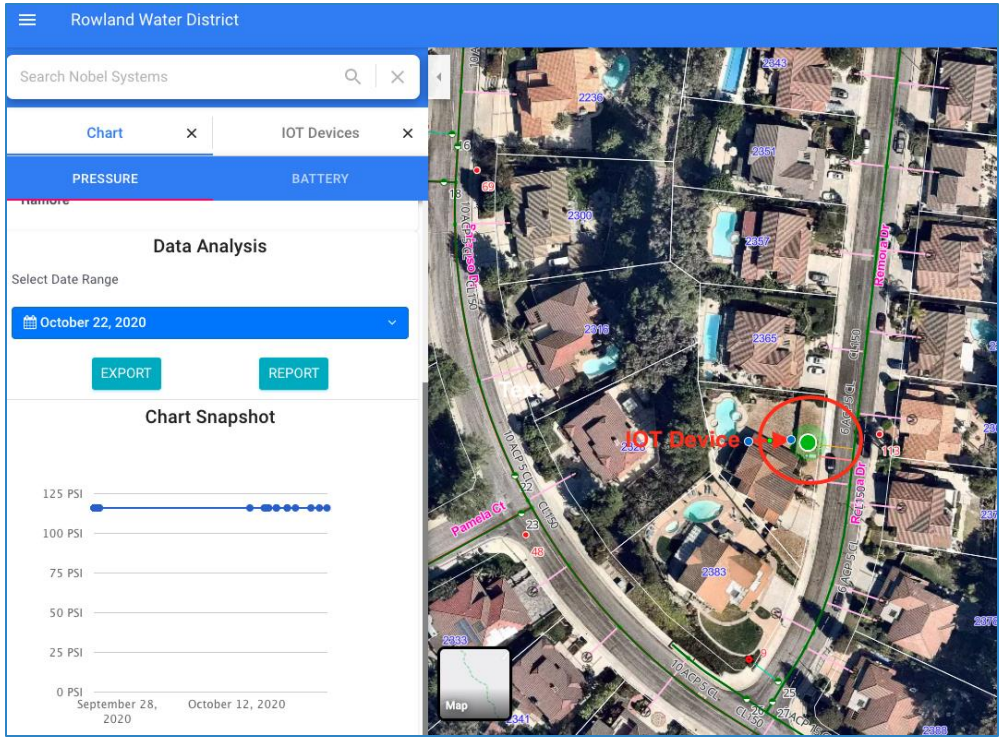
- The first step in any remote monitoring of water utilities would be to create a GIS system of the utility
- Nobel Systems has several years of experience in building such a system especially in countries such as the Philippines and India where data is not easily available
- Digitize the parcels from satellite images and transfer that data to a tablet
- The field staff take the tablet in the field and start to capture meters, valves and other assets
- The data is automatically transferred to the GIS and the staff start connecting the dots to build the water network
- This is again field verified to check for accuracy
- We can also import existing Data if available into the system
- Finally, the map is created

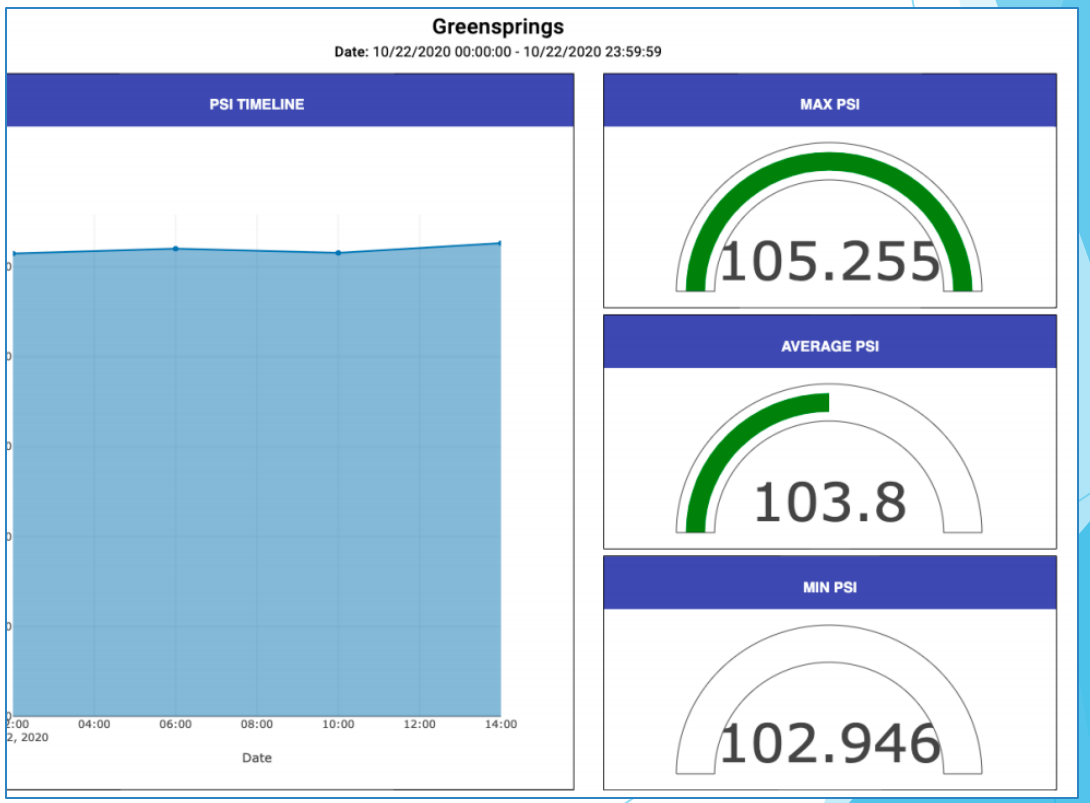
Real-Time Monitoring of water level and condition

- Nobel Systems provides its unique patented water quality/water level and pressure monitoring system
- This is based on the latest Internet of Things (IoT) technology
- This is an easy to install cellular battery powered device.
- Pressure data is transmitted every three seconds in real time

Viewing IoT Data

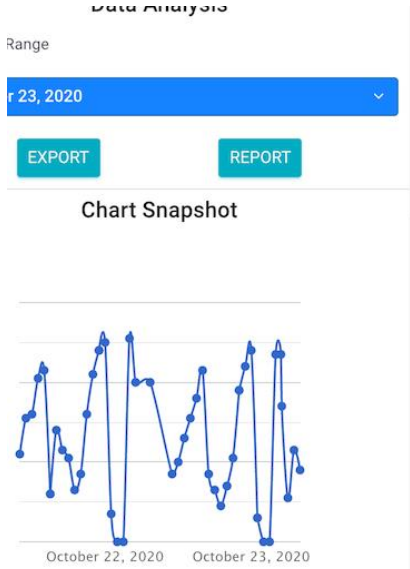
- Nobel's proprietary IoT device is installed on the street in an air release can (see highlighted circle in red encompassing the device in green)
  - Pressure data is transmitted every three seconds in real time

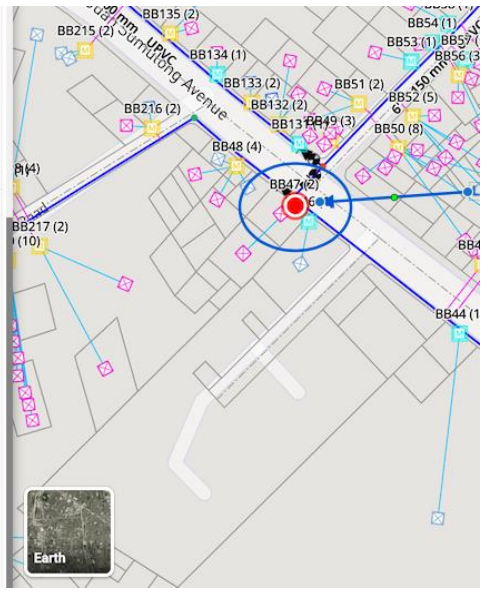




Low Pressure Alerts

- GeoViewer triggers an instant alert
- This alert sent via text to the duty foreman and any other designee
- Alert is highlighted in red on the map





Backup. Current value 0 PSI. Please take the necessary action.-- Nobel IoT alerts

Critical pressure at location Teresa Backup. Current value 0 PSI. Please take the necessary action.-- Nobel IoT alerts

Today 4:00 AM

Critical pressure at location Teresa Backup. Current value 47 PSI. Please take the necessary action.-- Nobel IoT alerts

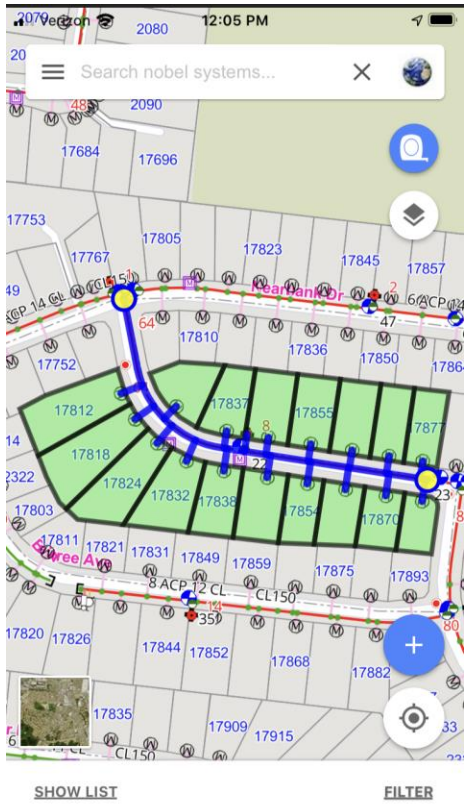
Critical pressure at location Teresa Backup. Current value 47 PSI. Please take the necessary action.-- Nobel IoT alerts

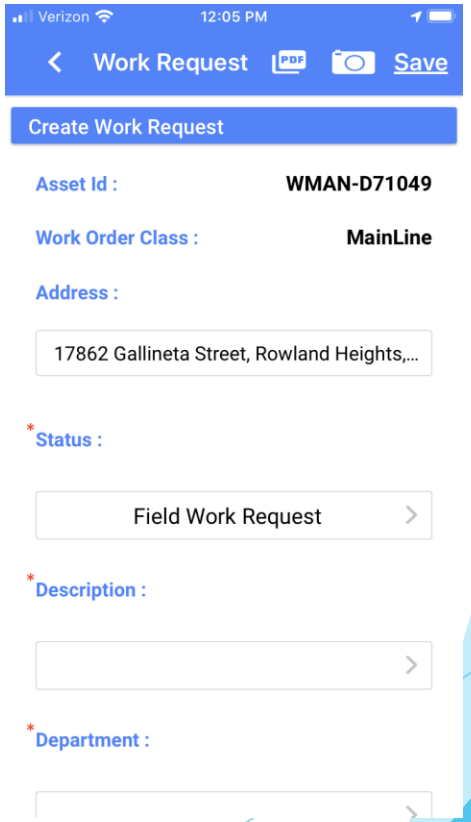
Critical pressure at location Teresa Backup. Current value 34 PSI. Please take the necessary action.-- Nobel IoT alerts

Operational Management - Leak Detection

A typical workflow on leak detection and asset management

- Digital Twin triggers low pressure alert
- Field staff identify leak and close valves (highlighted in yellow)
- Digital Twin simulates the scenario (Valve Closed) and affected Customers (highlighted in green) are notified
- Work Request/Work Order is generated to repair the leak

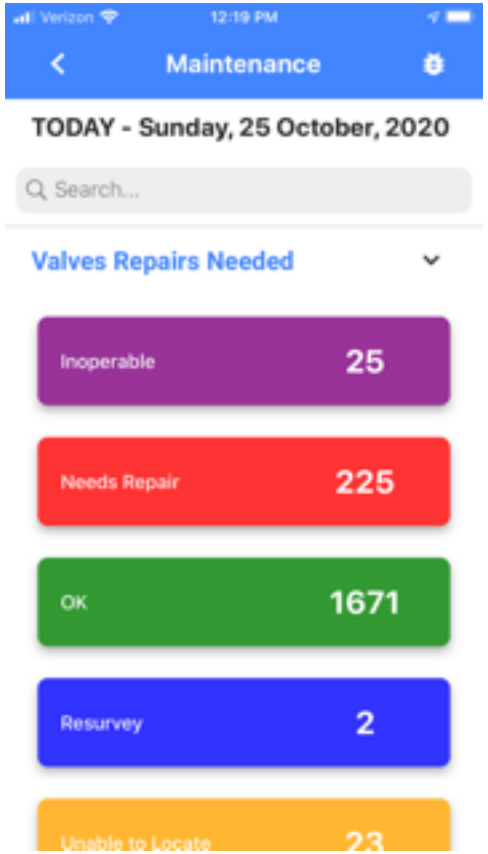


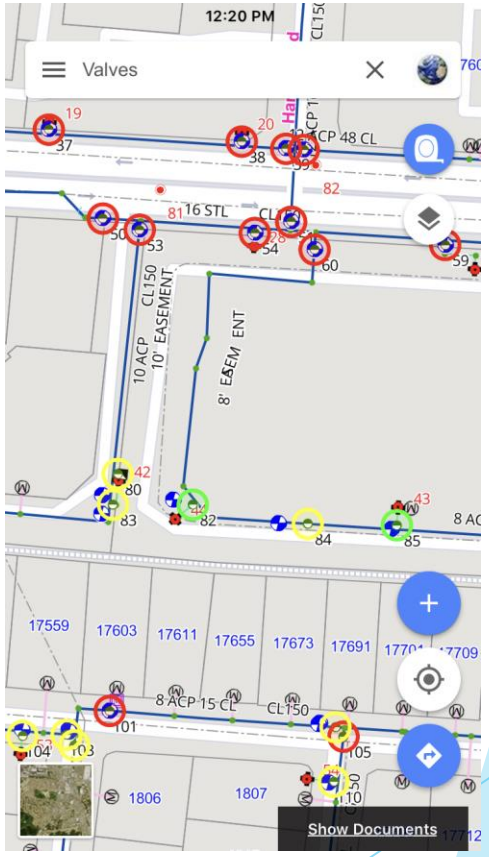


Preventative Maintenance

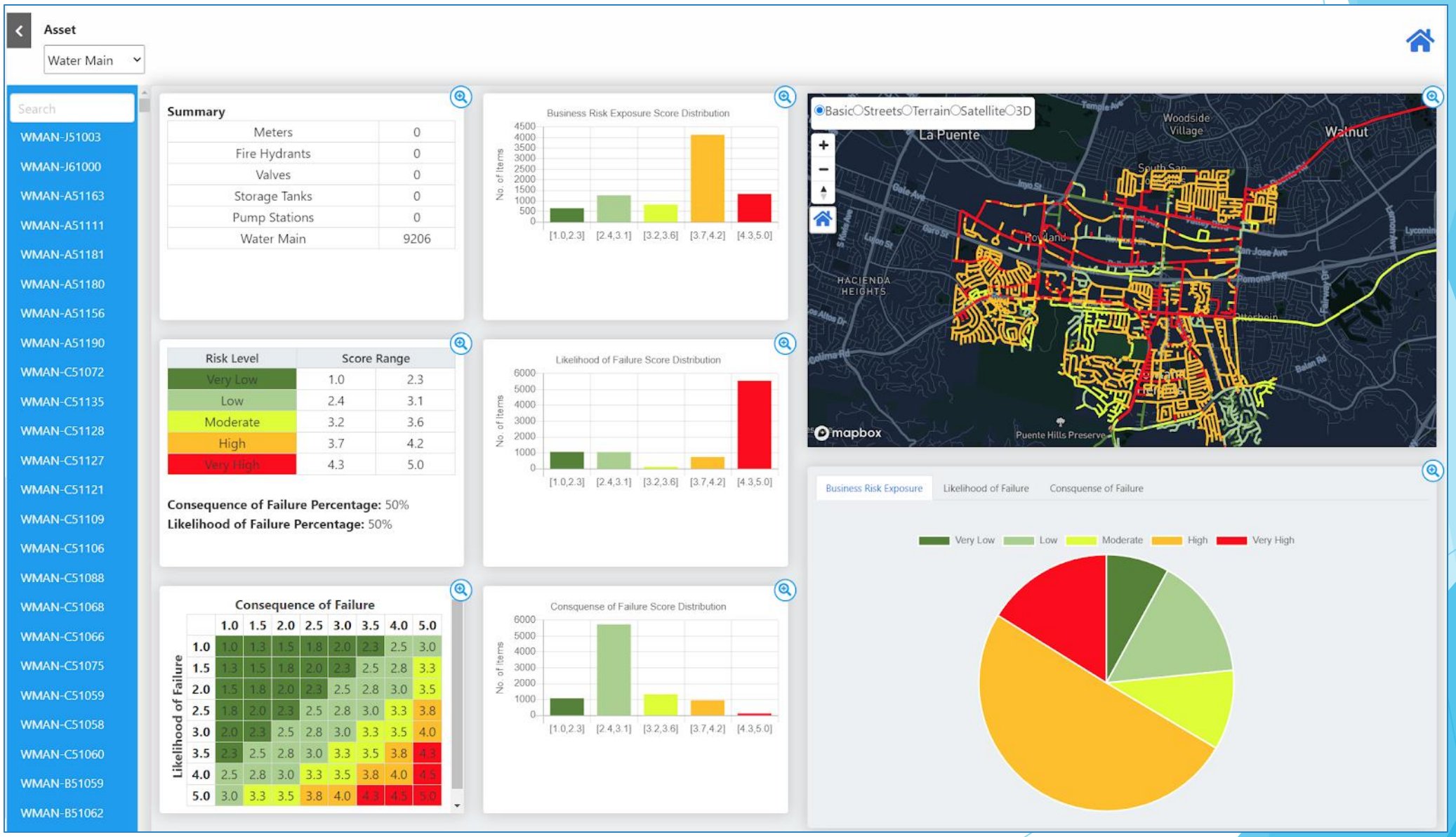
Valve Maintenance

- Dashboard shows valves needing repair, or inoperable or to be resurveyed
- Map is color coded showing valves recently exercised in green, valves exercised in the past one year in yellow and those valves in urgent need of maintenance in red

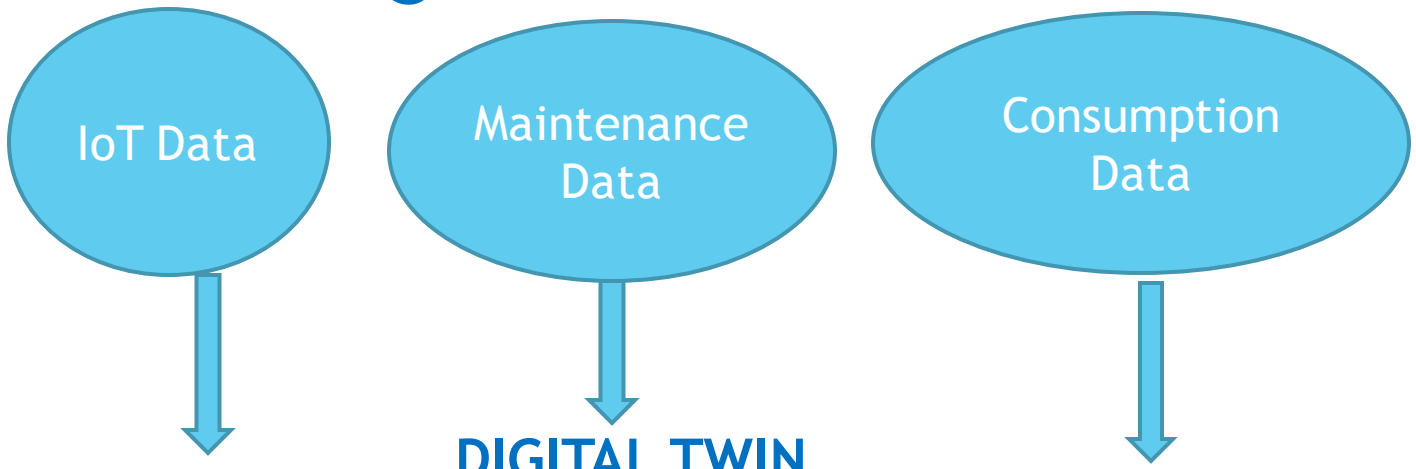


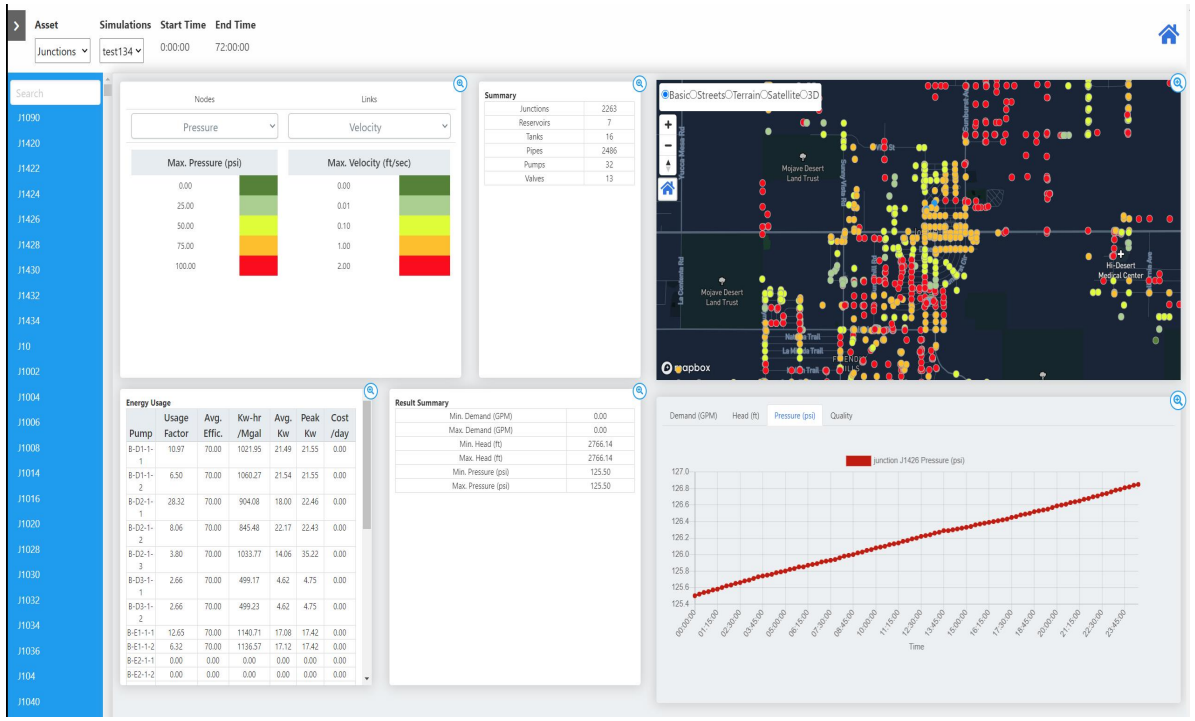


Deriving Business Risk of Failure From Sensor and Maintenance data



DIGITAL TWIN: Real-Time Demand Forecasting and Monitoring Water Pressure





- Nobel's proprietary Machine Learning Algorithm (ML) leverages the existing GIS Data, pressure, depth sensors and creates a DIGITAL TWIN of the existing water system.
  - Digital Twin Model is simulated every day using daily demand data and calibrated (verified) to measured pressure and depth datasets.
  - Once Digital Twin is calibrated, Nobel's Proprietory ML algorithm will accurately forecast the demand and predict pressure, flow, velocity for the next 24 hours for the entire water network.
  - The forecasted pressure, velocity, and energy use provides actionable insights to optimize existing network.

Asset: Junctions | Simulations: test134 | Start Time: 0:00:00 | End Time: 72:00:00

Search

J1090
J1420
J1422
J1424
J1426
J1428
J1430
J1432
J1434
J10
J1002
J1004
J1006
J1008
J1014
J1016
J1020
J1028
J1030
J1032
J1034
J1036
J104
J1040

Nodes: Pressure | Links: Velocity

Max. Pressure (psi)	Max. Velocity (ft/sec)
0.00	0.00
25.00	0.01
50.00	0.10
75.00	1.00
100.00	2.00

Summary

Junctions	2263
Reservoirs	7
Tanks	16
Pipes	2486
Pumps	32
Valves	13

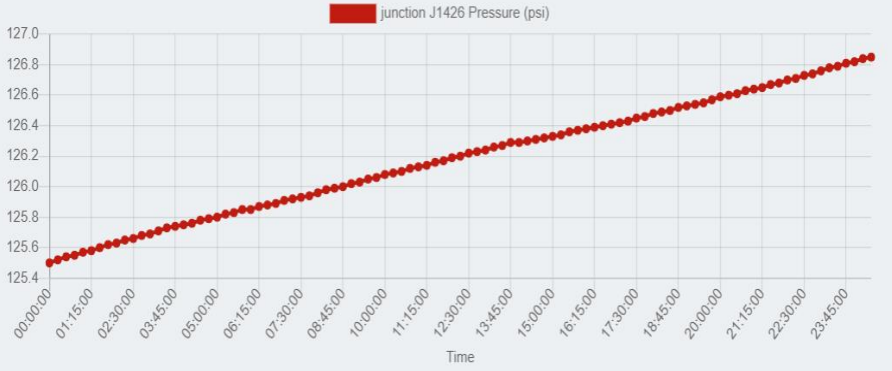
Energy Usage

Pump	Usage Factor	Avg. Effic.	Kw-hr /Mgal	Avg. Kw	Peak Kw	Cost /day
B-D1-1-1	10.97	70.00	1021.95	21.49	21.55	0.00
B-D1-1-2	6.50	70.00	1060.27	21.54	21.55	0.00
B-D2-1-1	28.32	70.00	904.08	18.00	22.46	0.00
B-D2-1-2	8.06	70.00	845.48	22.17	22.43	0.00
B-D2-1-3	3.80	70.00	1033.77	14.06	35.22	0.00
B-D3-1-1	2.66	70.00	499.17	4.62	4.75	0.00
B-D3-1-2	2.66	70.00	499.23	4.62	4.75	0.00
B-E1-1-1	12.65	70.00	1140.71	17.08	17.42	0.00
B-E1-1-2	6.32	70.00	1136.57	17.12	17.42	0.00
B-E2-1-1	0.00	0.00	0.00	0.00	0.00	0.00
B-E2-1-2	0.00	0.00	0.00	0.00	0.00	0.00

Result Summary

Min. Demand (GPM)	0.00
Max. Demand (GPM)	0.00
Min. Head (ft)	2766.14
Max. Head (ft)	2766.14
Min. Pressure (psi)	125.50
Max. Pressure (psi)	125.50

Demand (GPM) | Head (ft) | Pressure (psi) | Quality

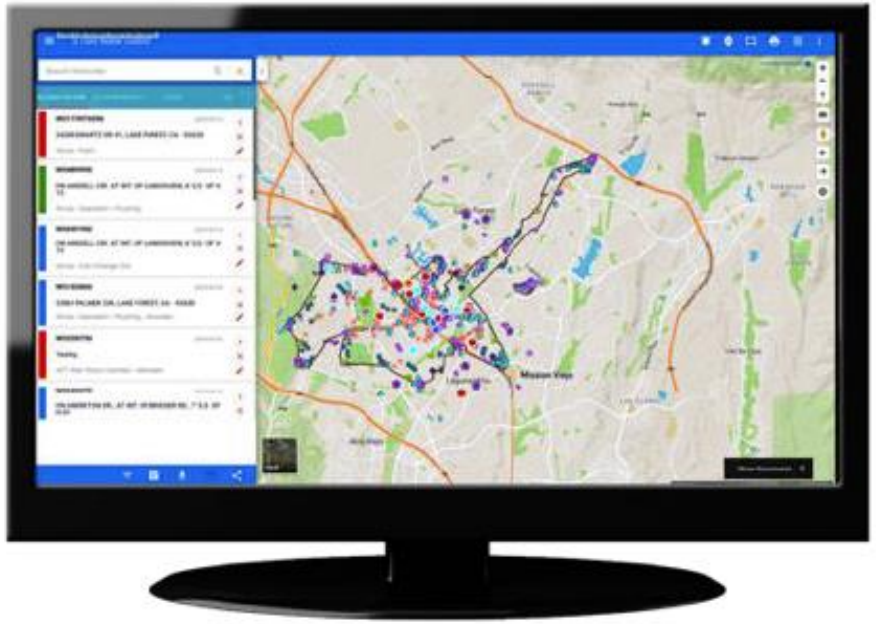


DIGITAL TWIN Model Reduces Non-Revenue Water (NRW) using GeoViewer

- GeoViewer pressure and flow monitoring tools monitors system activity.
- GeoViewer provides real-time data to be collected in throughout the water network, allowing demand-driven management.
- GeoViewer's meter replacement program helps utilities replace faulty meters efficiently to facilitate accurate tracking of Non-revenue water.
- GeoViewer work order and service order tools allow faster repair of main line breaks
- GeoViewer allows utilities to log water production and supply data and calculate water loss at the end of the fiscal or calendar year.
- Predict the NRW using GeoViewer machine learning tools.

Asset Management Cycle

- Utilities will use the GeoViewer Platform to accomplish these key activities



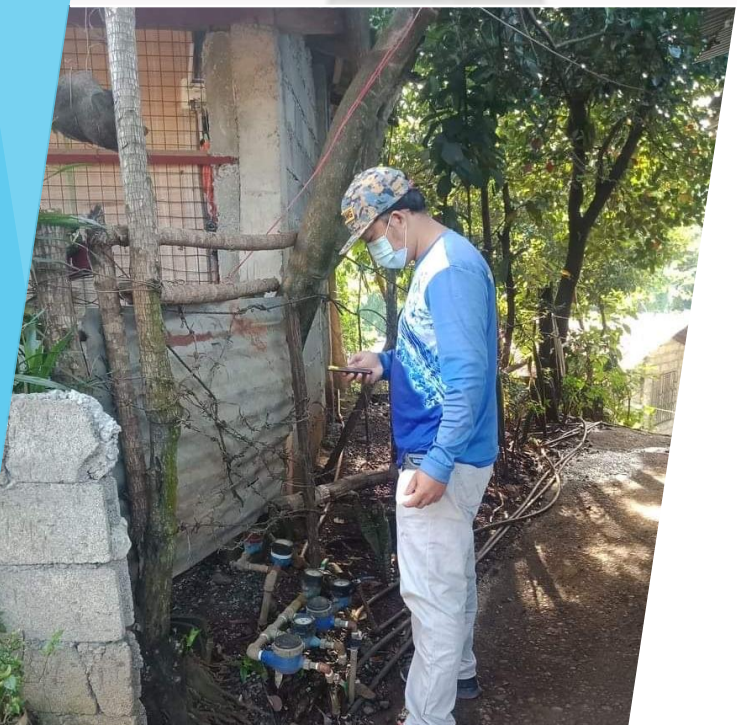
1) **Create / Update a utility's mapping system (GIS)**

2) **Monitor real-time water levels, pressures and other conditions**

3) Create DIGITAL TWIN -> then forecast Demand, Pressures, Flow

4) Asset Management – Combine DIGITAL TWIN AI and Operational Maintenance records to create Business Risk of Failure Models

5) Plan Capital Improvement Projects - Remove / Replace / Improve Asset Performance, then start the Asset Management Cycle again

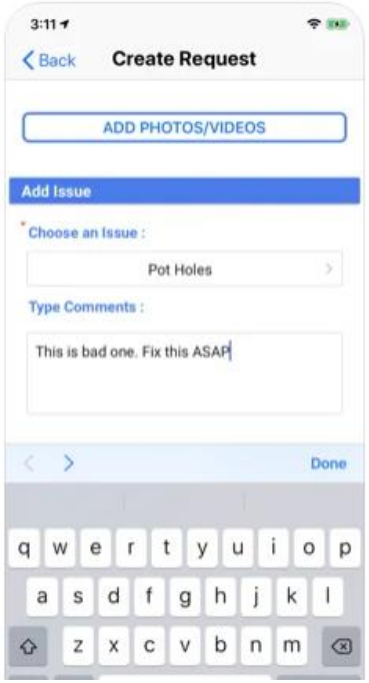


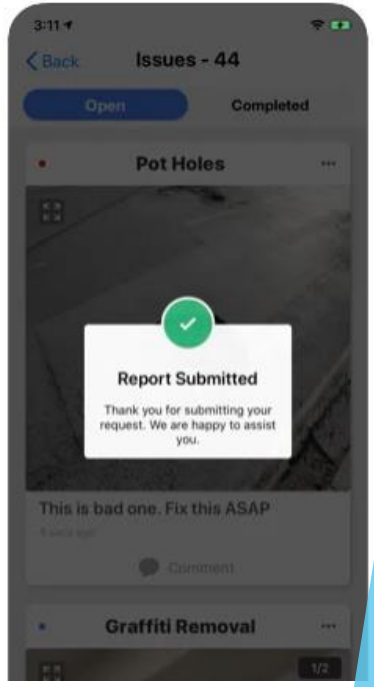
COVID Mitigation - Staff Safety & Operational Performance

- It is critical in today's pandemic that we provide water company staff as much contactless options as possible. This includes:
  - Meter Reading using mobile contactless app on smartphone
  - Electronic disbursement of bill
  - Less interactions with tellers at cash counters by providing electronic payment options
  - Public app that allows customers to submit issues
  - Paperless forms to generate work orders
  - SCADA monitoring of the water system

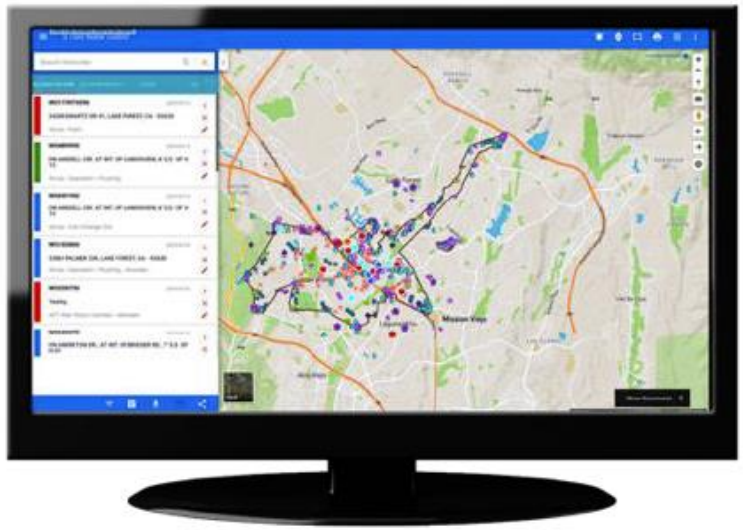
Tailored Customer Service

- Citizens can submit issues through a Public App and report leaks, meter issues, etc.
- Water Company can submit potential disruptions and get customer feedback through the App too





System Deployment



- Cloud Hosted Software as a Service (SaaS) subscription model
- Hosted on Amazon Web Services (AWS) secure servers
- Using GeoViewer, our proprietary trademarked software to deploy the data online, on the desktop and mobile, out on the field
- No maintenance, such as GIS staff, servers and software

CUSTOMER TESTIMONIALS - Philippines

- Teresa Water District – Rizal, Philippines

  General Manager – Marnelle Reyes

  High non-revenue water, lack of documentation of facilities and incoherent billing and collections procedures were a huge problem to TERWD. The GeoViewer Online and GeoViewer Mobile functionality allowed TERWD to have a detailed documentation and asset management capabilities crucial in decision making to address those problems. Nobel Systems made it possible for TERWD to have accessible, accurate and functional data needed in our day-to-day operations

- Bogo City Water District

  General Manager – Houdini Jumao-As

  Having the GeoViewer in our system has provided the district with real-time business insights in order to make more factual decisions in a short span of time because the data is actual. Having Nobel's IoT system that we recently acquired, we found that it helps the district understand the behavior of our key equipment and assets to prevent unintended events. Even for the short period of usage, we were nonetheless given on-time readings and data will be used for short and long-term planning to improve the district's business process.

Why Select Nobel?

- Digital Twin – a Proven System – Used at over 70 Nobel locations worldwide
- Meets and Exceeds all Challenge Requirements
- Improves Operational Efficiency by reducing NRW Loss and preventing Pipe Bursts
- Reduces Capital Investment Costs of Asset Maintenance
- Improves Staff Safety by going Digital
- Smarter decision making
- Enhanced communication between the customers and executing agencies
- Scalable

Proven - Reliable - Secure - Simple - Cost Effective

Contact Nobel Systems

- Nobel Systems, Inc.

MICHAEL SAMUEL – President
msamuel@nobel-systems.com
Mobile: +1 951 3178941

ARETHA SAMUEL – CTO
arethasamuel@nobel-systems.com
Mobile: +1 909 6776841

- GeoNobel, Inc.

GELLA S. ROMERO – BizDev Manager
gellaromero@nobel-systems.com
Mobile: +63 999 2295657

JUNE R. REYES – Operations Manager
junereyes@nobel-systems.com
Mobile: +63 999-2295659