Rezatec

Case Study: HERA Group

Using geospatial AI to improve water network performance in Italy

GRUPPO **HERA**

Overview

Headquartered in Bologna, Italian multi-utility HERA S.p.A manages more than 35,000km of water distribution network and the entire water cycle system with more than 400 drinking water treatment plants. The Hera Group aims to be the best Italian multi-utility for its customers, workers, and shareholders, by further enhancing an original business model capable of innovation with strong local roots, while respecting the environment.

The Challenges

Italy's water system is plagued with significant losses. It is estimated that more than 40% of all the drinking water in the country's national distribution network is lost to leakage. Inevitably this scale of loss comes at a considerable cost, some figures put this at more than EUR4 billion annually.

A regulation to reduce water leakage and provide a secure water supply was introduced in 2017, resolution 917/2017. Nonetheless, even before the introduction of this ruling, improving performance was a key objective for HERA.

In a bid to reduce losses, HERA adopted a cutting-edge approach to predicting where pipeline failures are likely to occur using Rezatec's Pipeline Risk product.

The journey to accurate failure forecasting began in 2015, when HERA began searching for innovative ways to reduce its pipeline losses.

"In 2015 we collaborated with the University of Bologna to understand if the age, diameter or material of our pipes were the only factors that could influence the risk of breakage. We wanted to find the factors that influenced the risk of breaks in our pipelines because we thought that it wasn't only intrinsic factors that were affecting our network, but also extrinsic factors," explains Maurizia Brunetti, Water Supply Technical Coordination Manager at HERA.

After several years of research with the University of Bologna, several additional factors were identified as influential in the rate of pipeline failure, including soil and temperature.
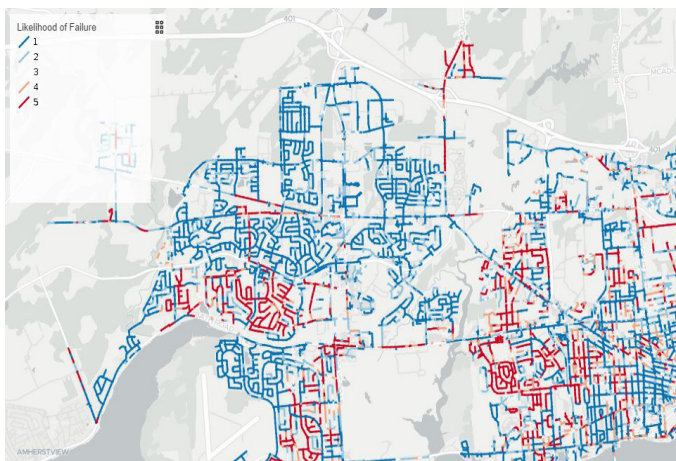
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The Solution

Armed with better understanding of failure modes from the Bologna University study, HERA Group commissioned ISOIL Industria S.p.A to help reduce non-revenue water using innovative technologies. ISOIL Industria's deep knowledge of market needs makes it the right partner to drive the best business decisions and achieve efficiency gains. ISOIL Industria partnered with Rezatec to deploy its Pipeline Risk tool.

"Rezatec's tool helps utilities better understand their buried assets, prioritise investment intelligently and improve results, pushing the limits of the active DMA control towards the performance set by the authority."

Luca Scansetti, Water Utility Service Manager at ISOIL

Rezatec's Pipeline Risk product combines satellite data with artificial intelligence techniques to produce risk maps expressing parameters such as the Likelihood of Failure (LOF).

The predictive assessment of the network began in 2019, with a retrospective analysis of data from 2016-2018, for a relatively small 490 km section of HERA's water system.

Rezatec platform showing likelihood of failure

HERA provided their 2016-2017 network breakage data and Rezatec predicted further breakages in 2018, which had already been identified and recorded by the utility. This was the first step towards validating accuracy.

Pipeline Risk helps HERA prioritise its pipeline replacement investment by assessing the likelihood of failure in each section of pipe using historic pipe failure data to build a predictive model. The model analyses data on the material, diameter and age of the asset, as well as the soil and terrain that surrounds it. Satellite data is used to factor in terrain motion such as uplift or subsidence and vegetation growth, which also has an impact on failure risk.
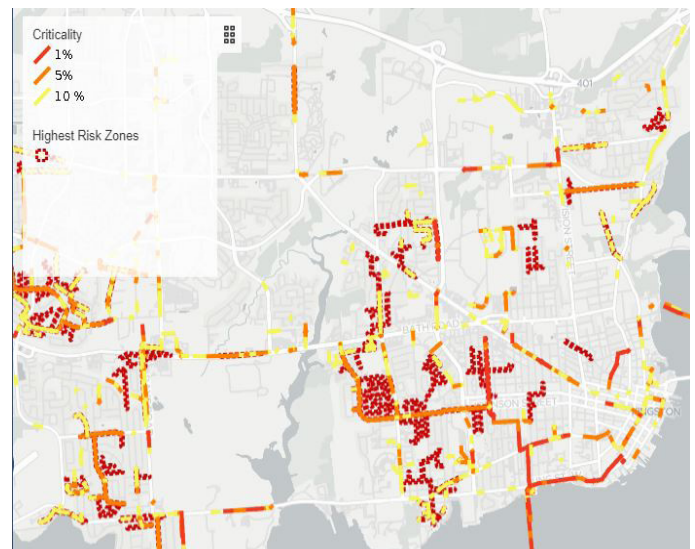

Rezatec platform showing criticality

Pipeline Risk not only identifies those parts of the network at higher risk of failure, it also expresses the Consequence of Failure (COF) as a cost to the utility. This metric considers the number and type of customers potentially affected by a failure, any third-party liabilities, potential effects on the transport network as well as the direct cost of digging up and replacing the pipe.

The combination of both the likelihood and consequences of failure gives a full risk profile or Pipeline Risk Value (PRV). The Pipeline Risk Value is visualised in a simple dashboard format for easy interpretation.

This advanced, data-driven, approach enables HERA to target field crew activities on key areas for intervention, as well as prioritising upgrades in areas of the network with the highest risk.
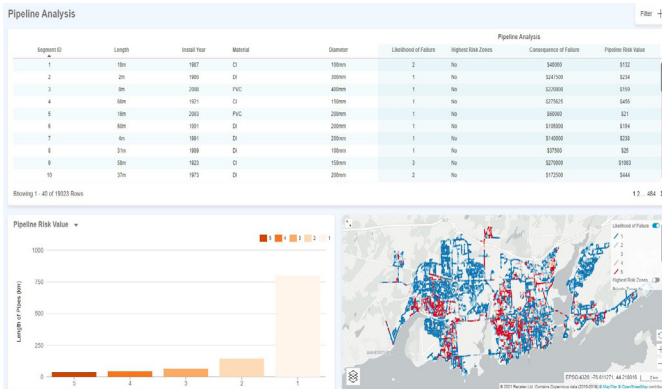
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Rezatec platform dashboard

"Rezatec and ISOIL were the only provider whose predictive solution considered not only pipeline diameter, age and historical breakage data, but also groundwater level, soil type, and temperature. Rezatec's algorithm considers all of these factors and is more integrated than the data we considered previously," observes Brunetti.

With the objective to find 70% of breakages in 30% of the network under investigation, the initial assessment gave HERA the confidence to deploy Rezatec's solution and in 2020 a further contract was awarded.

Outcomes

Rezatec's Pipeline Risk tool allows the HERA engineering team to potentially identify twice as many leaks compared to previous methods. It allows the company to focus investment where it is most needed and improve productivity.

HERA are using Pipeline Risk to drive renewal and detection activities, focusing on areas of the network with the highest risk of failure in the future. In 2021, HERA extended the solution to cover 2800 km of their network across the entire province of Rimini, and 400 km in the province of Forlì- Cesena.

Pipeline Risk is the only service of its kind that combines satellite data with the most advanced AI analytics capability on the market, giving 10% more accurate results than the next best risk model.

Geospatial AI enables water network owners to:

- Build a digital risk profile of the entire network that incorporates both likelihood and consequence of failure.
- Mitigate risk and reduce costs by allocating pipeline risk values across the network.
- Prioritize teams and IoT deployment by focusing on the top 30% of the pipeline where 70% of failures will occur.
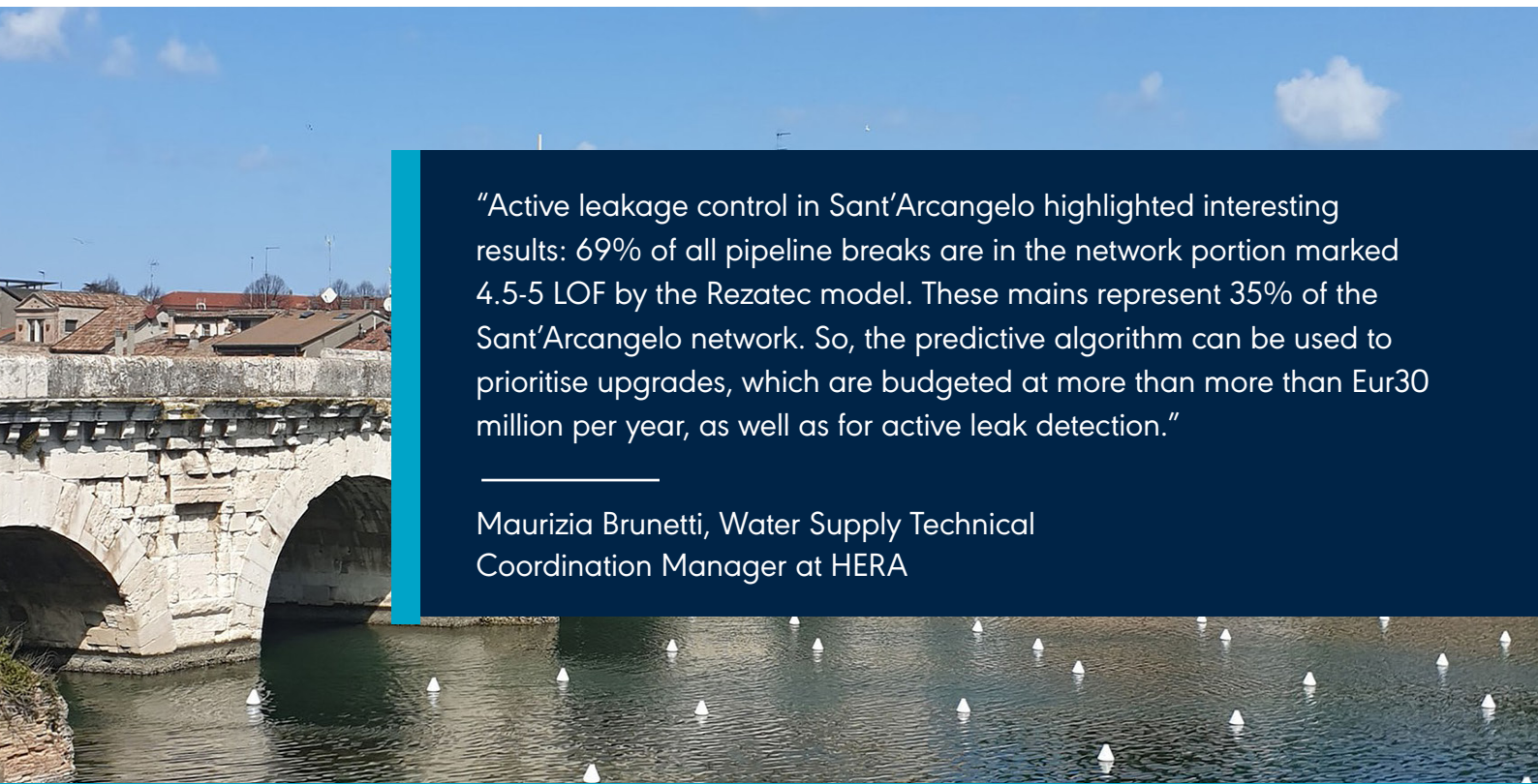
"Active leakage control in Sant'Arcangelo highlighted interesting results: 69% of all pipeline breaks are in the network portion marked 4.5-5 LOF by the Rezatec model. These mains represent 35% of the Sant'Arcangelo network. So, the predictive algorithm can be used to prioritise upgrades, which are budgeted at more than more than Eur30 million per year, as well as for active leak detection."

Maurizia Brunetti, Water Supply Technical
Coordination Manager at HERA