

## Predictive Incident Diagnosis for Effective Resource Planning in Utilities Infrastructure

Amey Utilities are responsible for the construction and maintenance of key infrastructure within the power and water sectors. Their services range from the design, construction, repair and maintenance of water infrastructure.

Amey Utilities approached the Virtual Engineering Centre (VEC) to explore how the use of simulation combined with big data analytics could be used in their process development and commitment to delivering impact, innovation and an enhanced customer experience.

### THE CHALLENGE

An integrated team, comprising Research Engineers for the Virtual Engineering Centre and Operations Support Specialists from Amey Utilities identified that the prediction of incidents and the associated process of resource planning and asset assignment was heavily dependent on factors such as local weather conditions, and an understanding of the nature of previous incidents that had occurred at the customer's location.

The traditional approach to day-to-day decision making required human operators to process large amounts of data from different sources, resulting in a time-consuming and costly process.

Amey Utilities wanted to improve the efficiency of their incident diagnosis and understand the potential impact and added value that advanced digital technologies, including smart data analysis and improved visualisation of data to support decision making, can have on key business metrics.

Process optimisation within this area would lead to better operator data assimilation, decision making and overall increased customer satisfaction.

### THE SOLUTION

Customer Decision Support Tool

Using Nottinghamshire as an example location, the VEC's industry experts created a web-based platform to improve incident diagnosis and resource allocation accuracy with real-time updates of customer incidents - adding strategic value to the process.

This intelligent platform provides a spatio-temporal forecast of job volumes using an Autoregressive Moving Average eXogenous (ARMAX) model, based on the historical job trends and prevailing weather pattern data provided by a Norwich based SME Weatherquest. This allowed the tool to factor in, and more accurately predict (50%) the weather's influence on incidents and better predict the job volume of work.

A high-fidelity simulation considering the actual vehicle schedule, resource planning allocation, traffic and random job failure was carried out to estimate the key performance indicators (KPI) of the customer decision support tool.

## BENEFITS

Through the use of this intuitive digital platform, Amey Utilities has been able to build in flexibility and resilience and gain resource planning and productivity benefits across the businesses repair and maintenance function.

Studies, using test data, have shown that the model could be 30% more effective than conventional methods of diagnosing the urgency of a customer-raised order.

Using the sample data from Nottinghamshire, together with the tool, the results show:

- Diagnosis accuracy increased by more than 13%
- Vehicle allocation accuracy increased by over 35%
- More robust job scheduling based on priority
- Better SLA performance
- Job volume and location prediction
- Quicker intervention times
- Increased customer satisfaction

Similar methodologies can be applied to any sector network infrastructure, run remotely if necessary, for the analysis and prediction of behaviour and incidents.

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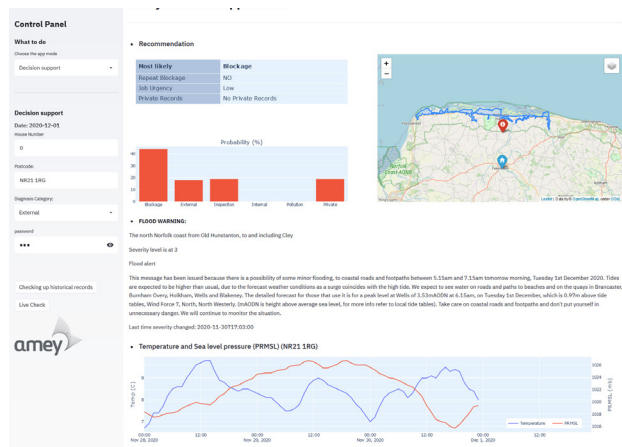
This project has shown that by using advanced data analytics we can develop a robust predictive incident planning tool that has the potential to improve customer experience across the water sector.

The VEC has demonstrated methods to overcome our challenges with algorithms that can be used in a commercial solution to deliver productivity saving benefits.

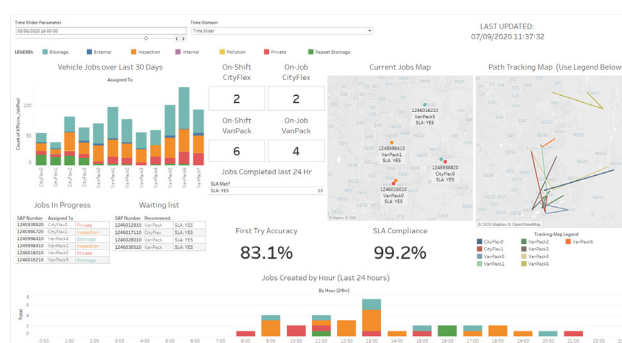
The professional approach of all the VEC team was exemplary, and we are keen to continue future projects with the team. ”

Ben Hawkins, Innovation Business Partner, Amey Utilities

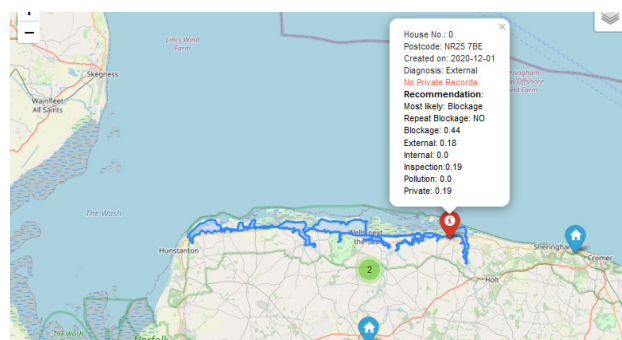
## AMEY Decision Support Tool



## Dashboard



## Map View



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