Smart Utility Network

Thames Water

02 November 2017

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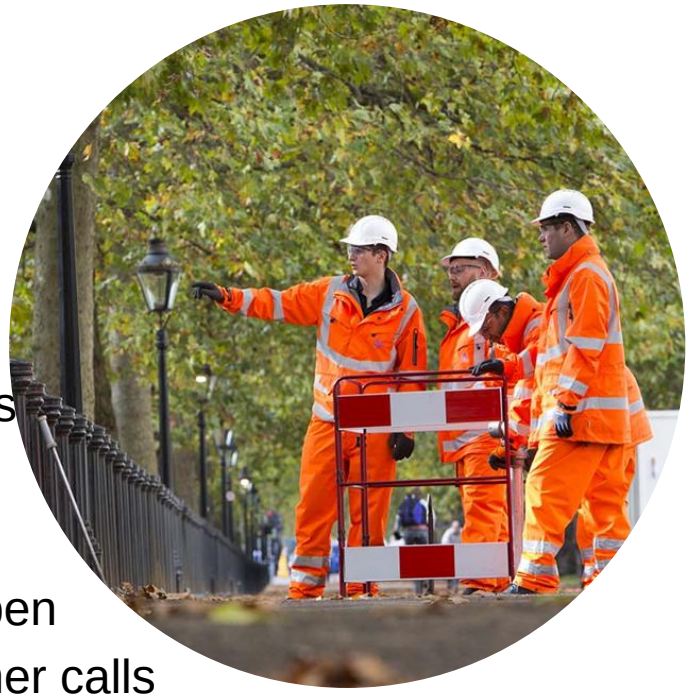
Introducing Thames Water.

Who are we?

- UK's largest water and wastewater service provider
- 15 million customers – 24% of the UK's population
- 85,000 miles of water mains and sewers
- Suppliers of 2,600 million litres of drinking water per day
- 4,500 employees
- Our water quality is meeting 99.97% of stringent tests
- 500,000 drinking quality tests each year

Why Smart Water 4 Europe?



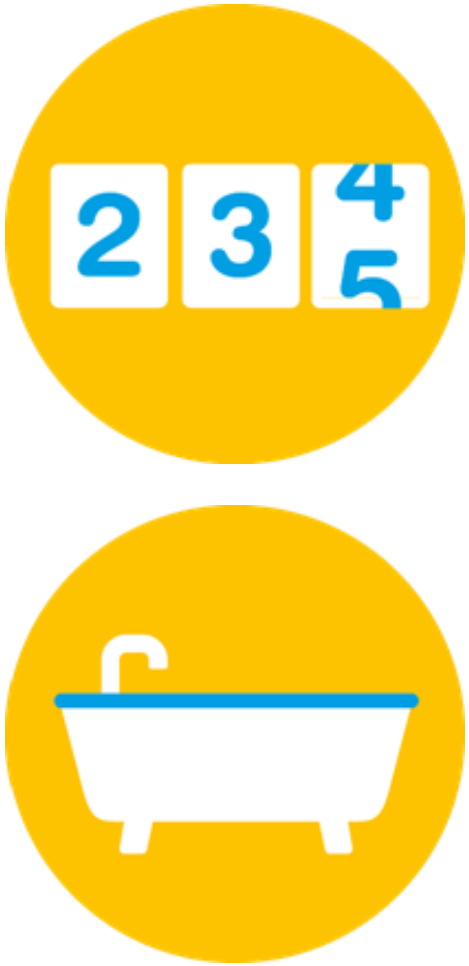
- We aim to provide an excellent and efficient service that meets our customers' needs
- For a Smart System, a smart DMA is the obvious
  - This is where our customers are
  - Where 80% of the network is
  - Where many of our performance failures happen
  - Is the origins of many of the unwanted customer calls
- We face challenges that make our water sources less reliable and lead to a deficit in supply versus demand
- A Smart Water Network could help us to address these challenges by reducing demand and tackling leakage
- Creating a small water network at small scale before increasing the scope and area, enables us to understand the best way to do it and assess the risks and benefits

Leak Detection and Asset Management

- Reducing leakage is very important to help secure a long term supply to a growing population
- Leakage has consequences on the volume of water we have to produce and has the potential to carry a reward or penalty on our performance against our target
- We hoped that the use of novel techniques, including machine learning algorithms, would enable the near real-time detection and location of bursts on the network
- We created algorithms to distinguish between customer side leakage and wastage
- Leakage is one of our business headline measure reputational importance

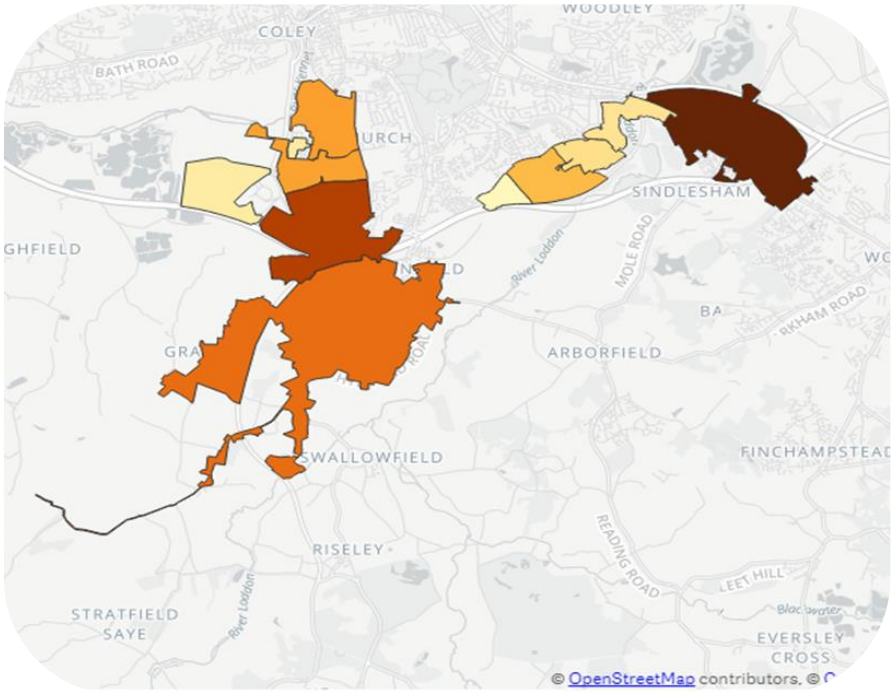
Customer Interaction and Awareness

- We aimed to improve the customer experience by providing information to customers to help them better manage their water use and wastage
- This helps customers to save money on water and energy
- We also aimed to reduce demand by metering customers and letting them know about their water usage, to entice them to use less water



Energy Visualisation

- After manpower, energy is the second highest operational cost for our business
- Anything we can do to better understand where energy is being used and where it can be reduced is key
- Improving our knowledge of energy consumption allows us to identify not only risks but also opportunities



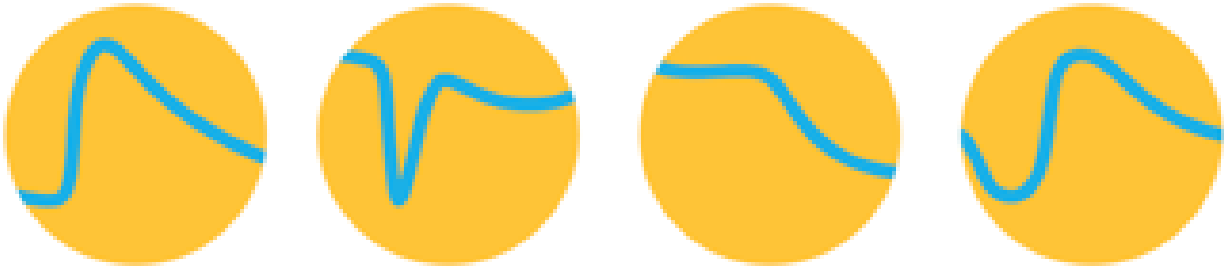
What did we do?

On top of our existing standard infrastructure we:

- Outfitted over a kilometer of a risky trunk main with TrunkMinders from Syrinix to measure flow, pressure and vibration in the pipe – detecting disturbances and anomalies that suggest leakage or may imply an impending burst
- Instrumented 4 DMAs using Syrinix PipeMinder-S technology giving us a clearer picture of pressures within the DMAs
- Tested methods to find abnormalities within distribution mains as soon as they happen, including solutions developed by the University of Sheffield and Vitens
- Developed a holistic visualization platform to integrate the different solutions

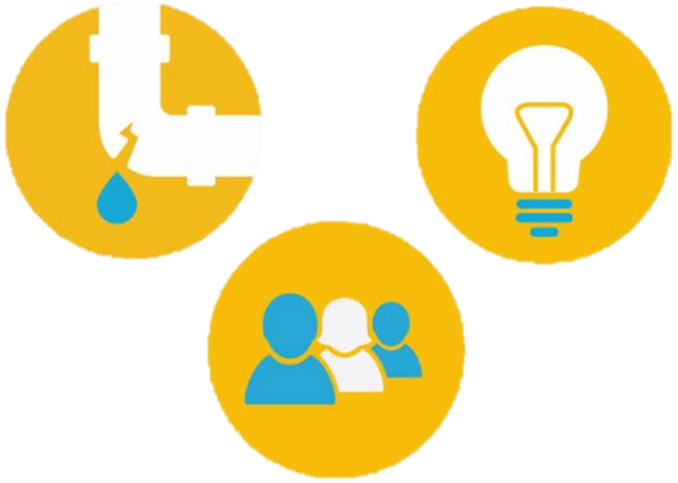
Results

- Developed an algorithm that makes the first attempt to distinguish between customer side leakage and wastage – allowing us to assess the severity of a customers' leak and help them to reduce their consumption and bills
- Completed the most comprehensive evaluation of trunk main leak detection capability devices to date
- Tested and assessed three network leakage detected algorithms (AURA BED alerts, Dynamic bandwidth monitoring (DBM) and Netbase envelopes)
- Created a "dictionary" of transient pressure waves to quickly identify transient types allowing us to take proactive action to avoid damage to the network



Results

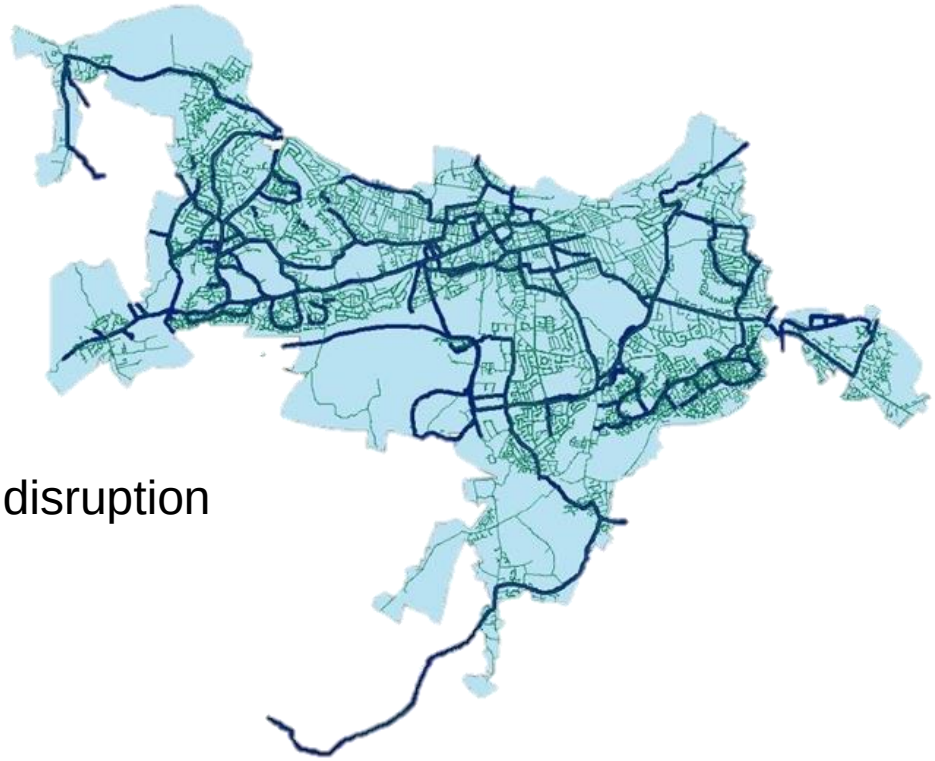
- Developed the Energy Visualisation Tool (EVT) to help us understand the relationship between demand, pressure and energy by displaying the energy used in the network quickly and intuitively
- We provided incentives to our customers using ‘Greenredeem’ to encourage our customers to be more mindful of their water use and to use water more efficiently
- Created the Integration Platform to combine all of the previous solutions, to help us to identify cause-and-effect relationships that may have otherwise been missed



What did we learn?

The deployment of a Smart Water Network has its own challenges such as:

- Large network data stores
- False positives
- Limited analytical capability
- Pipe location and condition
- Failure prediction
- Meter coverage
- Response to failures
- Interruptions to supply and traffic disruption



What does this mean for the future?

- We will continue developing smart networks following the smart DMA building blocks strategy
- Smart Water 4 Europe shows how much more data we could include in our decision making and how difficult it is to action insight when it is not part of your culture
- The ultimate opportunities to embrace data continue to excite and although it will be a long journey, it will be worthwhile to embrace digital data quality and governance

Thank you