Enabling data transformation for leak location

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As the world continues to hurtle into the digital age, the water industry is no exception. Fuelled by improvements and availability of monitoring equipment, “big data” is increasingly available. Yet, transforming this data into operational and strategic value to inform future water networks remains a challenge. This work focuses on pathways enabling data transformation into actionable information.

Data and leakage

In the UK and many other countries across the world, the practice of dividing up the water distribution network into monitored and isolatable sections is common practice. These district metered areas (DMA) can be used to identify increases in leakage or bursts. Data is typically collected from a few monitoring points, such that it is possible to detect leakage or a burst within the DMA, but not locate it. Many leak detection methods consider minimising the number of sensors within the networks. Fewer sensors requires greater reliance on models to increase the effectiveness of finding a pressure change to reduce the search area.

A field trial was established within a DMA in order to create a data set of co-located pressure and flow data. The data is currently being collected at 50 properties across the DMA, by installing a dual channel data logger (with internal pressure transducer) within the boundary box, thus utilising the meters that are already in place.

What has been done?

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Why collect data at the customer boundary box?

Pressure data can provide information on the network side, whilst flow data can tell us what is happening on the customer side.

What are the benefits?

- A novel, high density, co-located flow and pressure data set
- Improved understanding of the relationship between flow and pressure in a water distribution system
- Development of a method to reduce search area for leaks and bursts
- Differentiation between network and customer-side events

Pressure mapping

- Pressure data utilised to locate leaks/burst in network
- Utilising spatial analysis capability of GIS
- Data from instrumentation could be used instead of modelled data
- More data points = reduced interpolation distance

Summary...

The overall result is a better informed decision matrix. The data that has been collected during the trial will be utilised in future work in the field, building a better informed understanding of the DMA.

Understanding and making use of the DIKW pyramid can help us avoid the drip:

- Data
- Rich information
- Knowledge
- Wisdom
- Poor

To keep it simple, although it is easy to get dragged into the detail and search for a complex solution, less is often the most robust.

The tools developed for data transformation:

- System capabilities
- Software restrictions
- Data silos
- Culture

Each instance contains multiple features: date time, pressure, flow. The data is currently being collected at 1 month = 144000 data instances, 1 week = 33600 data instances. The reasons for modelled data are: pressure, flow, and time. The amount of data generated from just 50 properties across the DMA demonstrates the potential for a large amount of data. Future work includes the development of a method to reduce search area for leaks and bursts.