Approximate location of leaks/bursts in a district metered area (DMA)

S. Boatwright [1,2], Dr. M. Romano [1], Dr S. R. Mounce [2], K. Woodward [1], Prof. J. B. Boxall [2]

1 United Utilities PLC, Warrington, UK

2 University of Sheffield, Dept. of Civil and Structural Engineering, Sheffield, UK

Stream

The Industrial Doctorate Centre for the Water Sector

1a. Problem

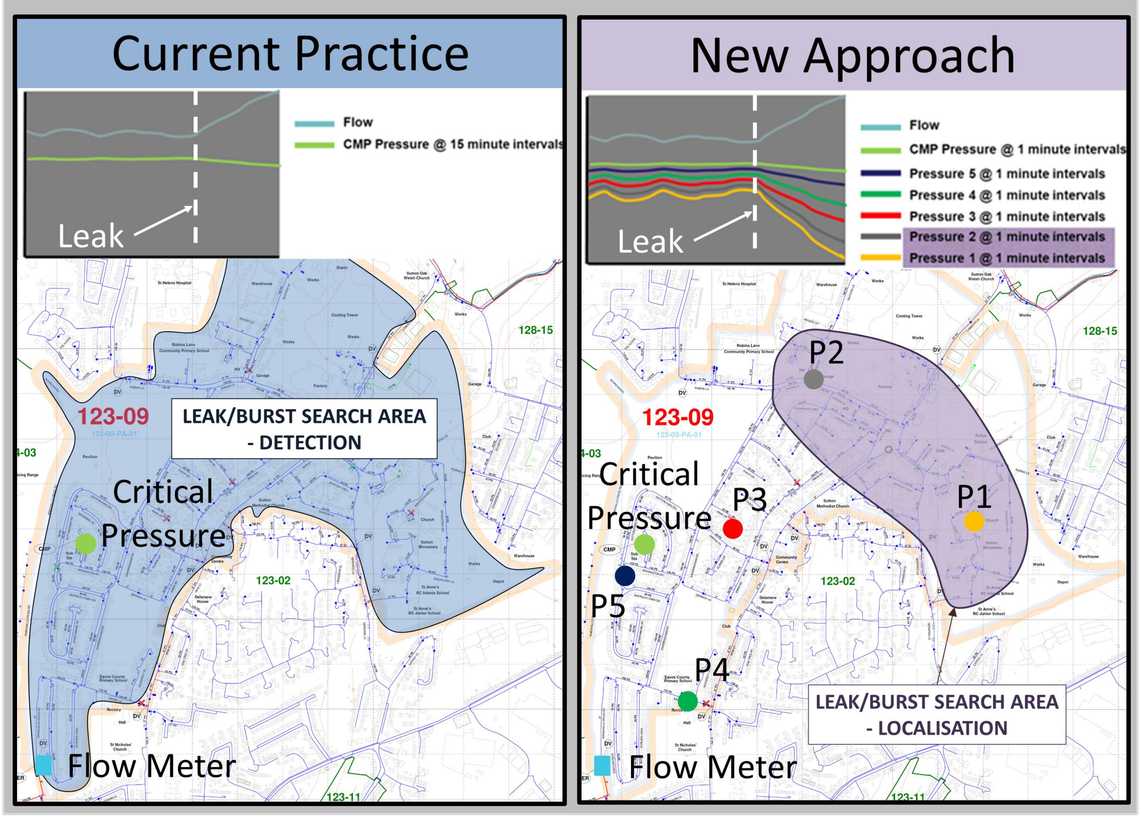
Water loss, including that caused by leaks/bursts, within the UK stands at approximately **25% of total production** but there is a requirement for this to fall sharply in coming AMP cycles. In addition to water loss, a number of **secondary consequences** exist (such as loss of supply or discolouration) which have a **significant impact on water company performance and customer service**. United Utilities have developed and implemented an Event Recognition System to allow **the timely detection of leaks/bursts**, which analyses pressure and flow data from all of their approximately 2800 DMAs. This project aims to build upon this by developing a system to allow localisation (i.e. determining the approximate location) of leaks/bursts within a DMA to improve performance in terms of Ofwat's key themes **(customer service, long-term resilience, affordable bills and innovation)**.

1b. Research Aim and Key Questions

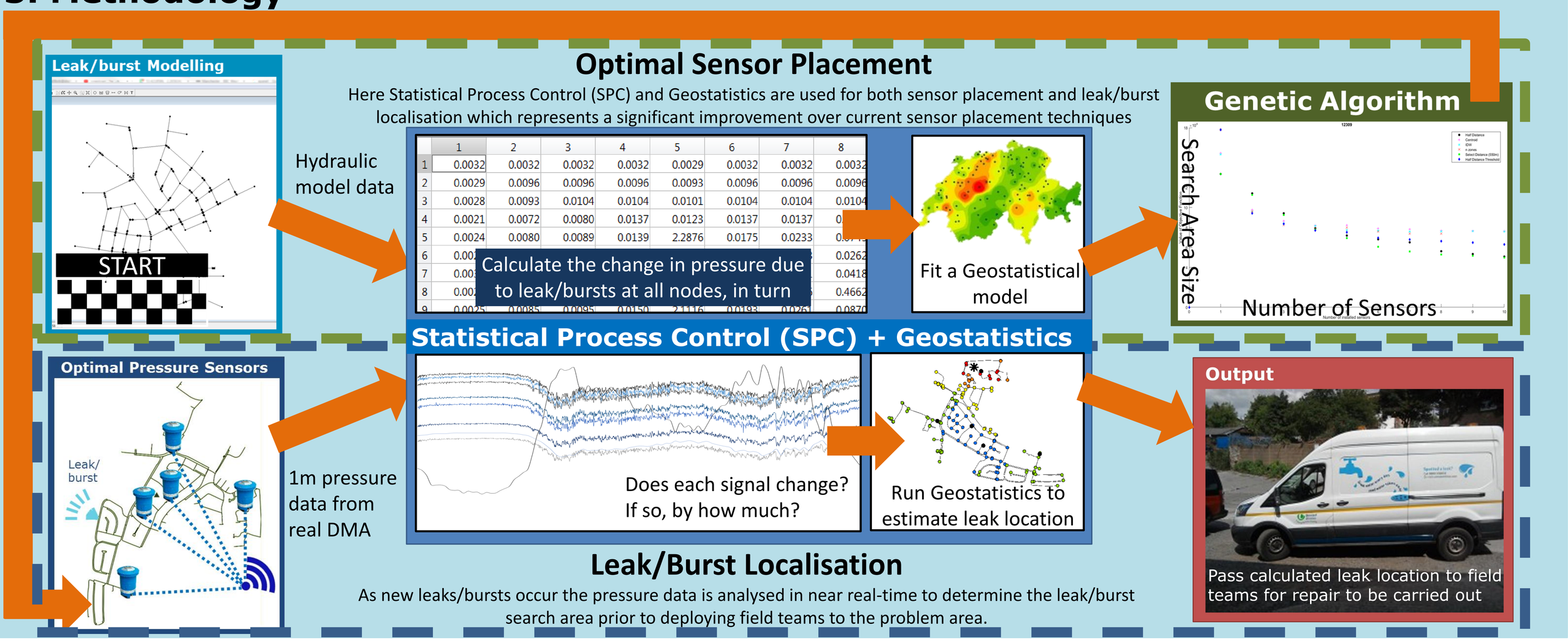
Aim: To develop a tool which can **automatically**, and in **near real-time**, determine **the location of new leaks/bursts in a DMA** using data from additional pressure sensors whose number and location in the DMA has been determined to **maximise localisation performance whilst minimising the number of sensors, and hence cost, required**.

1. How to use additional pressure information to determine the location of a leak/burst reliably?
2. How many additional pressure sensors and where?
3. Can the costs/benefits be quantified and how?

2. Rationale



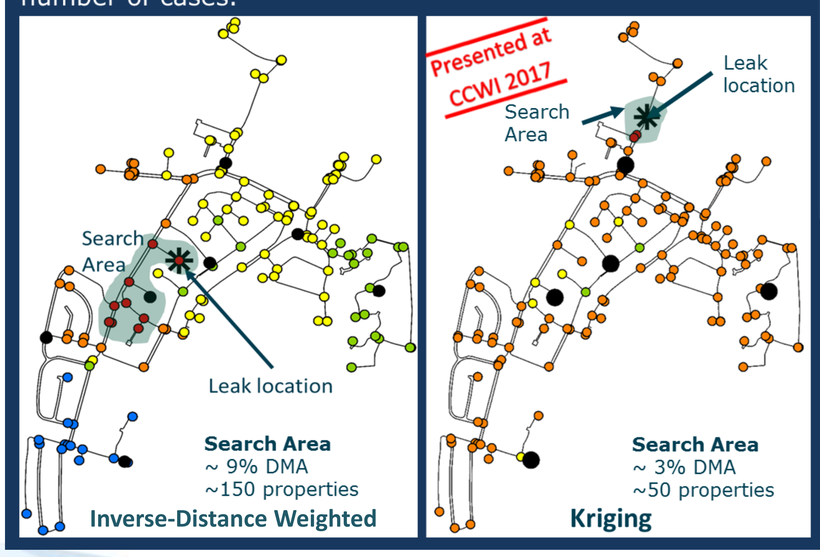
3. Methodology



4. Results

SPC + Geostatistics

Two geostatistical techniques have been developed and tested on real leak/burst data (using both naturally occurring and engineered leaks/bursts). Both techniques demonstrate significant reductions in the leak/burst search area in a number of cases.



Sensor Placement

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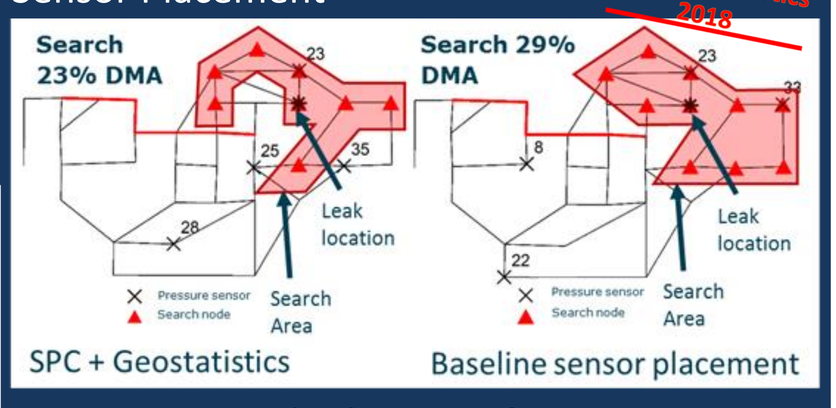

An improvement in localisation performance was achieved on a synthetic case study. This is because rather than being considered "generic" the sensor locations are optimised with respect to the SPC + Geostatistical localisation technique. Further work in relation to "real" applications of the combined sensor placement/leak localisation methodology is needed to determine its efficacy (both in terms of performance and cost/benefit ratio).

5. Benefits

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For further information: shaun.boatwright@uuplc.co.uk

Postal Address: United Utilities PLC, Lower Ground Floor, Haweswater, Lingley Mere Business Park, Warrington, WA5 3LP

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