Leak Detection using Dark Fibre

Background

Fibre optic sensing for leak detection has been proven.

Benefits:

- 24/7 monitoring
- Accurate location
- Monitoring of network activity

Limitation:

- Cost and location of monitoring equipment
- Cost of installation in pipe
- Speed of deployment via open cut

Dark Fibre detection

The Proposed Solution:

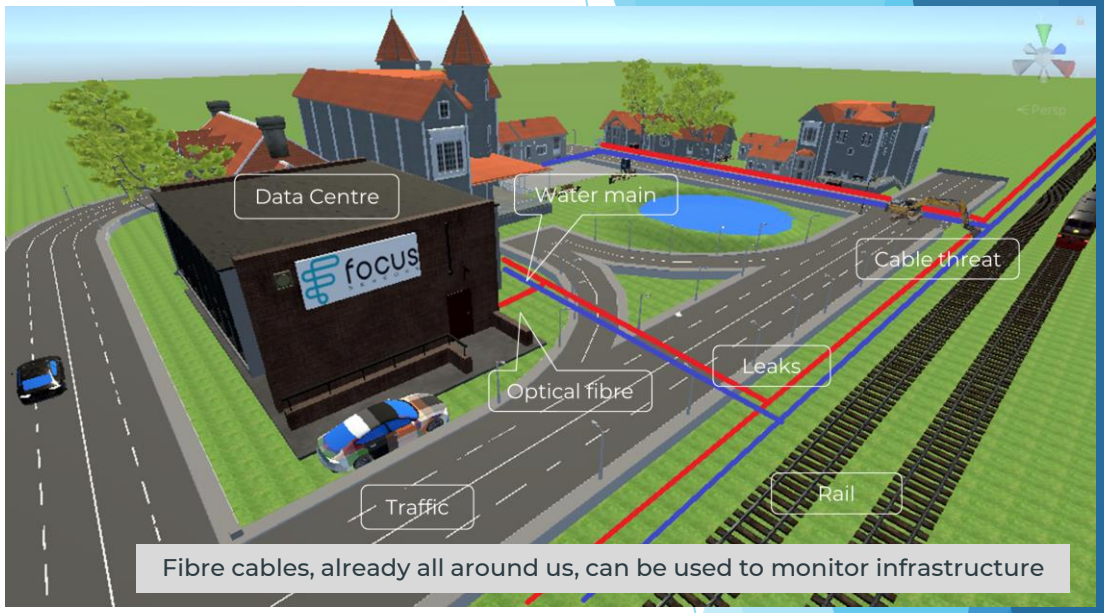
- Characterise vibrations and strain changes imposed on existing fibre cable networks to find leaks in water pipes

Enablers:

- Extensive fibre cable networks already in situ with proximity to water mains
- Focus Sensors' monitoring platform Indus can make use of these cables to find leaks.

Opportunity:

- Sweating existing infrastructure currently unused from other sectors (broadband, traffic management, rail)
- Leak detection via direct and indirect methods
- The provision of data not currently available:
  - Ground stability and subsurface voids
  - Network activity
- Data as a Service business model to share costs amongst multiple use cases



Fibre cables, already all around us, can be used to monitor infrastructure

Focus Sensors' Indus platform provides a web-based view of information derived from fibre cables

Alignment with the OFWAT fund

- Responding and adapting to climate change
- Restoring and improving the ecological status of our water environments
- Stimulating innovation and collaboration

How?

Consumers

- Ensuring leaks are detected and repaired before loss of water supply
- Reduction in the risk of property damage
- Reduced risk of discolouration of water supplies from changes in flow

Society

- A reduction in traffic disruption
- Reduced risk of damage to roads
- Reduced abstraction and improved river flow
- Reduced carbon footprint and use of materials

Project Partners

Focus Sensors:

- Are a technology start-up that has recently commercialised a new patented Distributed Acoustic Sensors (DAS) platform ‘Indus’.
- Indus is the enabling system for digitisation of large-scale infrastructure by using optical fibres that are in many cases already installed for other purposes.
- Ground Stability Characterisation is a novel patent pending system that will be used to used to aid leak detection.

Costain:

- Are a leading UK smart infrastructure solutions company with a unique focus on major customers meeting national needs in infrastructure, energy and water.
- They will support the coordination of project activities using experience in delivering projects in infrastructure using elements of agile project management.

Water company partners:

- Experience of the use of fibre for leak detection.
- An understand the cost and benefits of currently available leak monitoring systems, including trial data from in-pipe fibre sensing.

Project Scope – 9 Months

We are here!

Month 1
Identify suitable asset
Engage stakeholders
Confirm adjacent fibre and physical infrastructure
Stakeholder site visit

Controlled Environment
Installation of Fibres and Indus
Controlled Testing - Leak and Water Dissipation
Collection of Data
Report of WP2a Data Suitability
and PoC Success

Dark Fibres
Installation of Indus
Collection of Data & controlled testing
Report of WP3b Data Suitability
and PoC Success
Go/No-go (OFWAT)

Prolonged Demonstration
Identify demonstration location
Stakeholder engagement and site visits for trial
Installation of Indus
Demonstration Activities
3rd Party Unauthorised usage

Dissemination
Disseminate to industry stakeholders and propose scale-up
Digital on-line event

Preparing the IWC Submission

- Understand the scale of the problem
- Consider other solutions – e.g. in pipe fibre, fixed position correlators
- Analyse the benefits of the proposed approach
- Understand the gaps in knowledge, including the route to market
- Must be innovative

Measuring Success

- Ability to locate leaks by detection of leak noise
- Ability to locate leaks by changes in ground stability/increased water saturation of the ground
- Reduction in leakage
- Reduction in dry holes
- Reduction in discolouration complaints due to 3rd party activity

ANY QUESTIONS?