Asset Investment Planning using Tableau

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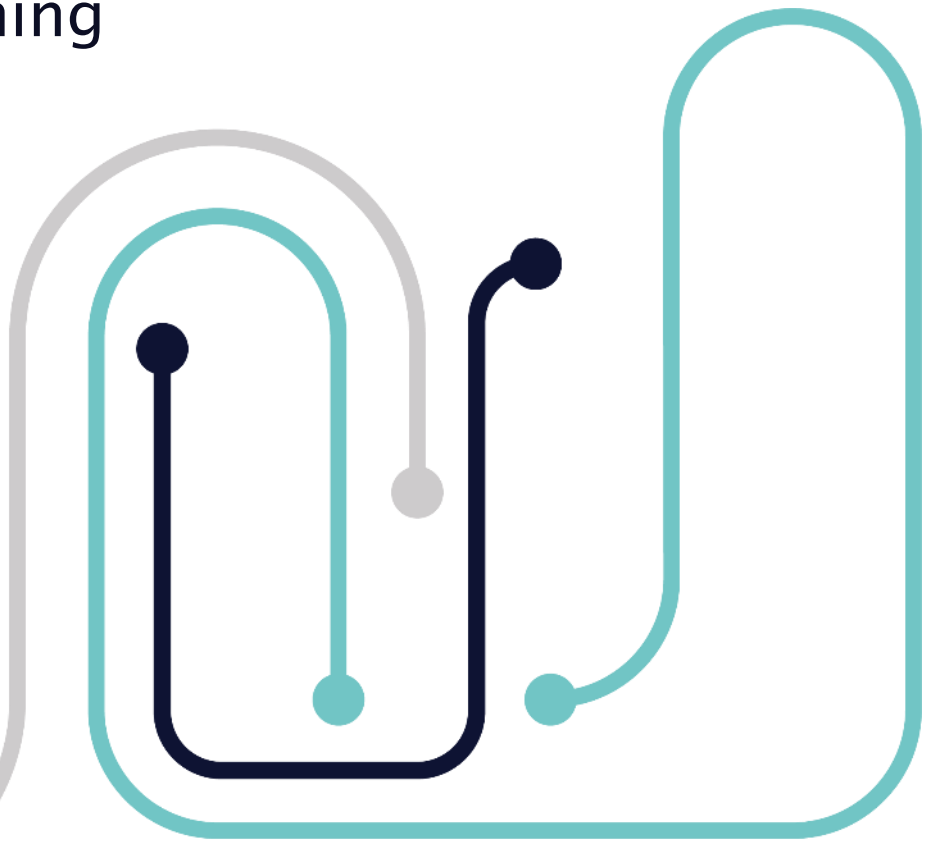
Stuart Fraser



ICS

Agenda

Communicating investment decisions and democratising data

- Overview of ICS
- Asset Investment Planning
- Key Challenges
- Real Case Studies
  - Cadent Gas
  - National Grid
  - Thames Water
- Summary & Discussion

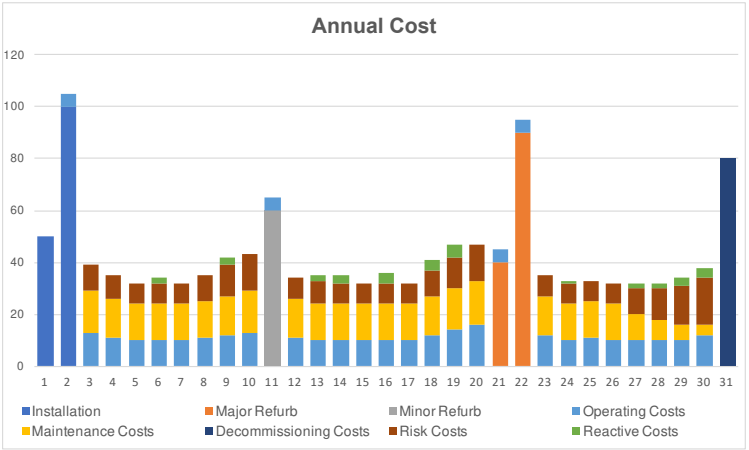
We help our clients link strategic intent to investment plans and delivery

To some of the largest asset owners in the world

Asset Investment Planning (AIP) helps organisations make objective, data-driven decisions to optimise cost and value while minimising risk over the full investment life cycle of an asset.

These need to be answered across the long, medium and short term

- What is the current and future level of whole life cost and risk presented by the asset base ?
- What are the costs and benefits of investment ?
  - Individual single investments
  - Investment strategies
  - Programmes of work
- What is the best mix of investment to meet defined balance of cost, risk and performance ?
- What is the payback period of investments, strategies or plans ?
- How can the spend and intervention types be optimised to allow efficient procurement and delivery ?



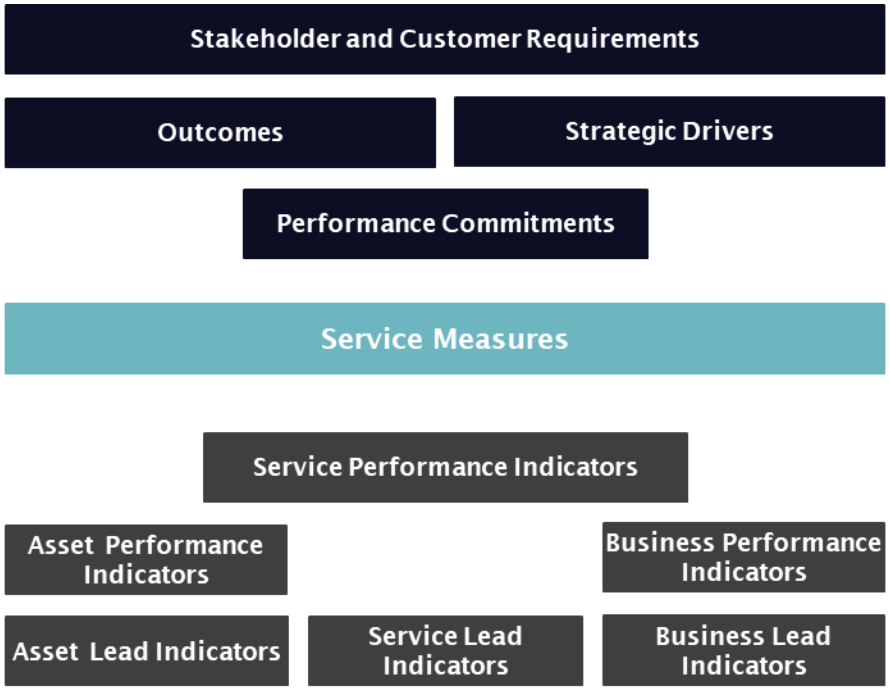
- Presentation and visualisation of the risk, with and without investment, from asset through to company level

AGEING ASSETS

A gas mains explosion

A ‘Golden Tread’ visibly linking asset and business performance to corporate and social objectives

A Service Risk Framework aligns all measures and priorities across the organisation



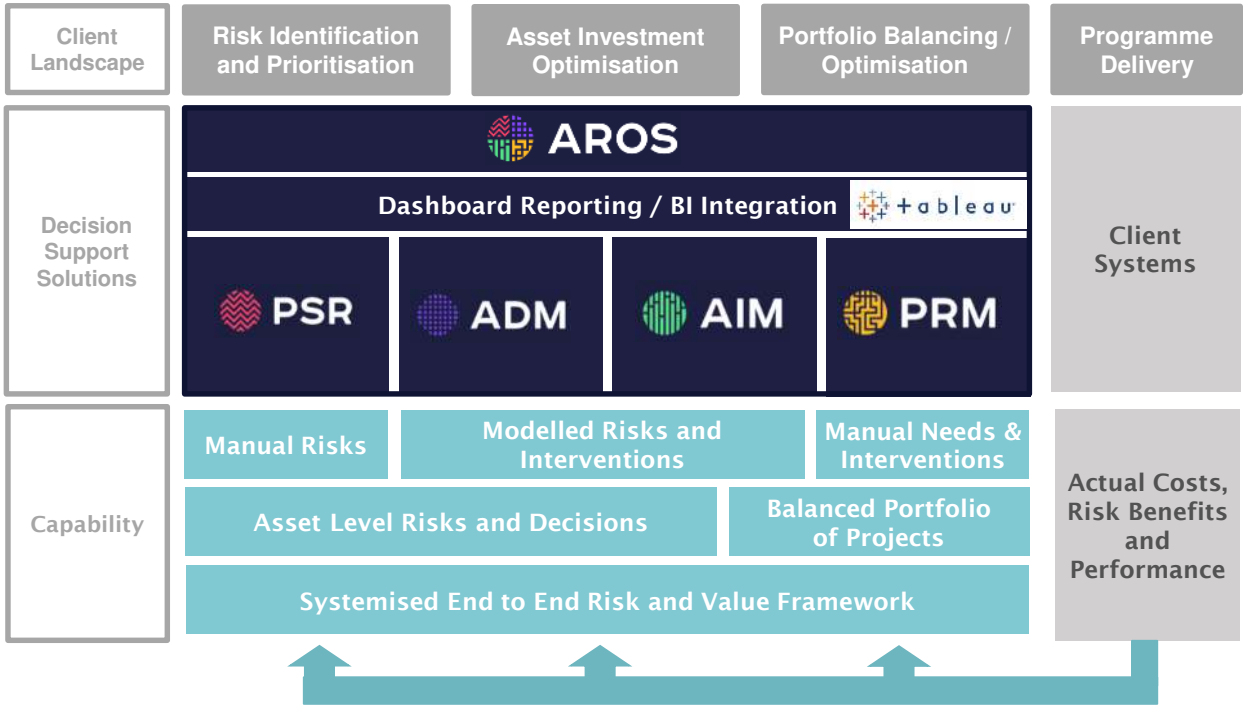
Top down

The communication of investment plans is critical in gaining approval from key stakeholders and regulatory bodies to ensure that money is well spent and provides sustainable value.

Bottom-up

AROS - Asset Risk and Optimisation Suite
Systemised end to end solution for planning and delivery

An integrated suite of modules using decision analytics to support the entire investment process



PSR – Plant Status Review

- Process safety based assessment, prioritisation and monitoring of asset risks

ADM – Asset Data Manager

- Rapid and repeatable processing of asset data to support continual investment decision making

AIM – Asset Investment Manager

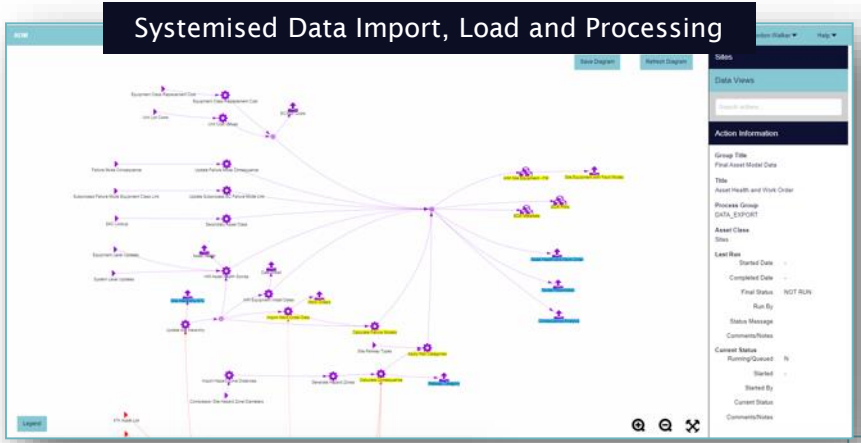
- Optimal planning of asset class investment programmes across millions of individual assets

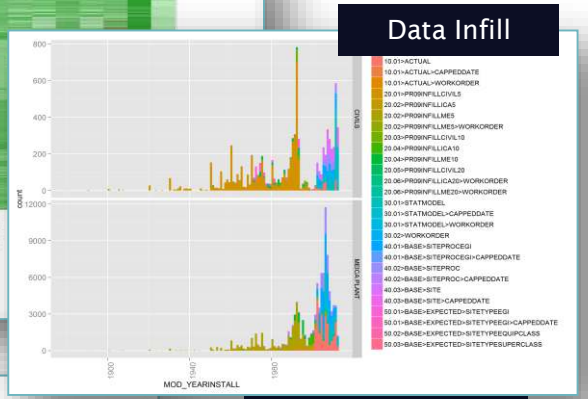
PRM – Portfolio Risk Manager

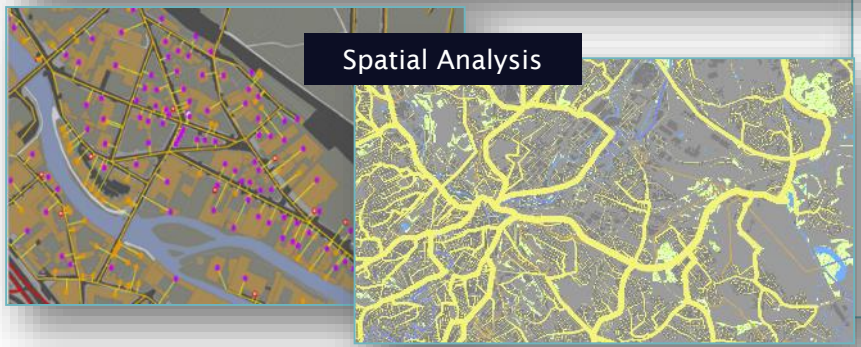
- Whole life value based assessment of investment and cross driver optimisation of investment programme

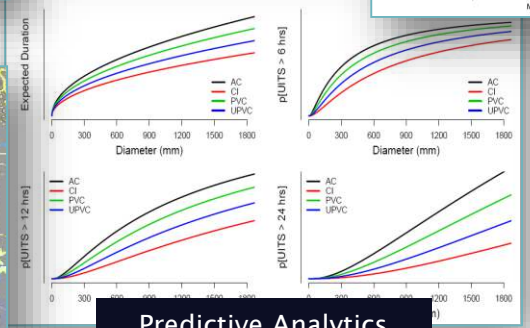
ADM provides consistent and efficient data integration, processing and analysis

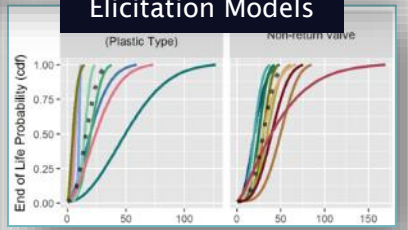
Links and processes all data required for AIM and PRM











AIM links individual assets to monetised risk

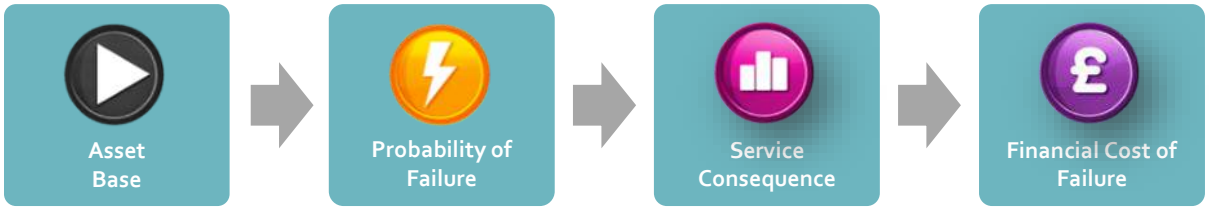
AIM facilitates the linkage of individual assets to monetised risk

Asset Condition, Age, etc.	Asset Performance	Service Delivery	Drivers for Investment	Corporate Priorities
				Stakeholder Value

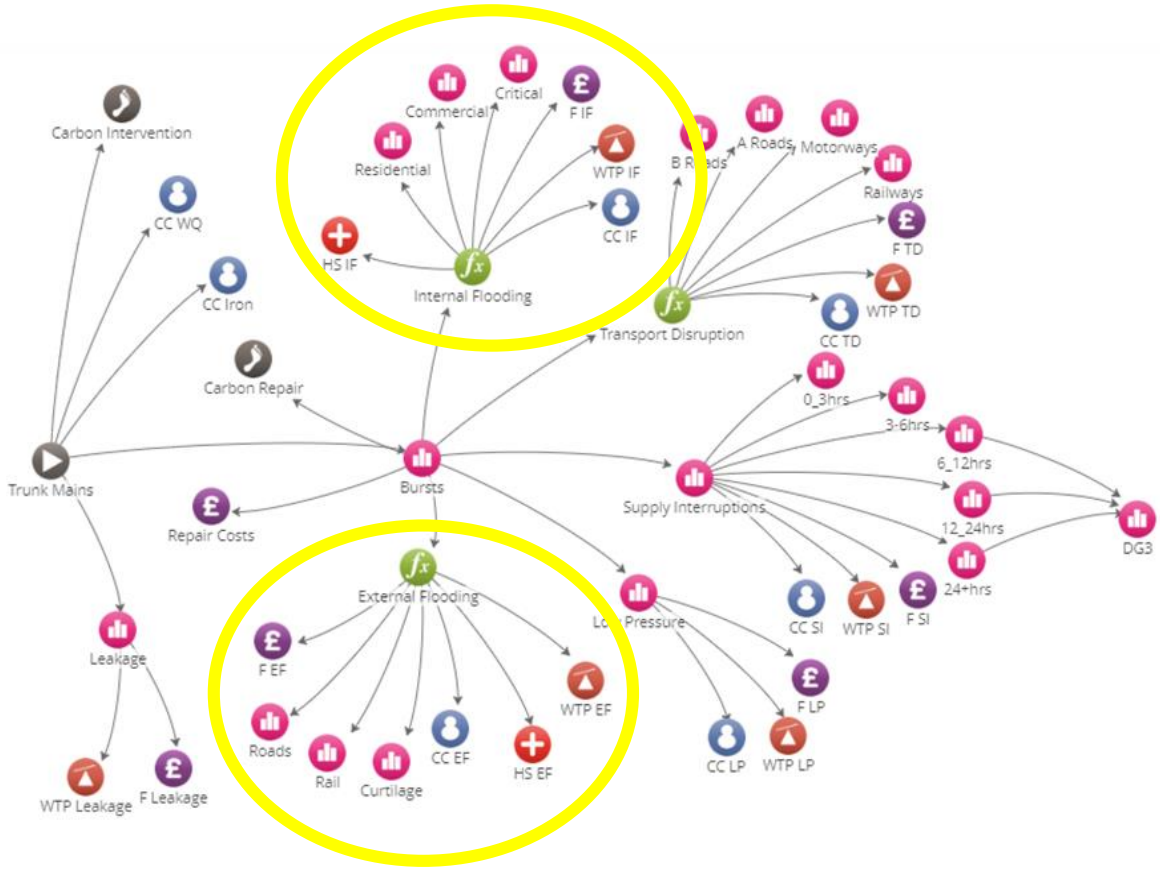
The impact of the assets and investment is understood in terms of risk to Service Performance

Understand impact on success of organisation using Service Performance

Understand strategic direction and the value of Service Performance



- A visual representation of risk drives consistency and transparency
- Linking engineering through to the boardroom
- A common language of economic service risk
- Highly configurable



This week's Herne Hill flood will cost Thames Water and its insurers around £4 million, it emerged today.

http://www.standard.co.uk/news/london/thames-waters-4m-bill-for-herne-hill-flood-after-burst-water-main-8753870.html

2D Flood Risk

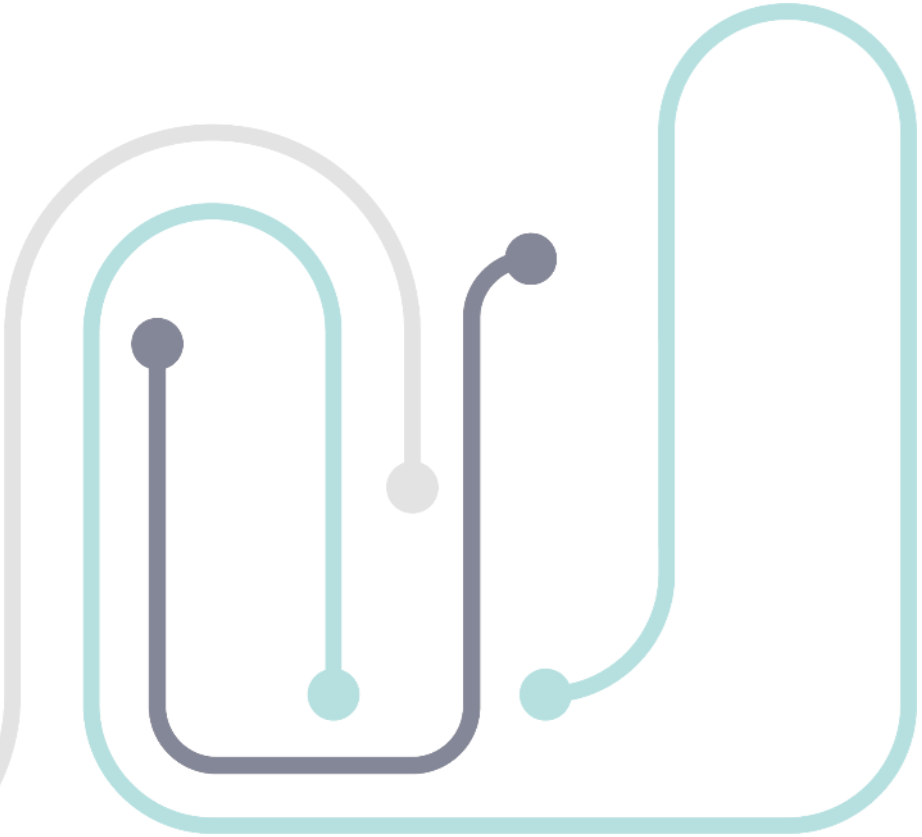
London and the Thames Valley 125,000 Simulated Mains Failures

Key Challenges

Many diverse challenges…

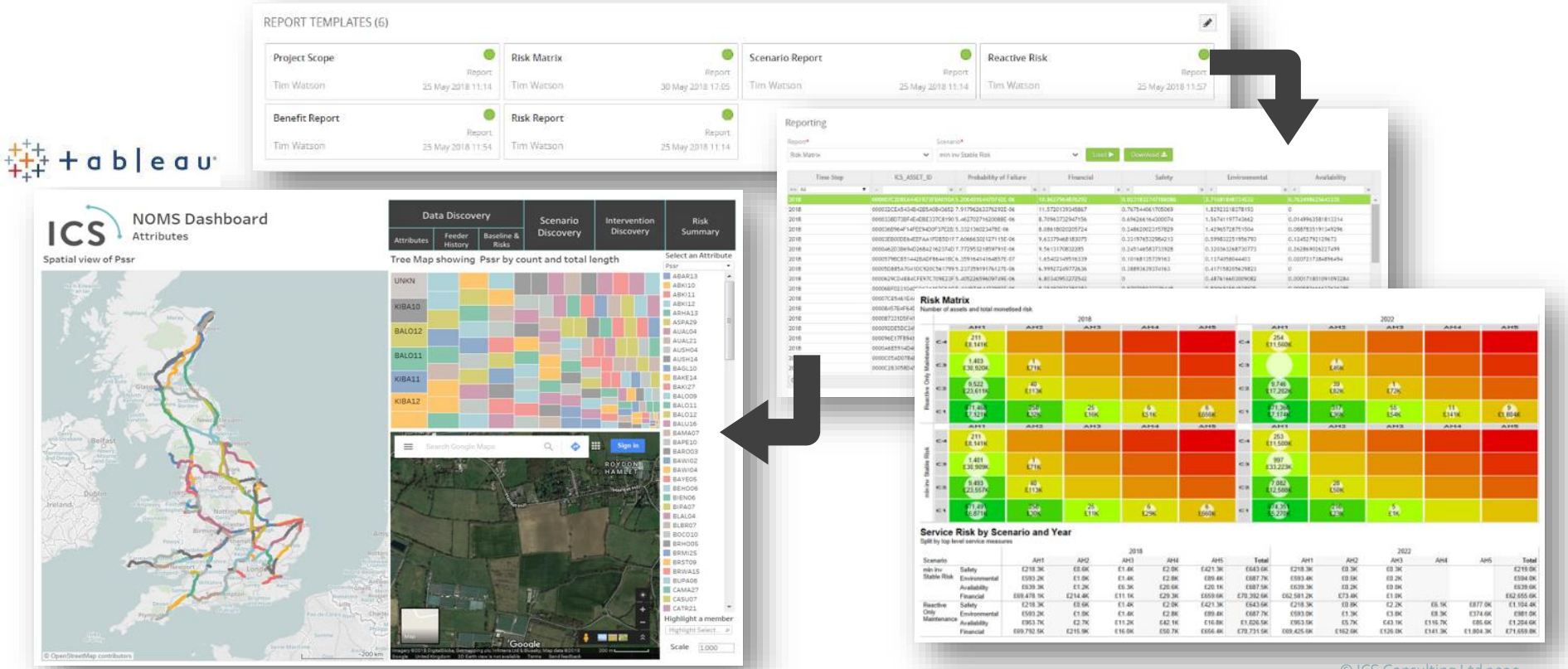
- Data
  - Not big data…
  - But messy and complex
  - Many sources
  - Spatial & Temporal
  - Data quality
- Process
  - Systemised and repeatable
  - Auditable and Transparent
  - Speed & setup
- People & Communication
  - Multiple levels in the business
  - Bottom-up and top down
  - Getting people to use Tableau
- XLS hell → Tableau hell???
  - Control versus individual insights (??)
  - Too many tableau masters!
  - Is it too easy?

National Grid Transmission

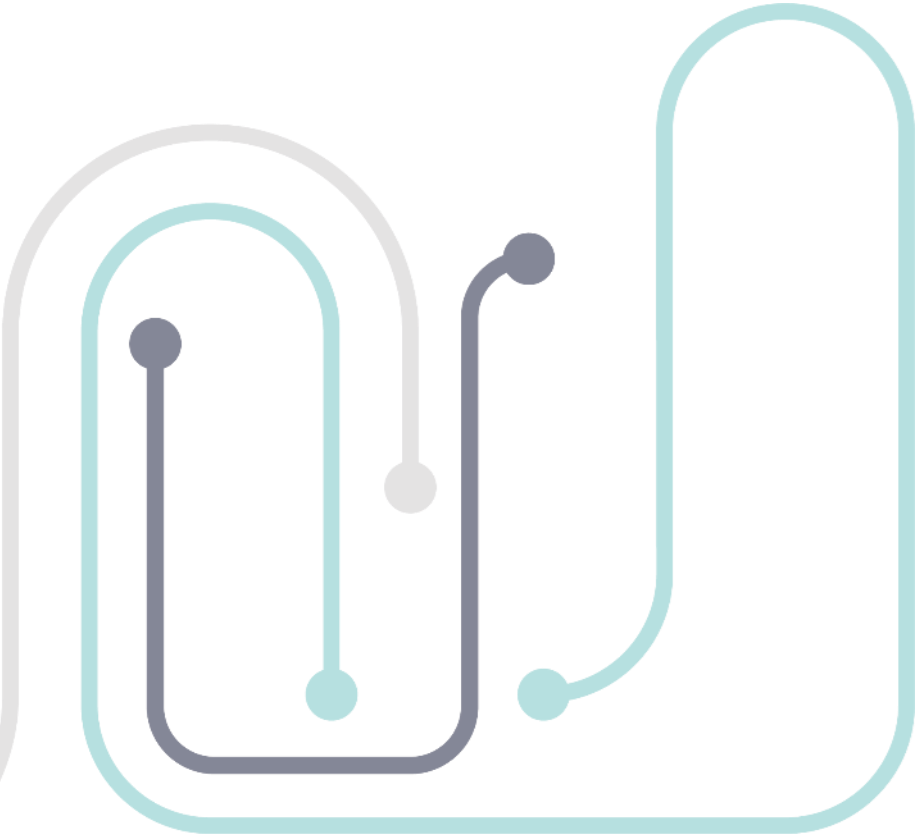


NGGT - Determining the investment for strategic infrastructure

Bottom-up to Top Down



Cadent Gas



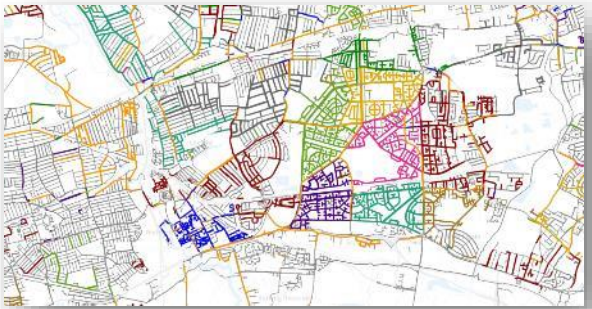
Gas Case Study:
Asset Driven Optimisation Programme

Gas Distribution Mains – Dec 2017

Cadent

Your Gas Network

- Cadent Gas is a gas distribution company
- Formerly known as National Grid Gas Distribution
- Maintains 131,000 kilometers of distributions mains
- Supplies 11 million homes



Client Need

- Opex costs rising 30% year on year due to lack of targeting both opex and capex investment at asset level

Solution

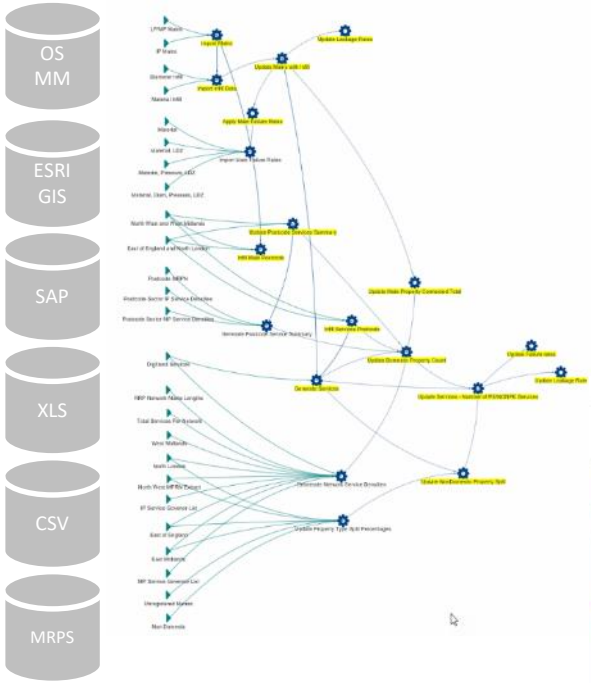
- **Data Integration**– linking and cleansing of asset data.
- **Cost Modelling** – predicting asset level costs of repair based on activity incl. job and travel times at a district post code level. Replacement costs are predicted using diameter and material at a district post code level
- **Failure & Deterioration Modelling** – Asset level predictive functionality to identify pipes with high probability of failure.
- **Systemised Process** – Consolidation, simplification and automation of process, including the development of a much wider and deeper range of business questions and what-if optimisation scenarios.

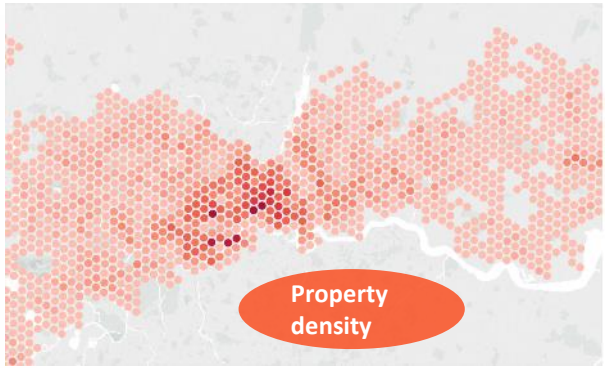
Benefits

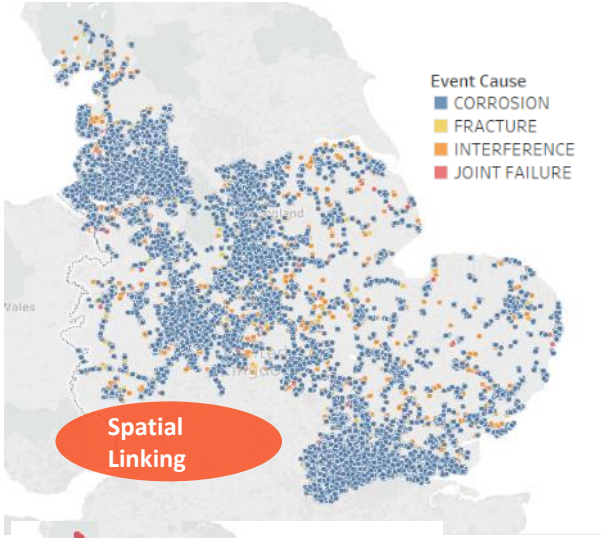
- Predictivity capability has improved from a historical level of 1:5 to 1:2, representing significant value for Cadent.
- **2 year OPEX savings of 25%, approx. £5m**
- **TOTEX (24yrs) savings of £81 million**
- **Whole life net benefit approx. £300 million**
- The increase in predictivity has allowed Cadent to optimise the investment programme at pipe level, resulting in significant efficiency gains across all four networks.
- Rolled out across all 4 networks for GD2 long term investment plan

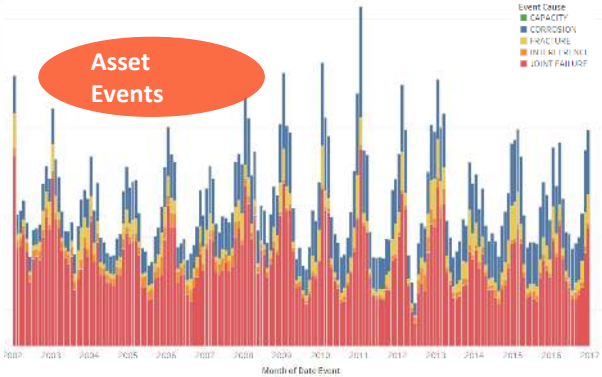
Data Understanding and Preparation

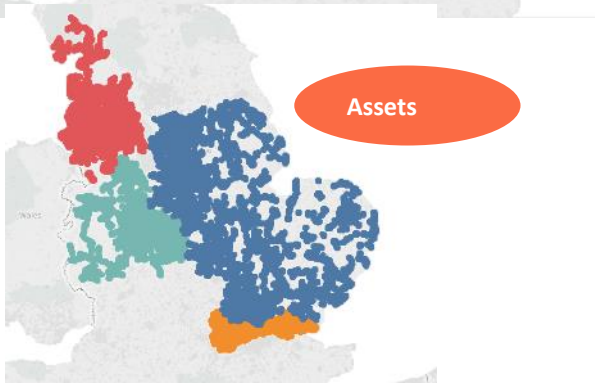
2 million pipes with 2.2m failure events over 12 years





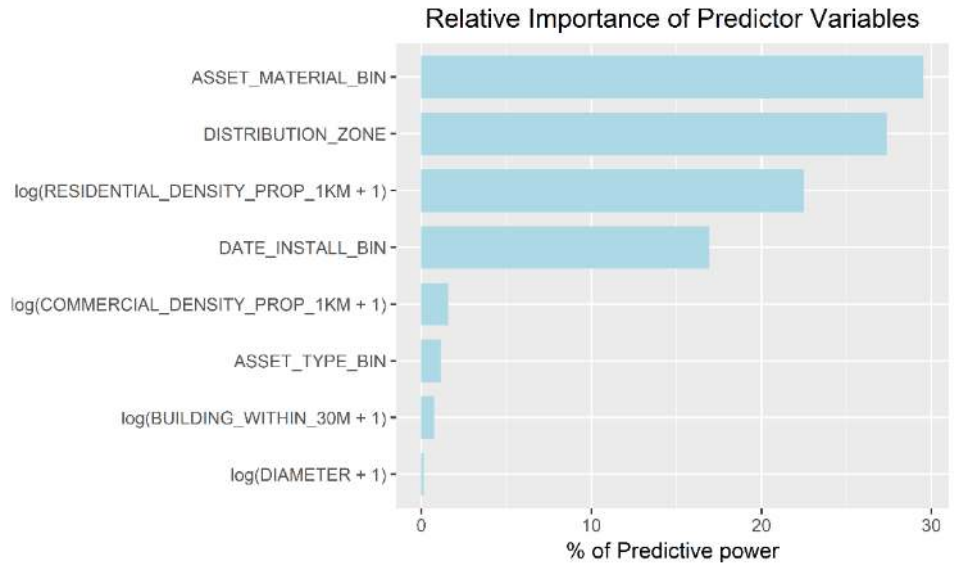


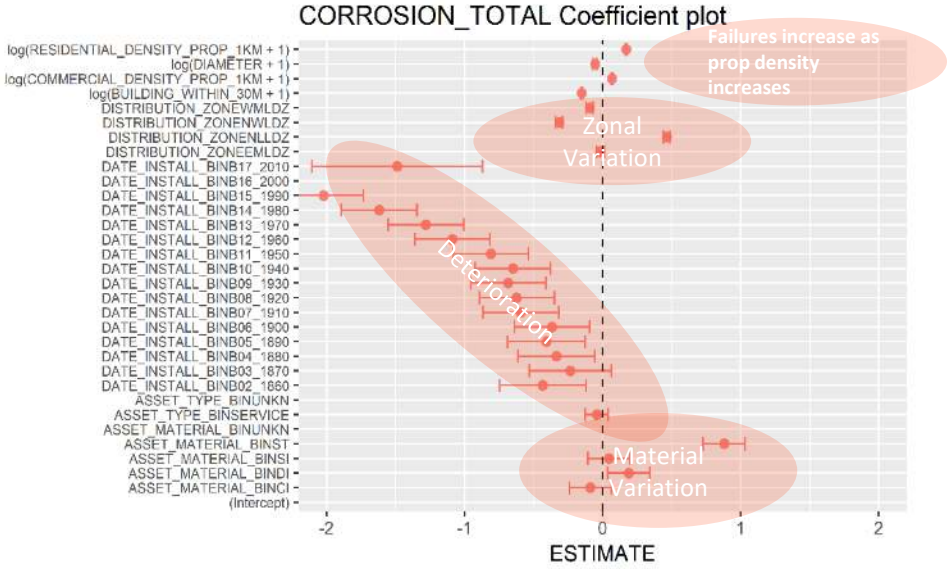




Predictive Analytics – Asset Level Failures

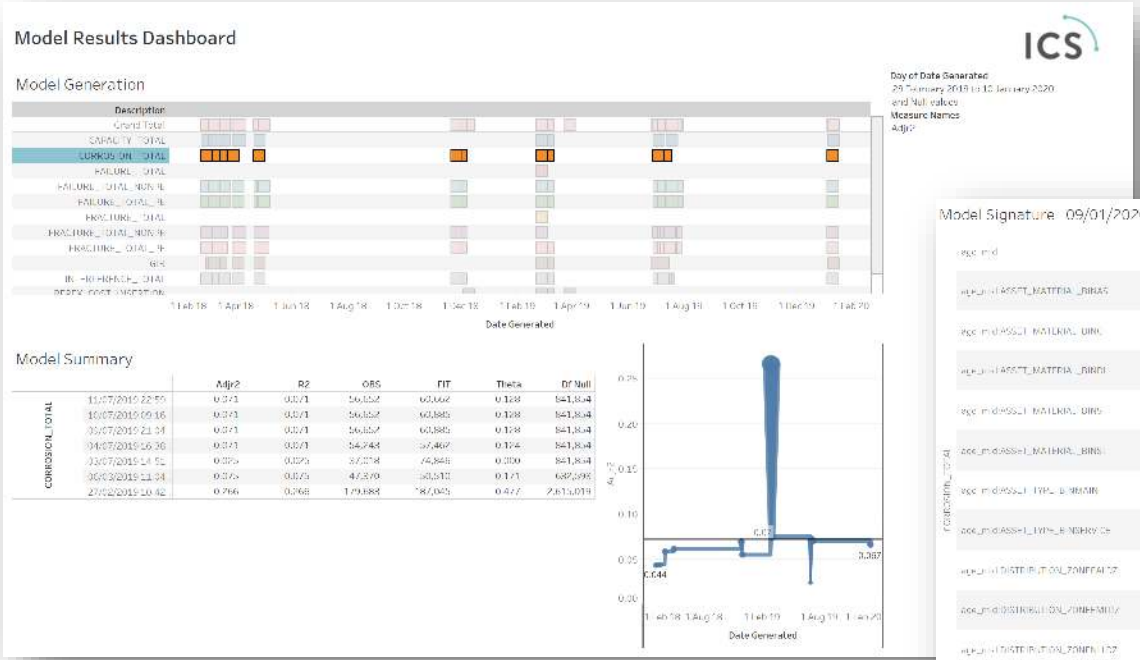
What asset has a higher chance of failing





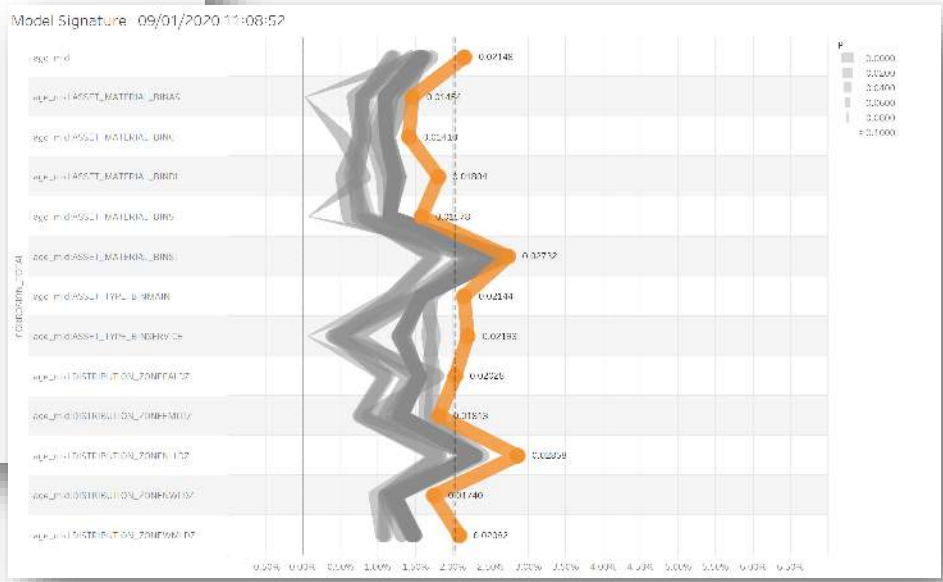
Model Dashboard

Auditable and repeatable



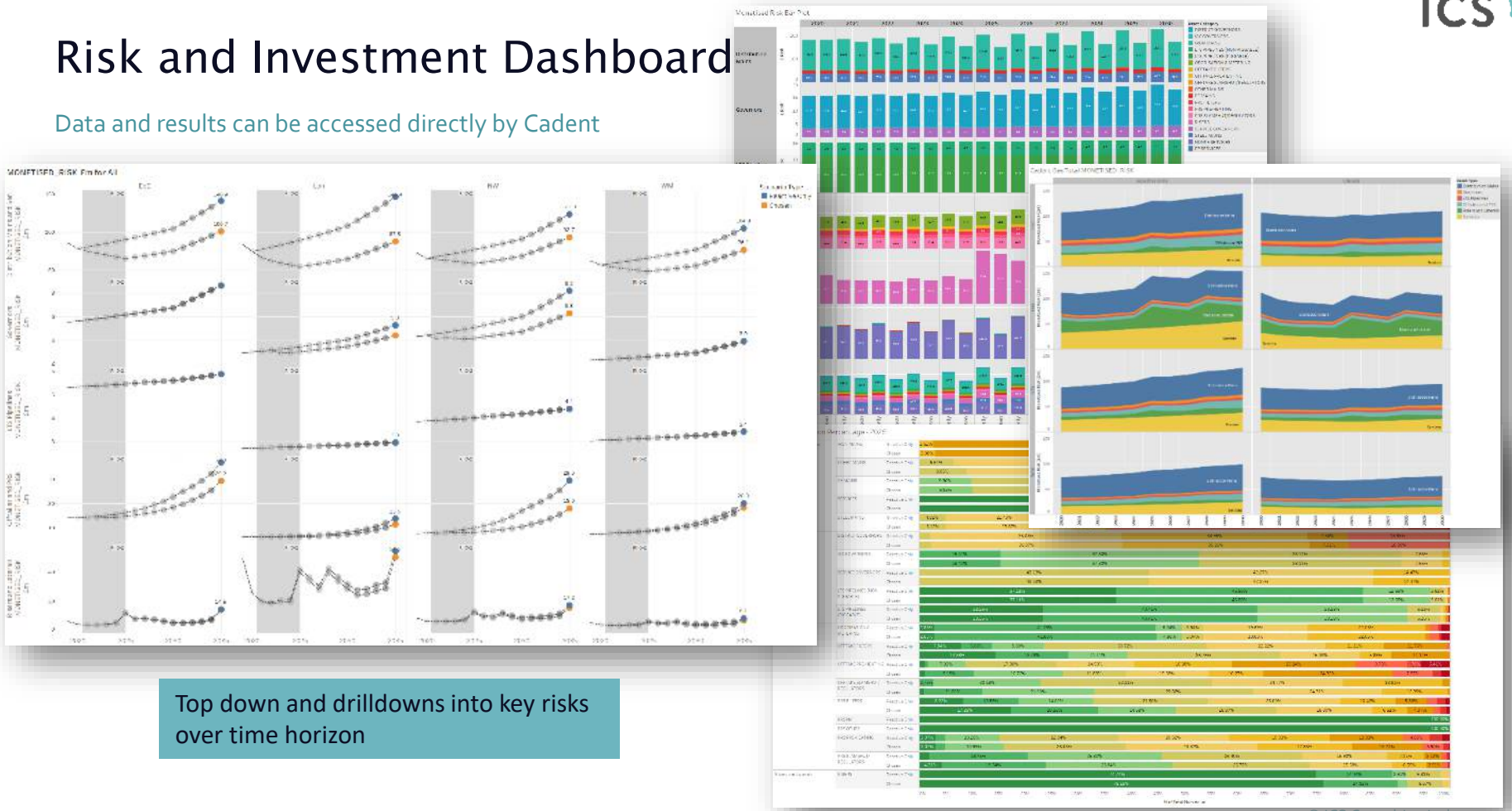
Tracking predictive models and model diagnostics over time

Model signature viz – changes in predictor variables over time



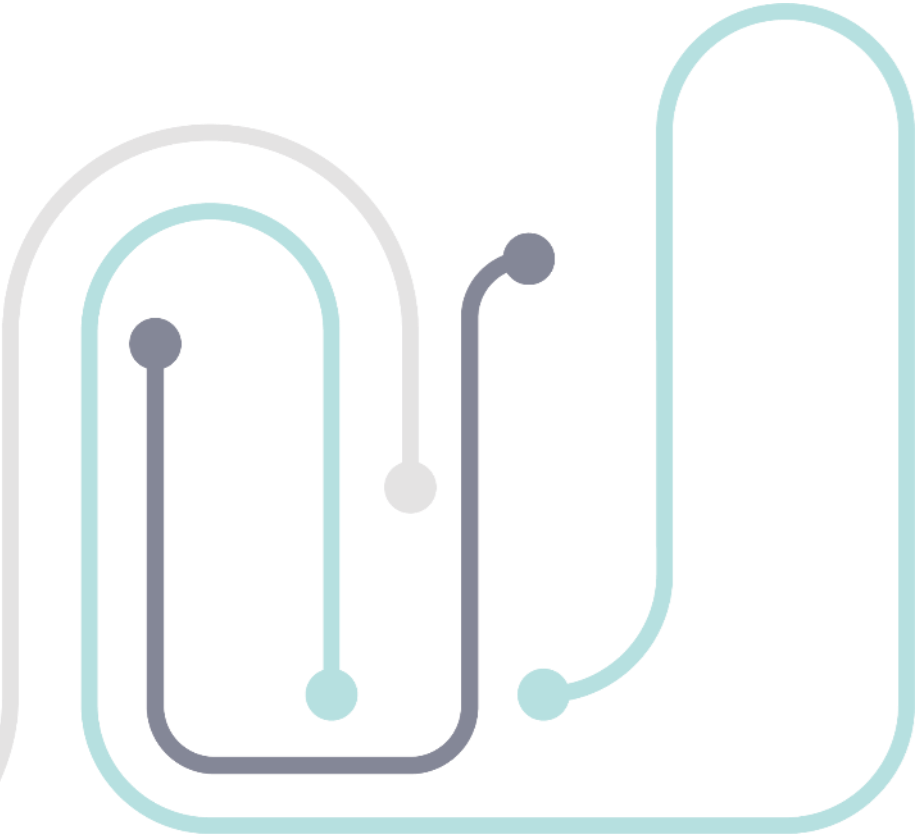
Risk and Investment Dashboard

Data and results can be accessed directly by Cadent



Top down and drilldowns into key risks over time horizon

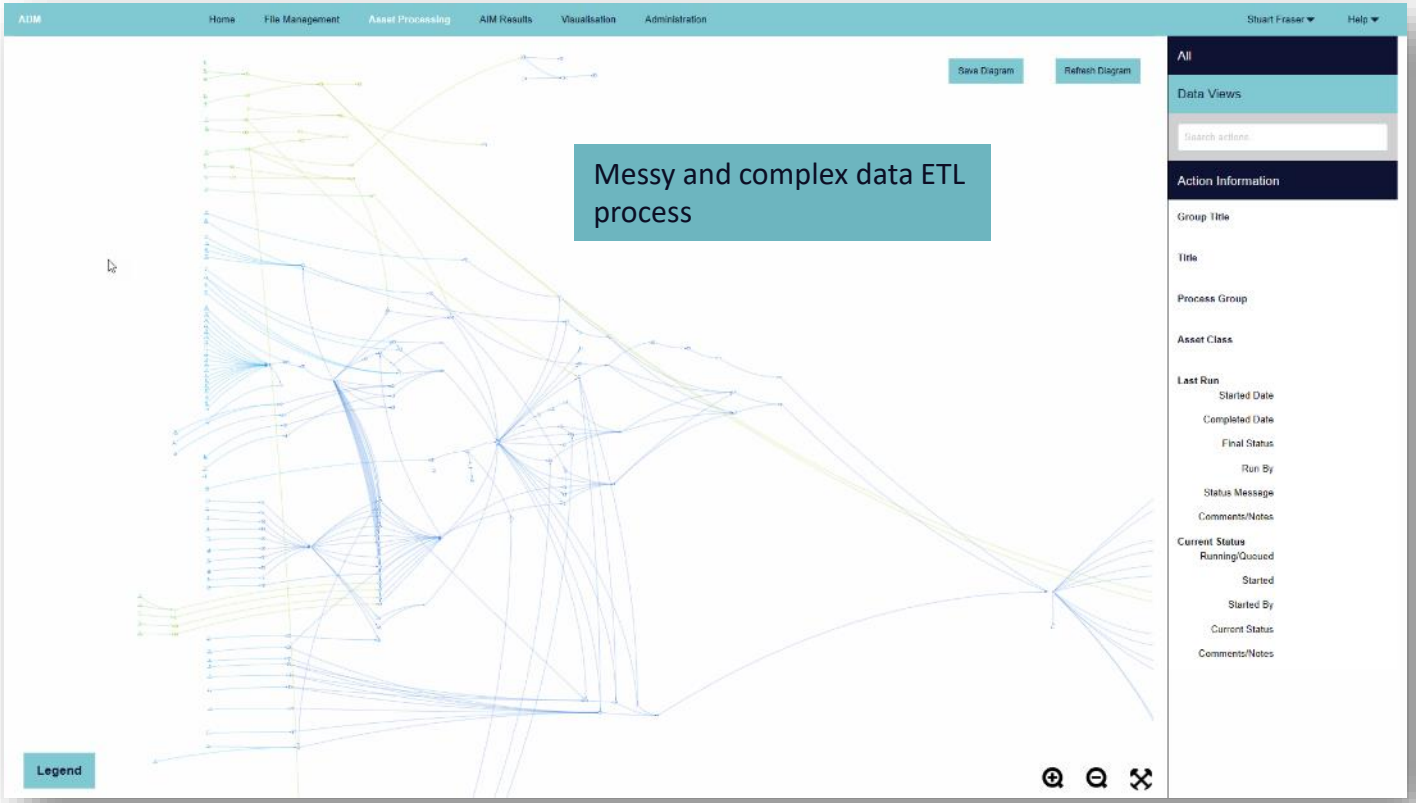
Thames Water



Thames Water
Collating and Structuring Data

Multiple datasets, multiple formats

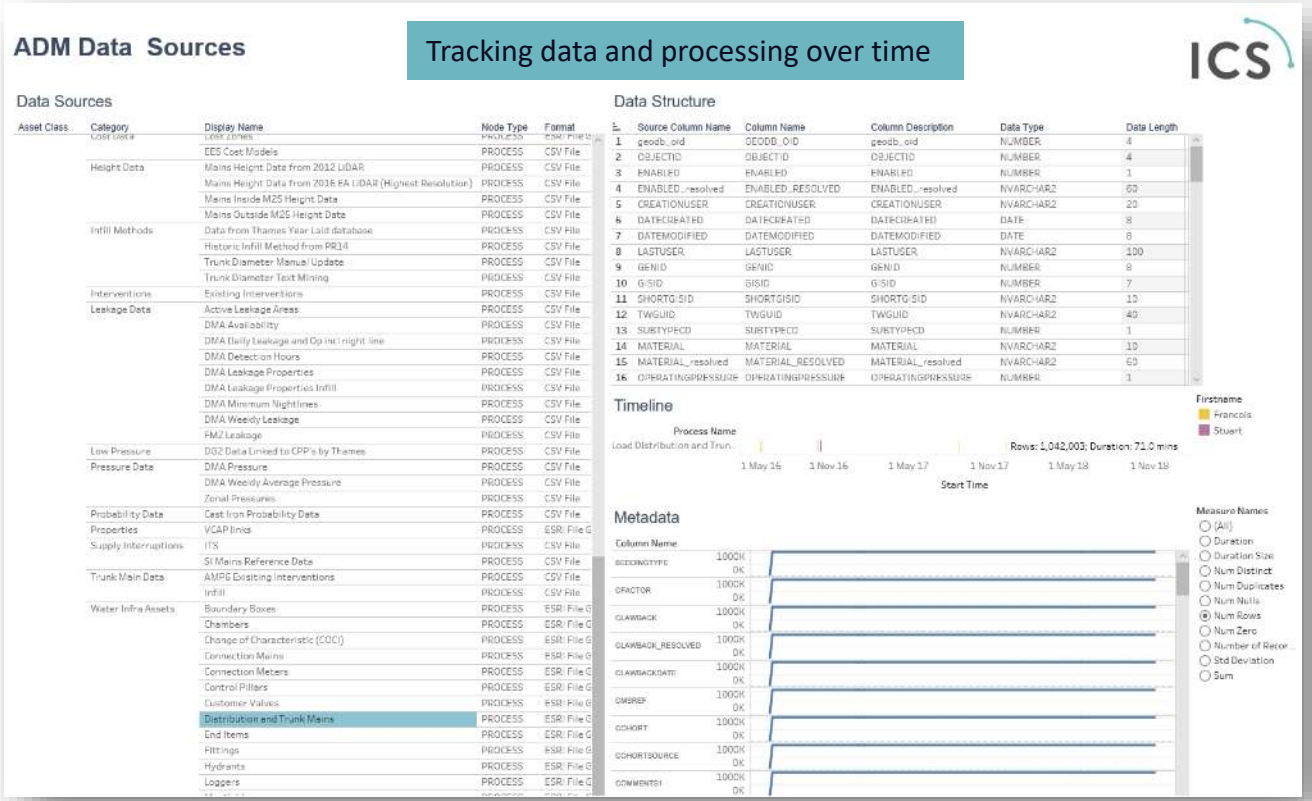
- 150 data sources
  - Structure
  - Content
  - Assess
  - Cleanse
  - Link
  - Process
  - Export



Thames Water
Collating and Structuring Data

Data Structure and refreshes

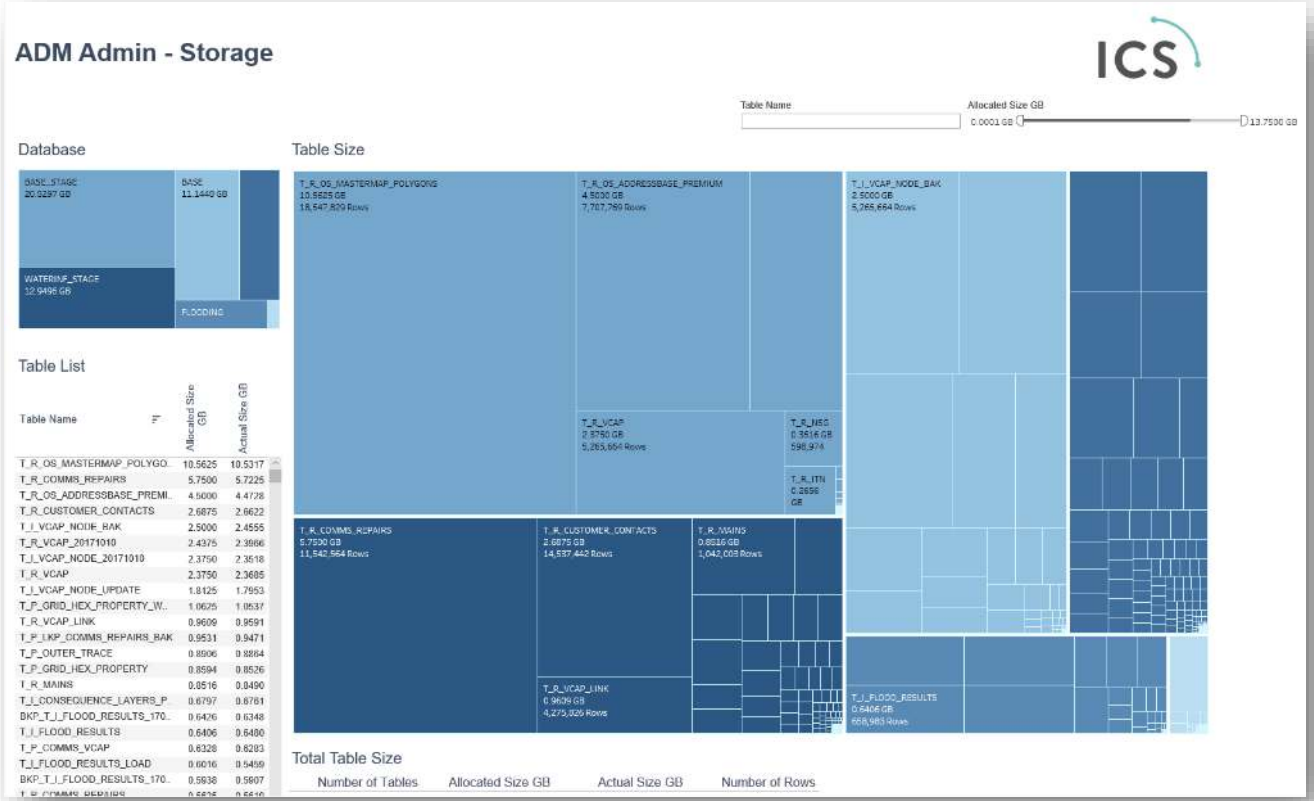
- List of dataset
- Structure
- Refresh Dates
- Metadata
  - Number Rows
  - Number Nulls
  - etc



Thames Water
Collating and Structuring Data

Monitoring Growth and Storage

- Data Storage
  - Schema Level
  - Table Level
  - GB/Number of Records



A large number of the assets within a Water and Wastewater utility can cause flooding if they fail

These have a significant impact on those affected

- Water
  - Water Distribution Network – 500,000 to 1,000,000 pipes
  - Service Reservoirs
  - Raw Water Reservoirs
  - Water Treatment Works
- Wastewater
  - Wastewater Collection Network (Sewers) - 500,000 to 1,000,000
  - Pumping Stations
  - Sewage Treatment Works
  - Overflows

Mains Failure

Sewer Surcharge

An example of the consequence of flooding on the Water Distribution Network

Flooding of this scale can cost up to £4m in real terms plus the associated reputational impacts

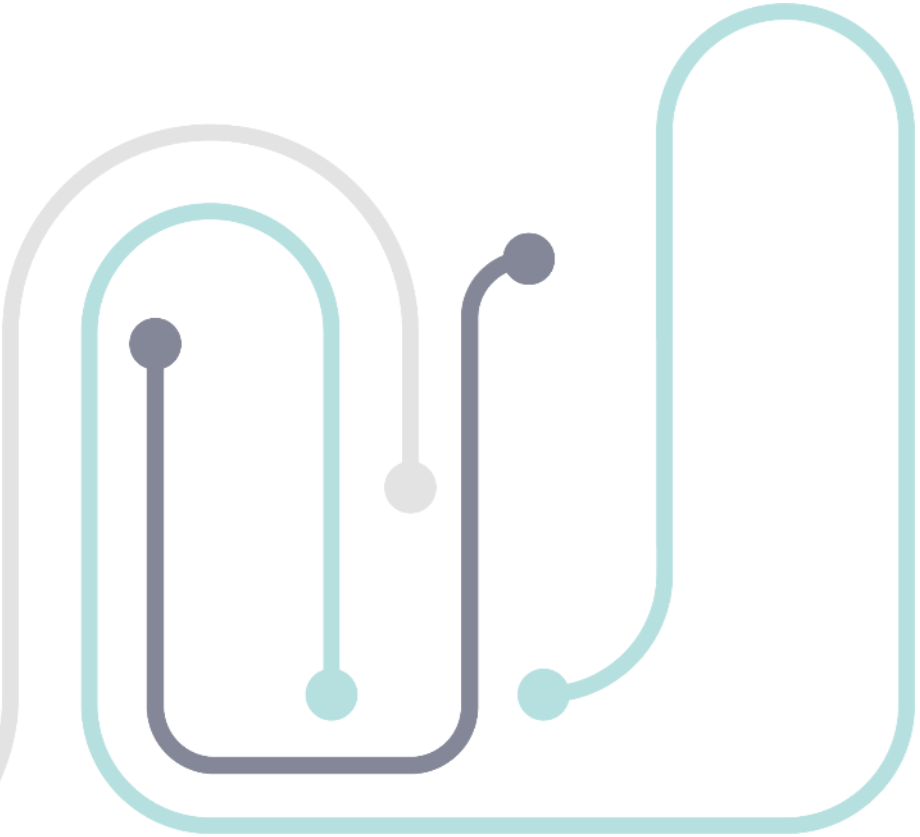
- The majority of the water distribution network is relatively small diameter, however
- The larger Trunk Mains have the potential to cause serious flooding
- What happens when these fail?
  - Flooding
  - Property Damage
  - Loss of Business
  - Pollution
  - Traffic disruption

Thames Water
Flood Risk Assessment

Spatial View of Flood Risk

- 125,000 Locations
  - Tableau Mapping
  - Google Maps
  - Spatial Results

Summary & Discussion



Asset Investment Planning using Tableau

Communicating investment decisions and democratising data

- Tableau is used throughout our consulting and software services
  - Bottom-up and top down
- Increased use of Tableau Server to:
  - maintain consistency
  - open up the value in data to a wider audience
- Many challenges to overcome
  - Understanding data content and context
  - Design for re-use, avoid client specific where possible
- Well designed process is key!
- Resources