

Water Utility assets and networks

Integrated real-time digital model representations

Stream

The Industrial Doctorate Centre for the Water Sector

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THE CHALLENGE

- Water utilities are large complex organisations that operate and maintain drinking water and wastewater assets and networks across extensive geographical areas.
- The asset data management systems used to manage their assets and the systems used to monitor the performance of those assets and networks tend to be disparate, heterogeneous and independent of one another.
- A capability that enables the interoperability of these disparate systems and the integration of the asset related data held within them is required to provide a holistic, real-time, digital representation of utility networks in operation.

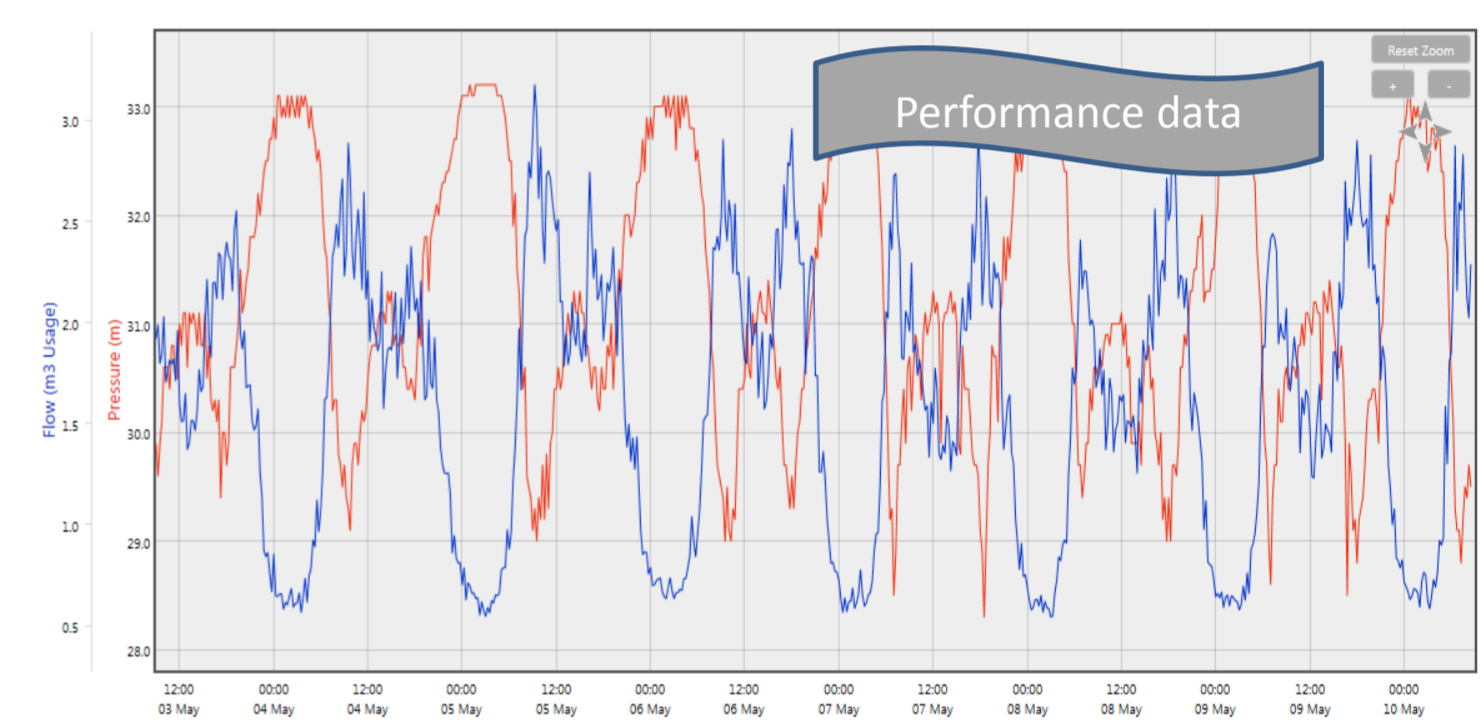
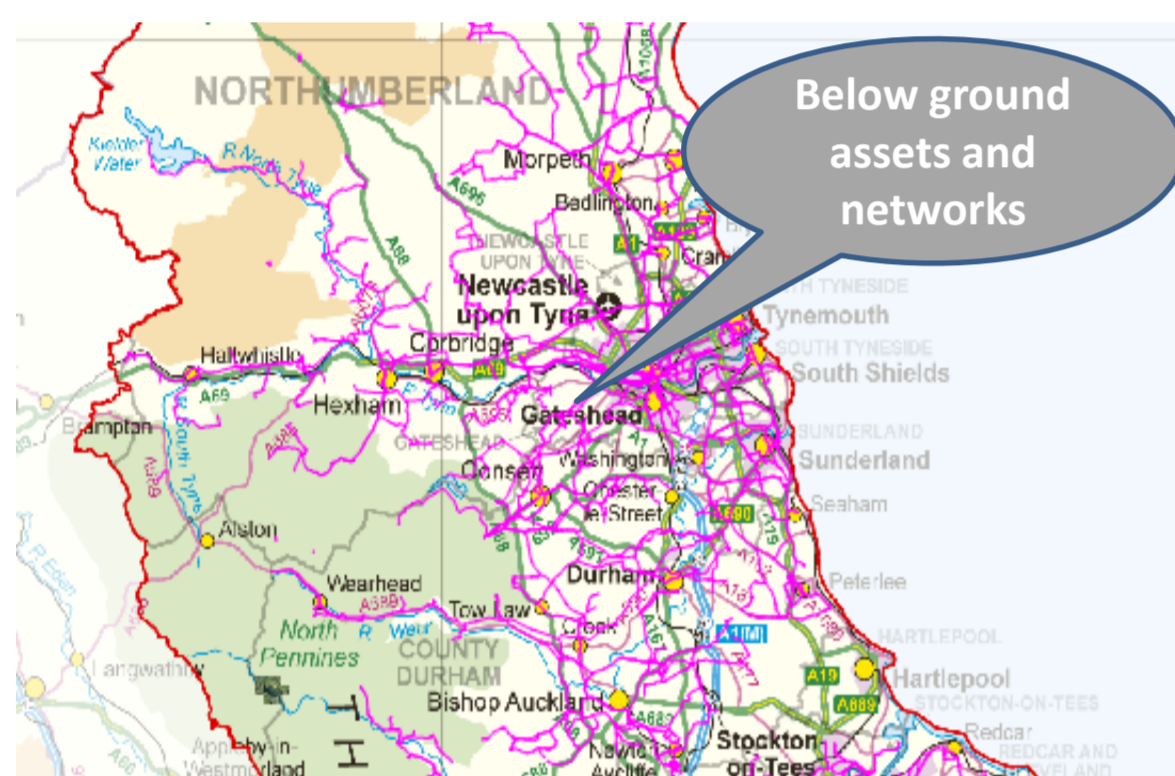
AIMS

- The development and implementation of a new type of hybrid database architecture that can bring asset data, network data and real-time performance data from heterogeneous systems into an integrated geospatial platform leveraging common open data standards (OGC, BIM Uniclass etc.).
- The platform will need to be scalable to accommodate new assets and their data as they are installed, including:
 - Smart water meters at individual property level.
 - IOT (Internet of Things) devices and sensors, and,
 - the increasing amounts of data that will be generated.

Bibliography

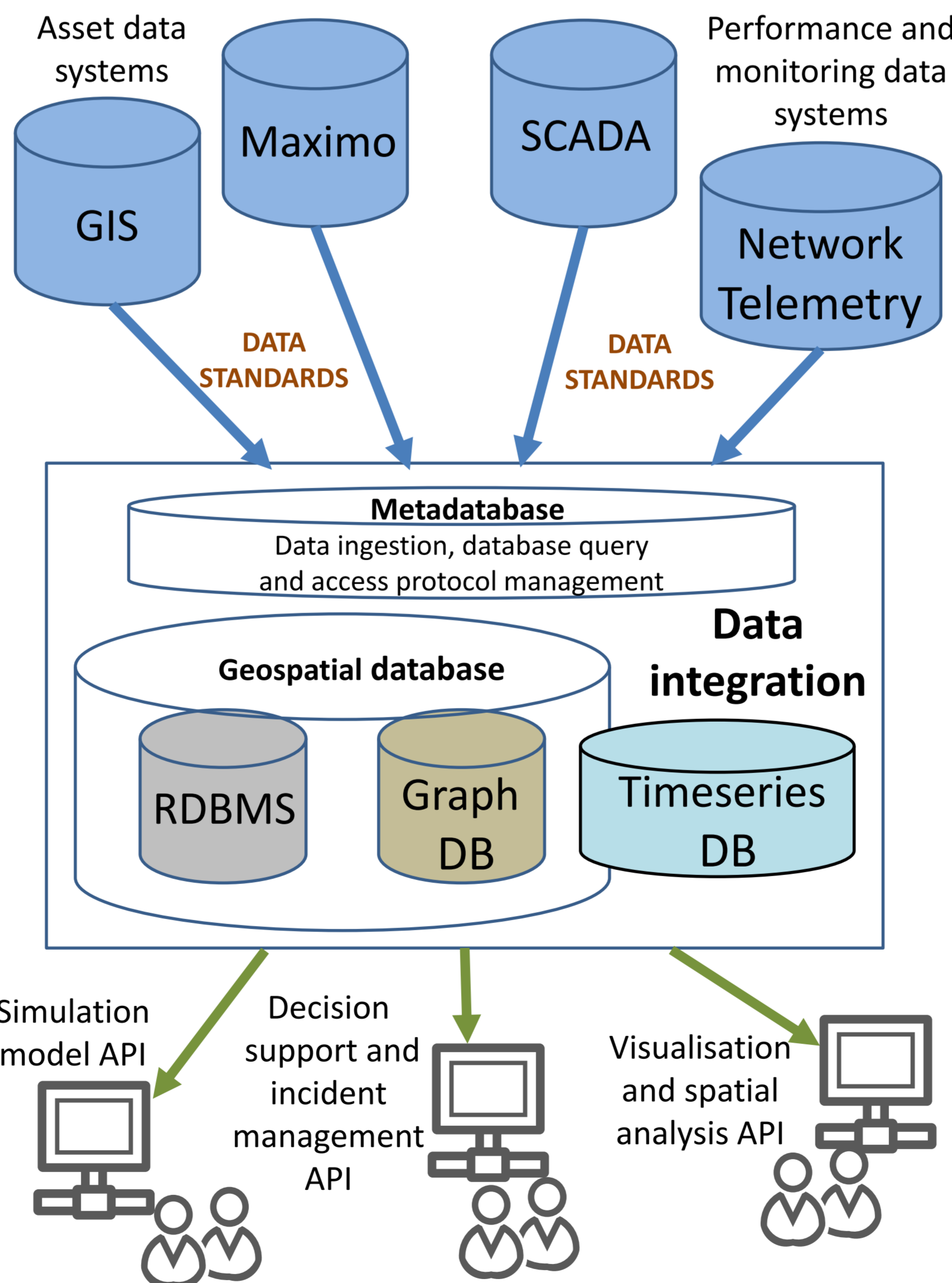
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METHODOLOGY

- Investigate and understand the systems currently used to manage and maintain asset related data from:
 - Pumping Stations, treatment works etc.
 - Water distribution networks, wastewater collections networks
 - and the assets and equipment within these systems along with their geospatial characteristics.
- Understand the range of diverse performance and monitoring systems that provide data about the behaviour and condition of these assets and how that data can be tagged or linked to the assets it describes.
- Employ different types of database technologies (relational, object-oriented, graph (Ji et al., 2017) and time series) in a hybrid database architecture to manage, process and integrate data from these disparate systems into a geospatial asset data hub.



OUTCOMES

- A platform that provides real-time, dynamic digital representations of the physical water and wastewater utility networks in operation, along with their interdependencies.
- Initially focusing on time series flow and pressure data through the network, the framework should ultimately be capable of processing sensor data from a range of other important system status and performance measurement devices.
- A framework that influences the ways in which asset data is managed and performance data is configured in order to provide standardised, consistent data feeds into the hybrid geospatial database architecture.
- Spatial analytics capabilities to generate new visualisations of networks in operation and the integration of new spatial layers with existing ones to provide greater insight around operational challenges i.e. leakage (Northumbrian Water Ltd 2019)
- Real time decision support based on the latest state of the network and a source of the latest data available for simulation models, enabling scenario testing prior to implementation in the real physical systems.

www.stream-idc.net

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