A digital twin of city-wide water usage

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Stream
The Industrial Doctorate Centre for the Water Sector

Combined simulation of **potable water network**, **household water usage** and **sewer network**

- A **Digital Twin** for Newcastle upon Tyne -

A **Digital Twin** (DT) is a digital representation of a physical object on which simulations for real time system analysis and assayment of different scenarios can be made. A DT enables us to do that both on long and short timescales as well as on either the whole or part of the represented object.

Some of the **challenges** faced by the UK water industry today where a DT can be useful**:**

- Continued development of **Drainage and Wastewater Management Plans**
- **Enhanced integration** between the **stakeholders** in a catchment.
- Improve understanding of the **sedimentation** and **blockages**.
- Improve understanding about **leaks** in the pipe system, especially in the **last mile**.
- Improve understanding on what will happen during **pipe breaks**.
- Enhance the continuing development of abilities to integrate and take advantage of data from high resolution **smart meters** both in homes and in infra-structure.

Having a full DT of a cities water cycle **enables** us to:

- Look at how **changes in water demand** impact the **pressure situation** in potable water networks.
- Help assess how differences in waste water generation **impacts blockages and sediment** in sewers.
- Quantify the **consequences** of **changes in social behaviour**.
- **Optimise** the sizing of pipes for **new developments**.
- Provides a building block (water networks) on the journey to a full Digital Twin of all the systems in Newcastle upon Tyne.
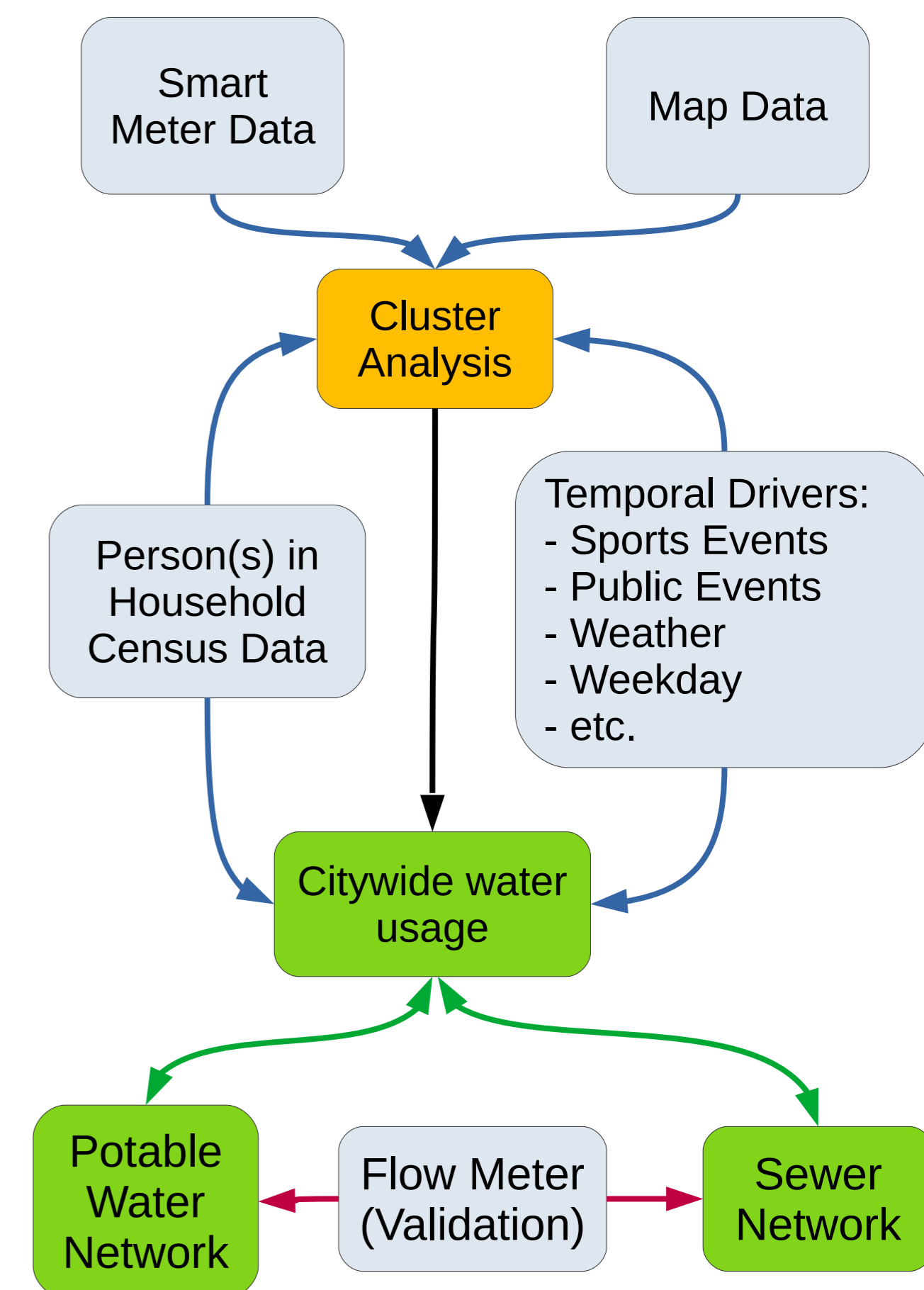- **Simulate** all three types of utility service (**water, gas and electricity**) concurrently.

The figure on the right shows how socio-economic data can be combined with measured water usage time series as inputs to a combined pipe network and water usage model, forming a DT.

Figure 1: Data Flow and Modelling Components schematic.

Take a picture to download the full project description

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