WATERNOMICS: Development of a water information platform based on a linked sensor data framework

Daniel Coakley[1, 2, 3], Peter O'Donovan[1, 3], Jan Mink[4], Edward Curry[1, 5], Eoghan Clifford[1, 2]

[1] National University of Ireland, Galway, Ireland
[2] Ryan Institute, NUI Galway, Ireland
[3] Informatics Research Unit for Sustainable Engineering (IRUSE), NUI Galway, Ireland
[4] VTEC Engineering, Netherlands
[5] INSIGHT Centre for Data Analytics, NUI Galway, Ireland

daniel.coakley@nuigalway.ie

Abstract

In Europe, 20-40% of water is being wasted due to poor infrastructure, consumer negligence and lack of proper resource management. Effective and efficient management of water resources requires a holistic approach considering all the stages of water usage. Waternomics aims to provide contextual information about water consumption at relevant time-scales to a variety of stakeholders (Domestic, Commercial, and Utility) to increase user awareness and enable more effective decision-making.

1. Introduction

The internet of things (IoT) represents the convergence of ubiquitous embedded sensor technologies with current internet infrastructure. This is a radical evolution of the current Internet into a network of interconnected objects that not only harvests information from the environment (sensing) and interacts with the physical world (control), but also uses existing Internet standards to provide services for information transfer, analytics, applications and communications [1]. Waternomics aims to develop a water information platform based on this IoT model, using a combination of novel sensing technology and semantic data analytics.

2. Software Architecture

The main components of the software architecture, as illustrated in Figure 1, are the sources of water usage metering on existing systems, the Linked water dataspace consisting of a linked data cloud & support services, and the resulting water management applications [2].

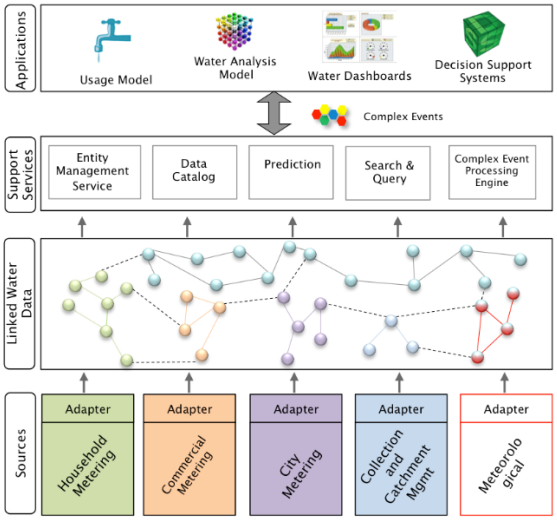

Figure 1: Waternomics software architecture

2. Hardware architecture

Distributed ultrasonic flow sensors provide data via an Arduino platform. This is aggregated with existing metered data in a cloud database through a HTTP-based REST API (See Figure 2).

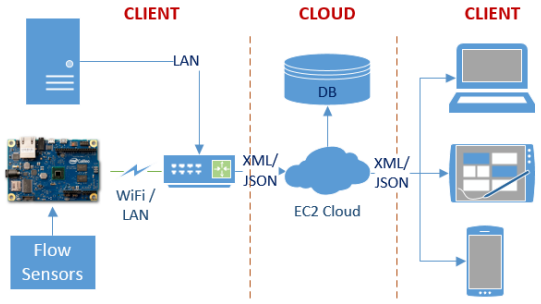

Figure 2: Hardware architecture

3. Applications

Analysis applications will use the rich data provided by the platform to provide additional insight into the performance of the underlying systems (e.g. performance dashboards, usage models etc.) [3].

References

[1] J. Gubbi, R. Buyya, S. Marusic, and M. Palaniswami, "Internet of Things (IoT): A vision, architectural elements, and future directions," Future Generation Computer Systems, vol. 29, no. 7, pp. 1645–1660, Sep. 2013.

[2] E. Curry, V. Degeler, E. Clifford, D. Coakley, A. Costa, S. J. van Andel, N. van de Giesen, C. Kouroupetroglou, T. Messervey, J. Mink, and S. Smit, "Linked Water Data for Water Information Management," in 11th International Conference on Hydroinformatics (HIC), 2014.

[3] E. Clifford, D. Coakley, E. Curry, V. Degeler, A. Costa, T. Messervey, S.-J. Van Andel, N. Van De Giesen, C. Kouroupetroglou, J. Mink, and S. Smit, "Interactive Water Services: The Waternomics Approach," in 16th International Conference Water Distribution Systems Analysis (WSDA 2014), 2014.