APPLYING DATA-AS-A-SERVICE TO THE WASTEWATER SECTOR

An Introductory White Paper

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Introduction

A major concern with real-time monitoring networks is the accuracy and reliability of data. In 2017, SWAN surveyed 23 global water utilities about their Big Data management practices as part of a Water Research Foundation (WRF) study, including their barriers to adoption – shown in Fig. 1 below.

Impediment factors on Big Data analysis adoption within utilities

	Low	Med	High
	Count	Count	Count
Data security	5	8	17
Data quality	0	8	22
Lack of budget	7	12	11
Lack of talent to implement big data	5	8	17
Lack of talent to run big data processing and analytics on an ongoing basis	5	4	21
Resistance to integrate existing systems	6	12	12
Procurement limitations on big data vendors	15	12	3
Lack of middle management adoption and understanding	5	15	10
Lack of data governance policies and practices	7	14	9

Fig. 1: The results were originally obtained using 1-5 ratings and were adjusted to a Low/Medium/High scale where 1 and 2 were combined to be "Low", 3 was made "Medium," and 4 and 5 were combined to be "High" (SWAN, 2017).

Based on these survey results, "Data quality" and "Lack of talent to create and run Big Data processing and analytics on an ongoing basis" were identified as the greatest impediment factors, followed by "Lack of talent to implement Big Data" and "Data security." One potential change agent to addressing these pain points is the "Data-as-a-Service" (DaaS) model, an outsourced approach to data collection, delivery, and verification.

What is DaaS?

DaaS is an innovative business model transforming the way organisations gather, share and interpret data by accessing data on demand. It can be defined as "a framework for designing and developing a set of reusable data services that are designed based on enterprise level standards" (Sarkar, 2015). In recent years, DaaS has gained considerable momentum as enterprises across all sectors are moving towards a service-orientated architecture. In essence,

DaaS enables users to only pay for the final analytics they wish to receive instead of purchasing and maintaining the equipment themselves. Thus, there are no sunk costs for hardware, data collection, storage or support with these risks remaining with the Data Provider. DaaS also relieves the obstacles involved in training and retaining staff to oversee the operational status of a network (van Vugt and Jacobsen, 2017). Any type of service involves providing a clear value to customers and facilitating successful outcomes the customer wants to achieve, while managing associated risks. Below, Fig. 2 displays the "service" aspect of DaaS.

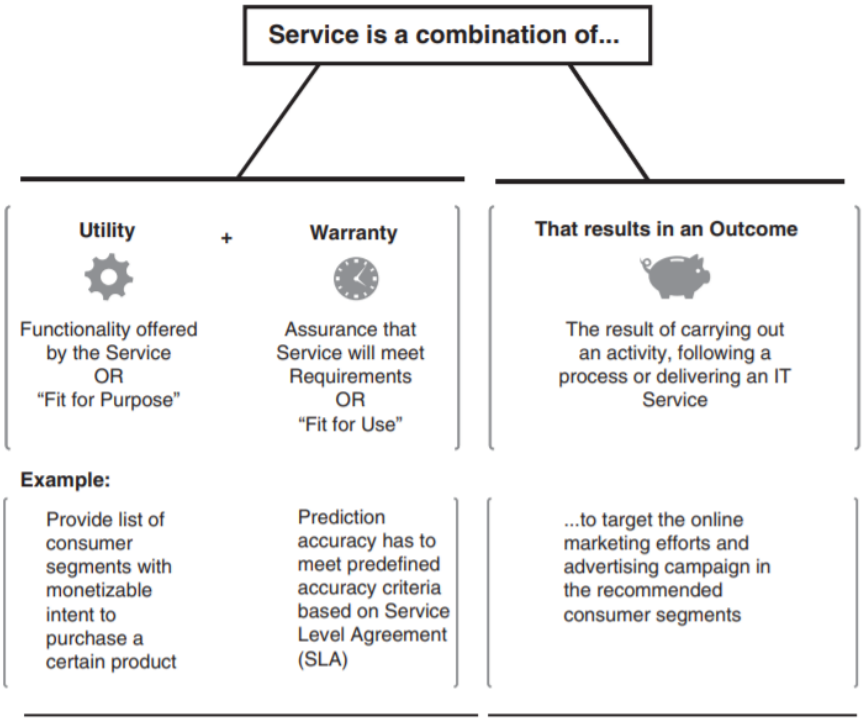

Fig. 2: Key features of a service (Sarkar, 2015).

There are notable DaaS challenges, such as concerns over data ownership, data security, and affordability (Truong and Dustdar, 2010). However, one of the main features of DaaS is that the cost of data collection, cleansing, and analytics is known, making it easier to forecast budget expenses and plan ahead.

Below, are a few guiding principles of DaaS.

Architecture not technology. DaaS is an architectural framework, beyond a mere technology or application. Its underlying foundation is typically based on the concept of service reuse,

enabling users to utilise common, standardised services over the web, the Cloud, and related technology for multiple purposes within an organisation (van Vugt and Jacobsen, 2017).

Focus on data quality. For any DaaS service provider, the quality of published data is the primary strategic asset that distinguishes them in the eyes of their service consumers. Therefore, it should be viewed as a key differentiator that must be exploited to drive market share by the data provider. The information fed to DaaS subscribers has to be consistent, timely and accurate and meet all the SLA (service-level agreements) specified by business stakeholders with regards to quality and fitness for use (Sarkar, 2015).

Data governance challenge. Data governance is often the most challenging aspect of a DaaS program due to the high degree of coordination required to gain consensus among multiple stakeholders on major governance issues. This is impacted by several items including local data laws (e.g. if the data must be encrypted), the support of data quality assurance, security and privacy compliance, data classification, information lifecycle, and auditing features that a DaaS system can support (Truong and Dustdar, 2009). Anyone considering a DaaS program should be aware that data governance is a critical success factor to the long-term growth and sustainability of data services across the organisation.

Within the water sector, DaaS is more commonly applied to wastewater operations with utilities outsourcing the operation and maintenance (O&M) of different services to outside private companies, such as for total wastewater system operations, combined sewage overflow (CSO) monitoring, water quality monitoring, and industrial pollution detection. To provide the required data, the Data Provider is responsible for acquiring and maintaining the necessary equipment to measure, collect, store, and transmit data to deliver reliable results. In different cases, a utility may choose to purchase the equipment themselves (e.g. flow sensors, level sensors, remote stations), rent the equipment, or only pay for the data they wish to receive. As a relatively new business model for the water sector, there is limited, existing information on how DaaS can impact utility operations and improve customer and environmental outcomes.

Next Steps

Despite several successful utility case studies for DaaS within the wastewater sector, there are still several unknowns, such as the questions listed below:

- What are the main utility motivations to implement DaaS? What are the biggest barriers?
- Is DaaS only suitable for utilities that do not have the capacity to install, operate and maintain their own network?
- How do utility DaaS practices compare across different wastewater applications, as well as across different sectors?
- How does DaaS improve the efficiency of utility operations and maintenance?
- Do DaaS utilities have improved regulatory compliance compared to non-DaaS utilities?
- Do DaaS utilities prefer to just acquire data, report summaries, or also predictive insights?
- What makes a utility an appropriate fit for DaaS?

Over the course of the next 6-9 months, I will investigate these questions by carrying out (1) a global utility survey and (2) an in-depth study of select utilities using DaaS for different wastewater applications to determine best data management strategies, data quality procedures, contract preferences, regulatory performance, and more. Each of these studies will be available for free to SWAN Members.

If you would like to participate in this research, please contact me at: amirc@swan-forum.com

Work Cited

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