

# Executive Summary

## Understanding the importance of Big Data analytics

Leveraging Other Industries – Big Data Management (Phase I) (SENG7R16/4836)

### The Central Issue

Internet of Things (IoT) technology and the need to process great amounts of data from multiple and often disparate sources are becoming very important in all industries including the water/wastewater industry. Findings indicate that the water/wastewater industry has not embraced Big Data analytics and IoT as rapidly as other industries. While utilities are collecting significant amounts of data, data quality is an issue that hampers data utilization. Generally, the technology solutions available address only single water industry uses. This leaves the onus on utilities to provide the integration capabilities when multiple applications are implemented.

### Context and Background

This research project examined the current capabilities and state of knowledge of IoT and Big Data processing within the water industry and certain non-water sectors. The research team conducted a survey of water and wastewater utilities using Big Data analytics for processing large data sets to understand technology tools being used. Concurrently, they surveyed water industry organizations (WEF, AWWA, Smart Water Network, IWA, Smart Cities Council) to identify committees that are evaluating the use of big data analytics and visualization tools and large IoT firms (e.g., CISCO, Qualcomm, Intel, Microsoft) to identify work being done and trends for managing and processing large data sets.

### Findings and Conclusions

There is still a “wait and see” element within the water sector that impacts adoption of these concepts and technologies. Most respondents consider Big Data analysis to be important, but only one-third considered it to be a significant issue that needs to be addressed as a priority. Utilities generally believe that they have advanced skills for management of Big Data, but feel they lack skills in real-time analysis of Big Data. Utilities believe that Big Data will have a dramatic impact on customer relationships, the way operations are organized, and making the business more data-focused. The benefits of Big Data seen as important include: Optimizing the operation of treatment plants and



**The Internet of Things and Big Data analytics are changing the stages of maturation for technology applications in the water sector.**

networks, predicting system and equipment failure, reduction of expenses through operational cost efficiencies, improved workforce management (including mitigating knowledge loss from aging workforce), realizing greater value from existing tools, and accelerating the speed with which new capabilities and services are deployed.

### Management and Policy Implications

IoT and Big Data analytics are changing the stages of maturation for technology applications in the water sector. Only about 10% of data collected is actually used. The poor result is driven by a lack of Big Data analytics tools and staff resources. As a result, associated research such as *Workforce Skills of the Future* (SENG5C16) are essential to have the staffing requirements in place to make use of the rapidly evolving data driven world. The survey results and knowledge gained from interviews with personnel in other sectors allowed the researchers to determine trends and future technology paths. This research established the basis for research efforts into the use and management of the data-connected world through the use of advanced analytics to produce insights and knowledge to lead the water sector towards the digital utility.



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## Related WRF Research

| Project Title   | Research Focus   |
|---|--|
| <b>Compendium of Sensors and Monitors and Their Use in the Global Water Industry (SENG1C11)</b> | Documents information on commercially available instrument types, capital and operating costs, and users' real-world experiences with sensors in the global water/wastewater industry. Final report includes 22 case studies from water utilities and an online Compendium database that provides a guide for facility managers, operators, and designers for selecting and operating real-time water quality monitoring solutions.                    |
| <b>Designing a Sensor Network in an Urban Sewershed (SENG6R16/4835)</b>                         | Examines the current state of remote monitoring technology applications in urban sewersheds, including the greatest challenges facing wastewater and combined wastewater and stormwater systems.   |
| <b>Defining Attributes and Demonstrating Benefits of Intelligent Water Systems (4614)</b>       | Includes literature reviews on existing intelligent water technologies for both drinking water and wastewater utilities.   |
| <b>Workforce Skills of the Future (SENG5C16)</b>  | Provides an understanding of key workforce trends driving change and the future workforce skills requirements to enable success in the water sector over a long-term horizon to 2040 focusing on customer trends and the future of work.   |
| <b>Considerations for Security and Communications for Intelligent Water Systems (4670)</b>      | Identifies the types of information sources used by water utilities, as well as the associated communication media and protocols. Assesses the security risks associated with each information source and whether current cybersecurity measures in use provide acceptable protection. Includes an Intelligent Water Systems Matrix that presents security considerations for communication methodologies used by the most common information systems. |
| <b>Intelligent Water Networks Summit (4714)</b>   | Documents information and practical experiences among utilities interested in intelligent water networks. Topics covered includes cybersecurity, big data, smart network design and implementation, maintenance, and other relevant topics.  |
| <b>AMI-Meter Data Analytics (4741)</b>  | Investigates how advanced metering infrastructure (AMI) data can best be used and identifies strategies for AMI data analyses, using case studies to demonstrate the value of AMI data. Includes a meter performance index, which will allow utilities with AMI data to define their meter maintenance and replacement strategies based on actual meter performance.   |

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