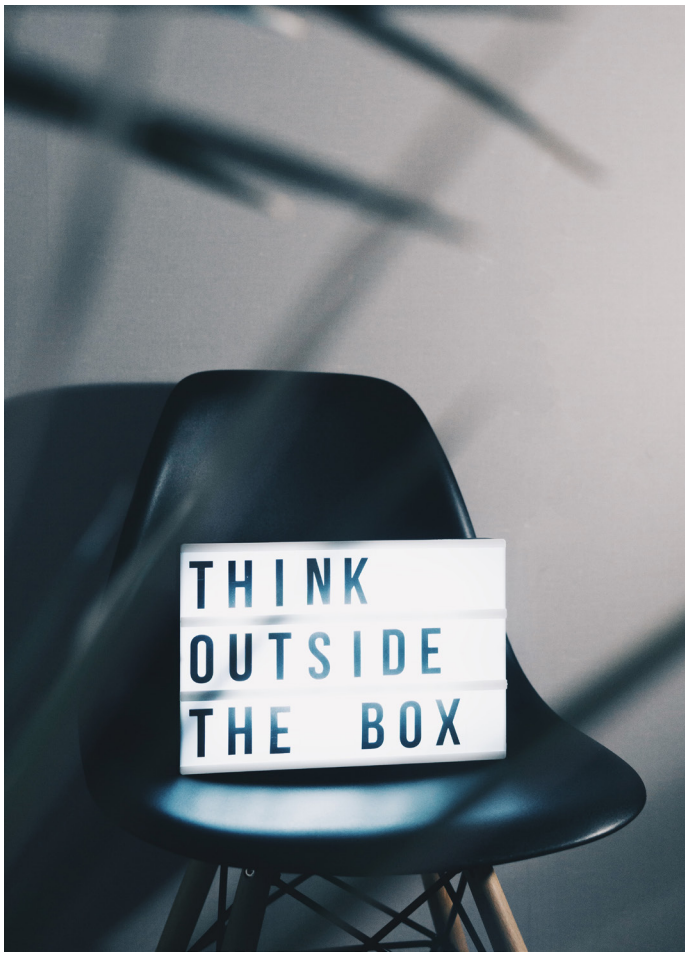
# Real-Time, Online Water Quality Analyzers Can Change the Game of Technology Acceptance

**By Rick Bacon**

To meet the goals for safe drinking water and sustainability in the most cost-effective manner, there is an urgent need for the water industry to accelerate validation and adoption of technology innovations. Until now, there have been few examples of how water innovation hubs can address this need due to the intrinsic challenges of their service model. The adoption of real-time, water quality analyzers at water hubs is poised to change the game of technology acceptance in the water quality sector— let's learn how.




## Water Innovation Challenges

***The current nature of pilot testing.*** The validation of new technologies in the water industry is accomplished through pilot testing. Results from pilots are a critical precursor to the adoption of new technologies by those who operate utilities; a utility seeks to evaluate the effectiveness of a technology in their local context where requirements may vary compared to other utilities. The cost burden and time required for each unique pilot to be negotiated, planned and implemented before adoption contributes to the high cost of infrastructure upgrades. The use of limited resources in this manner is especially taxing for water technology innovators, many of whom struggle to fund the cost of piecemeal evaluation of their technology by multiple utilities before it gains general acceptance.

***Reduced access to many local utilities due to COVID-19 pandemic.*** During the COVID-19 pandemic, difficulties faced by solution providers in obtaining access to multiple utility sites and the need to provide a safe working environment for site and vendor employees have become a further barrier to field-based technology evaluation.

***Cost prohibition.*** Vendors are often expected to participate "in-kind" (i.e., for free) when there may be state-based funding available for demonstration pilots in the field or a conditional sale opportunity.

***Costly regulation requirements.*** Treatment requirements of wastewater and drinking water plants often vary considerably based on their influent characteristics and effluent goals. Each water treatment plant or state regulator requires its own demonstration that a new treatment technology is applicable to its specific influent conditions and regulations. This regulatory requirement generates a significant duplication of costs, often at the taxpayer's expense (e.g., publicly funded pilots).

### A New Approach That Will Benefit All Stakeholders

Getting beyond these barriers to innovation requires a new approach to evaluating technologies in the water industry. A new approach can offer enhanced services to multiple stakeholders – water technology vendors, consumers, utilities, regulators and taxpayers – seeking to improve water quality and improve the efficiency of its use. Here are some new approaches to consider:

***Streamlined piloting at water innovation hubs, rather than on site.*** Rather than the technology vendor having to negotiate an evaluation of their technology at multiple sites, it is envisioned that utilities that are interested in evaluating a specific technology would contract (for a fee) with the water innovation hub to undertake that evaluation against a clearly defined set of performance criteria. As part of this, the utility will ship a volume of water to the hub for such an evaluation (or will accept the representativeness of the water to be treated at the hub). The water innovation hub will publish an independent report on its evaluation of the vendor's technology that can be made available on commercial terms to third parties. This would represent considerable value to both the vendor and utility. System performance data from online monitors could even be streamed to interested parties who are located remotely.

This mode of innovative piloting has been validated at a non-utility site for the treatment of iron, manganese, hexavalent chromium and arsenic from wells across the U.S. and has been proven very successful and cost-effective.

***Online, real-time water technology performance monitoring and data.*** An essential requirement of the evaluation of any treatment system is the availability of time-series data that track the performance of that system under water quality and other environmental conditions that can change on an hourly, daily, weekly or seasonal basis. Moreover, for such evaluations to serve the needs of the broader water treatment industry, such evaluations should be carried out – to the extent that it is possible – under varying conditions that reflect the interferences typically encountered in water treatment systems.

Online water quality data can: enable rapid assessment and evaluation of water treatment technologies; reduce the cost and time to evaluate and commercialize; provide an understanding of the impact of operational changes on contaminant levels in real time; quickly diagnose changes in system performance; provide immediate notification of abnormalities; ensure regulatory and contract compliance in real time; and eliminate the need for on-site physical supervision or attendance.

### Case Study

***The evaluation of real-time water quality analyzers.*** Real-time water quality monitoring technology is a fast-emerging segment in the water technology sector and is increasingly recognized as a critical component of an "intelligent water treatment system." Historically, wastewater and drinking water treatment systems have been unintelligent. They have had neither the capacity to determine whether they were under-treating or over-treating, nor the ability to identify performance issues in a timely fashion. AMS has brought to market numerous online water quality analyzers for chlorine, hexavalent chromium, selenium, lead, arsenic and more. These AMS instruments help drive intelligent water treatment systems, ensuring system performance is optimized to avoid under- or over-treatment. The ability to obtain high frequency data and adjust contaminant remediation processes in real-time to mitigate the impact of trace metals and disinfection byproducts is only made possible through the use of the online analyzers. However, the industry is still only in the phase of early adoption of real-time sensing and there is a need for the broader industry to become aware of the benefits of online water quality monitoring.

Generally, the performance of such instrumentation is presented under normalized water conditions free of all of the interferences that are to be found in a natural environment. In reality, such conditions do not prevail in the field and therefore the selection of analyzers based on normalized conditions is problematic.

Water innovation hubs can also offer the water industry an independent evaluation platform for online water quality analyzers. In order to evaluate the analyzers in different natural environments, these "environments" would be shipped by participating utilities to the water innovation hub and the analyzers installed to run on each of these for an extended period of time. This would reduce the number of in-situ evaluation projects that are required for utilities to determine that a specific online analyzer will meet their requirements and allow them to make informed purchases based on field-data from an independent source. This would be of particular benefit to smaller utilities who do not have the resources to investigate or evaluate online analyzer options for their treatment systems.

Online analyzers also need to be assessed for mean time to failure and mean-time to repair, the requirement for operator intervention (e.g., calibration), type and use of reagents, waste disposal and overall service requirements. These are all components of the lifetime cost of an online analyzer, its reliability in a mission-critical application and the value of the data it generates.

**Innovating for the Future**

In summary, water innovation hubs must begin innovating in the services they provide to ensure they generate sustainable value for the multiple stakeholders they seek to serve. Taking the water to the water innovation hub rather than taking a pilot water treatment system to multiple sites is a far more cost-effective approach that eliminates the substantial costs associated with duplicative design, engineering, facility preparation, permitting, supervision and evaluation.

AMS hopes to continue providing support to water innovation hubs in order to be more successful and provide more value to the water treatment industry, not only with its technological innovations but with its pioneering and innovative vision for the future of the industry as well.

## About Rick Bacon

Rick Bacon has served as CEO of Aqua Metrology Systems since 2012. Prior to joining AMS, Bacon held senior management and board level positions in the energy, industrial, technology, and water sectors. He has a keen interest in technology start-ups and has successfully led several companies in securing seed and development funding. Bacon holds a degree in Land Economy from the University of Cambridge, United Kingdom.

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