Shaping the architecture of smart water networks

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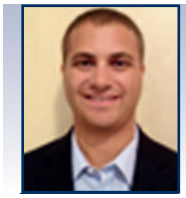

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To address an ever increasing demand and deteriorating infrastructure, a growing number of global water utilities are adopting a "smart" approach to managing and controlling their networks. SWAN, the Smart Water Networks Forum is comprised of global leaders in the water industry seeking to raise awareness and encourage the adoption of smart water technologies. One of SWAN's main goals for 2013 is to map the architecture behind Smart Water Networks in order to bridge the information gap between water utilities, technology solution providers, and investors.

What are Smart Water Networks?

A "Smart Water Network" is a fully integrated set of data-driven components and solutions which allow water utilities to optimise all aspects of their water distribution systems. Smart water solutions improve the efficiency, longevity, and reliability of a utility's underlying physical assets by better measuring, collecting, analyzing, and acting upon a wide range of network events. This can impact on different dimensions of the utility work, such as day-to-day operations, maintenance, or network planning. By generating knowledge, a utility can accurately set goals, plan investments, and address some of its largest challenges such as leakage, energy efficiency, regulatory compliance, or customer service.

A layered view of Smart Water Networks

When describing Smart Water Networks, it is useful to separate its various technology components into layers. The "Five SWAN Layers" model can provide a useful guide to this discussion. In general, Smart Water Networks are layered beginning with the sensing and control layer through data collection, data management, and up to the data fusion layer (See Figure 1). A utility's network as a whole can become more intelligent by applying the right components to each layer.

The initial, "Physical" layer includes pipes, pumps, valves, reservoirs, and other delivery endpoint components, which are typically not considered "smart" since they are data-less. The second, "Sensing and Control" layer contains equipment and meter components which measure water delivery and distribution parameters such as flow, pressure, noise, and water quality, as well as remote-controlled devices such as remote-controlled pumps and pressure-reducing valves. In essence, this layer connects the "smarts" of the Smart Water Network to the real, physical network.

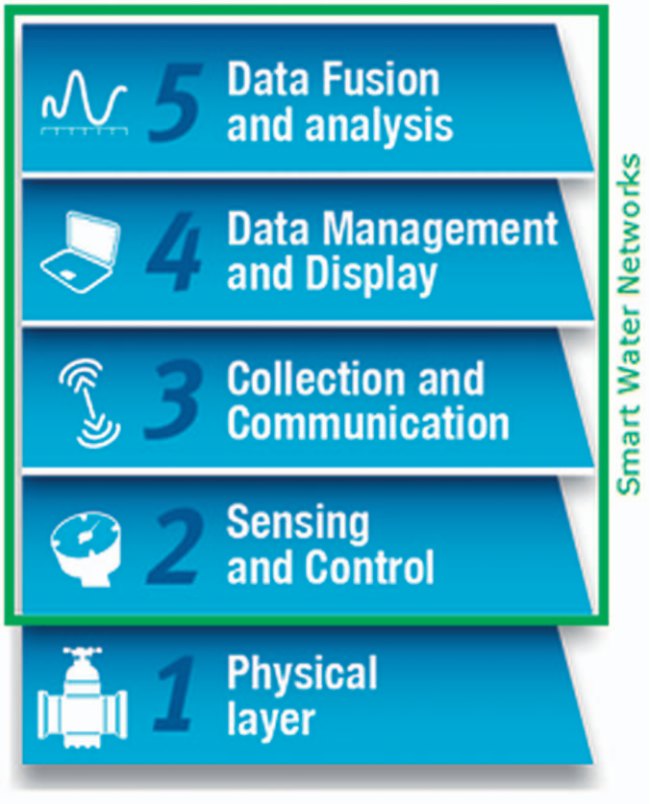

Figure 1: The "Five SWAN Layers" (Source: SWAN, "A Layered View of Data Technologies for the Water Distribution Network").

The third, "Collection and Communications" layer is responsible for discrete data point collection, transmission, and storage aimed at timely availability to a central location. For example, a fixed cable network, cellular, Wi-Fi, and other technologies related to data transfer are all part of this layer. The fourth, "Data Management and Display" layer aggregates data from the lower SWAN layers and interfaces it for human operators. Components in this layer include SCADA (Supervisory Control and Data Acquisition), GIS, and other network schematic visualisation tools.

The fifth and final "Data Fusion and Analysis" layer is the most sophisticated, but least developed today. Like the previous layer, it sifts through information, but further takes data from multiple samples, sources, and types to provide advanced Decision Support Systems for human operators, as well as feedback for automated control of the network. Solutions in this layer provide alerts on problems, automated control responses to system changes, high-level summaries, and network forecasts. This features automated network monitoring, pressure management, pumping and energy optimisation systems, hydraulic modeling, and more.

SWAN and the Smart Water Network Architecture Workgroup

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of data technologies in water networks, making them more efficient and sustainable. SWAN members vary from water utilities, technology solution vendors, engineering and consulting firms, academics, and investors. What began in 2010 as a small group of founding members, today boasts close to 80 member organizations from nearly 20 different countries. By aligning industry leaders and participants, SWAN has the unique ability to share its members' diverse experience, develop its own research, and shape industry language and standards.

In 2013, SWAN established the "Smart Water Network Architecture Workgroup" comprised of its different member types and chaired by Andrew Burrows, CTO of i2O Water. The goal of the Architecture Workgroup is to research global water utilities' different network topologies and many-to-many component relationships across the Five SWAN Layers. In addition, available solutions are being mapped against utility challenge areas and root business drivers. The Workgroup's output will enable water utilities to learn about their network such as how various components interconnect, available solutions, and will also focus on the return on investment for various smart water technologies.

As a rapidly growing forum, SWAN welcomes new members across the water industry – together we can proactively influence the future of Smart Water Networks.

For more info, visit the website at: www.swan-forum.com