Free Flow of Data in Iran Water Industry

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Abstract

Comprehensive network planning, analysis, and O&M[1] are essential for water utility companies as well as industrial network operators, water generating companies, etc. This can be a time-consuming process. To facilitate the planning and design of supply networks, Siemens has designed a data integration platform which will be proposed as an enabler to facilitate digitalization of Iran Water Industry.

This platform integrates a variety of data silos and use open or commercial databases which permits direct data exchange with other systems like GIS[2], SCADA[3], ERP[4], MDM[5], asset management engine application, billing, condition monitoring, maintenance scheduling, spare part management, resource / reservoir management, weather forecast, quality management, etc. as well as Integration of external data sources in simulations even with standard protocols such as CIM[6] (IEC 61968/61970).

Keywords: **Data Solis Integration, Digitalization, Asset Management, Smart Water, Digital Twin.**

1- Introduction

Go easy on resources, optimize energy consumption, avoid water losses, prevent flooding, perform predictive servicing and maintenance … there are many challenges facing the water industry. And they will only increase with the trend toward urbanization and the transition to a new energy mix. Digital solutions can play a major role in staying on top of these demands and guaranteeing a reliable security of supply [1].

Less than one percent of all the water on our planet is accessible and usable for domestic and industrial purposes. In view of the growing global population and increasing urbanization, it is therefore vital that we find new ways of using our limited resources of drinking water more sustainably and more efficiently, and of using new technologies to make existing water resources potable. The same applies to the treatment of wastewater, as 80% of municipal sewage currently flows untreated into our rivers, lakes and seas [2].

[1] Operation and Maintenance (O&M)
[2] Geographic Information System (GIS)
[3] Supervisory Control and Data Acquisition (SCADA)
[4] Enterprise Resource Planning (ERP)
[5] Meter Data Management (MDM)
[6] Common Information Model (CIM)

When it comes to our most precious resource, cost is obviously important. But it is equally vital that improvements are made in the way existing water resources are handled, in collection, in disposal and in transportation. For example, we always look at the entire value chain and add a range of levers to improve efficiency. And in doing so we fulfill diverse requirements – after all, limiting efficiency to costs alone misses the point. There are also key safety aspects, such as the fast localization and fixing of leaks. In the case of wastewater treatment plants, we have to improve efficiency and performance. The more efficient all of the plant's processes, the smaller (and less costly) the plant can be [2].

Irrespective of its role in the value chain, the life cycle of a water plant can be broken down into four phases: planning, engineering, operation and modernization. There are different requirements in each of these, and we have to provide tailored solutions to match. We need proven concept modules and planning tools to make planning job easier and reduce costs. We have to reduce the project costs for engineering and hardware when fitting out the electrical systems of the plant, from control level to field level. During operation and modernization phases, we have to ensure the efficient, secure and sustainable operation of plants as well as maintenance and expansion in line with requirements [2].

2- How to integrate data silos and perform free flow of water data?

We have to keep control of costs, improve service quality and increase availability. The latter is important for sea-water desalination plants, as in many cases there are no alternative ways of obtaining drinking water. Nevertheless, consumption of the plants is typically at the top of the agenda, as well as the energy used in transportation and in distribution networks [2].

The water industry of the future will be smart and energy-efficient. Networked, intelligent systems will help make better use of energy, avoid unnecessary water losses and minimize the consumption of resources. In addition to automation and drive technology, the key components of such a water program are software solutions for Smart Water. These help generate relevant data for the water industry and make it available and also offer fact-based data analysis – throughout the entire lifecycle of the system [1].

The intelligent linking of data from different sources, such as sensors, water meters or weather data, creates new opportunities for more efficient use of water in industry, agriculture and in municipal utilities, thus supporting sustainability. A precondition is the end-to-end networking of system engineering from commissioning through operation, maintenance, and ongoing process optimization based on a data platform [1].

System planners and operators – including those in the water and wastewater industries – face questions like: How can I make my engineering more economical and faster, while improving the design quality? And how can I simplify the sequences and processes involved? The standardized data platform for plant engineering software lets us benefit from a comprehensive flow of information and project-relevant data across all company levels and phases of the project, from process engineering to automation [1].

Nowadays, data can be transferred to the distributed control system easily and without errors. At the press of a button, the entire plant structure is generated in the distributed control system from the engineering data, or the plant data can be made available in the engineering system in real time. This saves vital time in engineering the automation system [1].

Whereas system performance used to be tested using prototypes, software tools for simulation are now being increasingly used. System performance can be simulated prior to completion, and errors can be identified and rectified at an early stage. Simulation software enables real-time simulation and emulation so components and automation solutions can be comprehensively checked. This makes the task of virtual commissioning both flexible and straightforward. Simulation software also enables us to arrange secure, efficient training sessions in a virtual environment (i.e. using the Operator Training System) [1].

3D visualization software packages use 3D engineering data to create a realistic representation of highly complex plant models; typical benefits of such solutions are maximum efficiency in planning and monitoring, operator training, forward planning, and the simulation and execution of service and maintenance work. Open cloud platforms are also opening up new opportunities. These platforms lay the foundation for applications and data-based services, including predictive maintenance, energy data management, and resource optimization [1].

To ensure optimized operations, we need to control and manage our plant and infrastructure in the water and wastewater industry intelligently. A modular solution for pipelines, drinking water and wastewater networks is needed to handle this requirement. Such a smart water solution should include software modules that can be flexibly combined with each other. Depending on the requirement, they should help optimize processes, identify and locate leaks and dynamically simulate pipeline systems. The benefits are obvious - in addition to improved security of supply, you can reduce energy consumption and thus your costs as a system operator [1].

Systematic monitoring of plant components means we can extend their service life, avoid unscheduled downtimes, and significantly improve plant availability as a result. Protecting industrial plant against cyber attacks also plays an important part in this regard. We need products and services in the form of Industrial Security, which comprises both system and network security and system integrity. We need a single coherent view of information, enabling a variety of solutions in real-time performance management and decision support to aggregate, relate and present operational and business data in real-time to improve enterprise performance [1].

More and more often, Ethernet connections extend all the way to the field level. This offers many advantages for plant automation. At the same time, however, production processes that were secure in the past are now open to attack from both the outside and inside. Only an approach that integrates or includes security mechanisms with a comprehensive understanding of automation can provide reliable protection.

3- Conclusion

Benefits and features of the proposed water date integration platforms are as follows [3]:

- Benefits
  - Develop robust water industrial IoT[7] solutions faster
  - Open PaaS[8] with native cloud accessibility
  - Extensive water device, enterprise systems and edge to cloud connectivity
  - Powerful water industry solutions with advanced analytics

[7] Internet of Things (IOT)
[8] Platform as a Service (PaaS)

- Closed-loop innovations with end-to-end digital twins [9]
- World class partner ecosystem for water industry solutions and services

– Features
  - Secure connection of water assets and reservoirs with hardware or software connectivity solutions
  - Easy development, deployment and testing with preconfigured solutions
  - Facilitate start up involvement via application developments based on IoT
  - Broad spectrum of engineering, operation, and optimization applications and analytical services
  - Native cloud development
  - Data visualization and exploration
  - Automate insights from product performance data with product intelligence

4- References

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[2] Completely Committed to the World's most precious Resource, Solutions for Greater Efficiency in the Water and Wastewater Industry, siemens.com/water/automation
[3] MindSphere – open IoT operating system - Software - Siemens Global Website
[4] The digital twin - Digitalization in Machine Building - Industry - Siemens Global Website

[9] The digital twin is the epitome of the digitalization of plants and machinery – the virtual copy of a real machine or system. And the twin is indeed increasingly proving that it can help ensure optimized machine design, efficient commissioning, short changeover times, and smooth operation [4].