Using data for Water Management

Optimizing industrial water processes: A solutions paper on data integration, plant network integration, downtime reduction and Cybersecurity.

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General Overview

If you already read the whitepaper "What Data can do for Water" then you might be aware of how IoT technologies can generate benefits in water management, including improvement of performance and efficiency in the operations, ensuring water quality for compliance with increasing standards, reduction of water losses with early leak detection, energy savings, and reaching sustainability goals among others.

In this Solution Paper you will discover how HMS - as a leading supplier of products and solutions from Water Management - will help addressing those challenges and opportunities in a practical and effective way.

In this Solution paper, we focus on:

■ How to integrate Data into cloud and Management Systems

■ How to create a seamless plant network integration

■ How to reduce production undesired downtime

■ How to reduce risk from external cyberattacks

Integration of Data into cloud and Management Systems

OT/IT Integration is an essential part of water management digitalization. While there are different strategies and architectures applicable for field data collection and integration, our Ewon universal, secure, and flexible IoT gateways become an ideal choice for many applications while providing an extra security layer with the VPN connection. Some of the benefits offered by Ewon include:

- Saving time and money with the Talk2M Service for remote access to any field control system to program, diagnose, update, calibrate, or monitor them.
- Availability of real-time data of field assets using native industrial protocols (including serial, ethernet, and Profibus) and without the need to modify its configuration. Data can be collected directly from sensors since the Ewon optionally includes digital and analog I/Os. No data loss and timestamp at origin even if there is a network outage thanks to the local buffer in the Ewon.
- Immediate notification by SMS or email of any alarm or event that requires attention to the right person(s)

But what would data be if not converted to valuable information? With the Ewon i4 solutions machines and infrastructure can be easily connected to the digital world, wherever they are, processing the collected data to obtain valuable information in real-time. With i4scada it is possible to create modern process visualizations with individual designs for operating and monitoring machines, and production plants based on HTML5 technology so pages can be displayed in any browser and device.

Ewon also supports data integration to proprietary or popular cloud platforms such as Azure, AWS, MindSphere, EcoStruxure, AVEVA Insight, PTC Thingworx, Cloud of Things, and SoftwareAG among many others, via dedicated connectors or MQTT, REST API or OPCUA protocols. You can also check our HMS Solution Partners for innovative IoT software solutions that are integrated with Ewon hardware with a minimum effort and all of this supporting the highest security requirements including ISO27001 certification and a complete defense-in-depth strategy as we will find later in this paper.

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Seamless plant network integration

Typically, water and wastewater plants consist of different types of machines from different vendors that need to exchange information between them but also with the SCADA, BMS, and other management systems in the plant or cloud. Hundreds of instrumentation devices, actuators, and sensors need to be integrated with the plant network as well. While the use of ethernet as an industrial network is now extended, protocols running on top of it are not always interoperable, so gateways are needed to exchange information between devices. Add to it that still many devices – and not only legacy- still use fieldbus and serial protocols.

Our Anybus Gateways allow seamless integration of all these machines, systems, and devices with little configuration effort and all the necessary diagnostics tools. Anybus Gateways translate almost any industrial protocol including Profinet, Profibus, Ethernet/IP, EtherCAT, Modbus, CAN, PowerLink, CCLink, BACNet, Mbus, MQTT, OPCUA. So basically, no matter what you need to integrate, even proprietary or old legacy protocols, you will find a solution within the Anybus products.

So, what if you have Profibus DP instrumentation on the field and a new PLC is installed supporting only Profinet? In this case, you will need an Anybus Profinet Slave to Profibus Master Gateway to avoid changing and reconfiguring all your instrumentation. And one of the benefits of using gateways is that you can still use the best-in-class equipment according to your needs instead of being tied to a specific brand or protocol.

And network communication technologies inside a plant are not only wired. Wireless communication is gaining adoption with as much as a 8% increase per year. The reasons are various, but when systems are spread in a big geographical area where some assets are isolated – case of a pump station – then it is very convenient to transmit the data over the air. Ethernet, serial, and CAN protocols can be transported wirelessly, so most of the intelligent devices in the field – even legacy - can send and receive data wireless with the adequate interface to do it.

> " Wireless communication is gaining popularity, with an increase of up to 8% per year. "

Some cases where you would consider implementing wireless are:

- To reduce installation and maintenance costs
- To replace cabling in long distances
- To communicate with rotating equipment
- To integrate isolated equipment in the networks, such as meteorological stations or energy meters
- To integrate mobile equipment, such as phones/ tablets or even AGVs
- As a secondary channel to be used in case of failure of the main channel (redundancy in communications)

The HMS Anybus Wireless product line offers state-of-the-art, robust, and certified radio devices, easy to install and configure, covering private networks (WiFi, Bluetooth, and Bluetooth Low Energy), and public networks as well (5G, LTE and NB-IOT). The technology to be applied will depend on the use case, but our experts will always be ready to help and support you to design the best option and architecture.

Reduce undesired downtime

According to different studies, the hourly cost of having a wastewater treatment plant down can go beyond 10,000€, in addition to the environmental impact that this can entail.

With digitalization, the industrial communication infrastructure becomes a critical part of the plant because a failure in the network can affect its whole operation. Though normally during the start-up and commissioning phase, the networks will be tuned for their ideal performance, as installations are upgraded or grow over time, industrial networks are affected by many architectural and installation-related constraints that can lead to failures.

Having online monitoring tools to predict possible network failures and, in any case, being able to react very quickly is essential for the smooth operation of the plant.

For this purpose, the Anybus Diagnostics product line ensures a reliable network infrastructure for industrial networks such as PROFIBUS, PROFINET, EtherNet/IP, and other industrial Ethernet standards. The portfolio includes products that help field technicians monitor, analyze and troubleshoot efficiently, both onsite and remotely, thus avoiding undesired downtime.

Reducing risk from external cyberattacks

Digitalization in the OT environment entails some perceived risks that might hinder its implementation. On top of them, Cybersecurity concerns [1].

While the importance of IT security has been recognized by experts for years, the security of industrial control systems seems to have been overlooked. Attacks on operational technology (OT) environments are becoming more frequent, so companies are looking for ways to strengthen their industrial cybersecurity strategy and bridge the gap between OT and IT.

The water and wastewater sectors have been defined as essential in the EU's Directive 2022/2555 (NIS2) on measures to ensure a high common level of cybersecurity across the EU, which will become mandatory in 2024. But in fact, cyber-attacks on water treatment systems have occurred and will continue to occur. [2]

Therefore, we must be ready and protect control systems not anymore as an option but as a functional requirement choosing the most secure architectures and technical solutions according to internationally accepted standards to reduce risks as much as possible.

HMS, as a leading company in information technology and industrial communications, has cyber security as a top priority in the design of its products. Our Ewon devices and cloud service are ISO27001 certified, which guarantees continuous improvement in Information Security, and with a complete defense-in-depth strategy, including LAN/WAN segmentation, data encryption, firewall-friendly for compliance with configuration policies (outgoing connection only), strict authentication and authentication with the definition of access policies and account management, traceability of connections, high availability and redundancy of the service with more than 40 Datacenters worldwide, and much more.
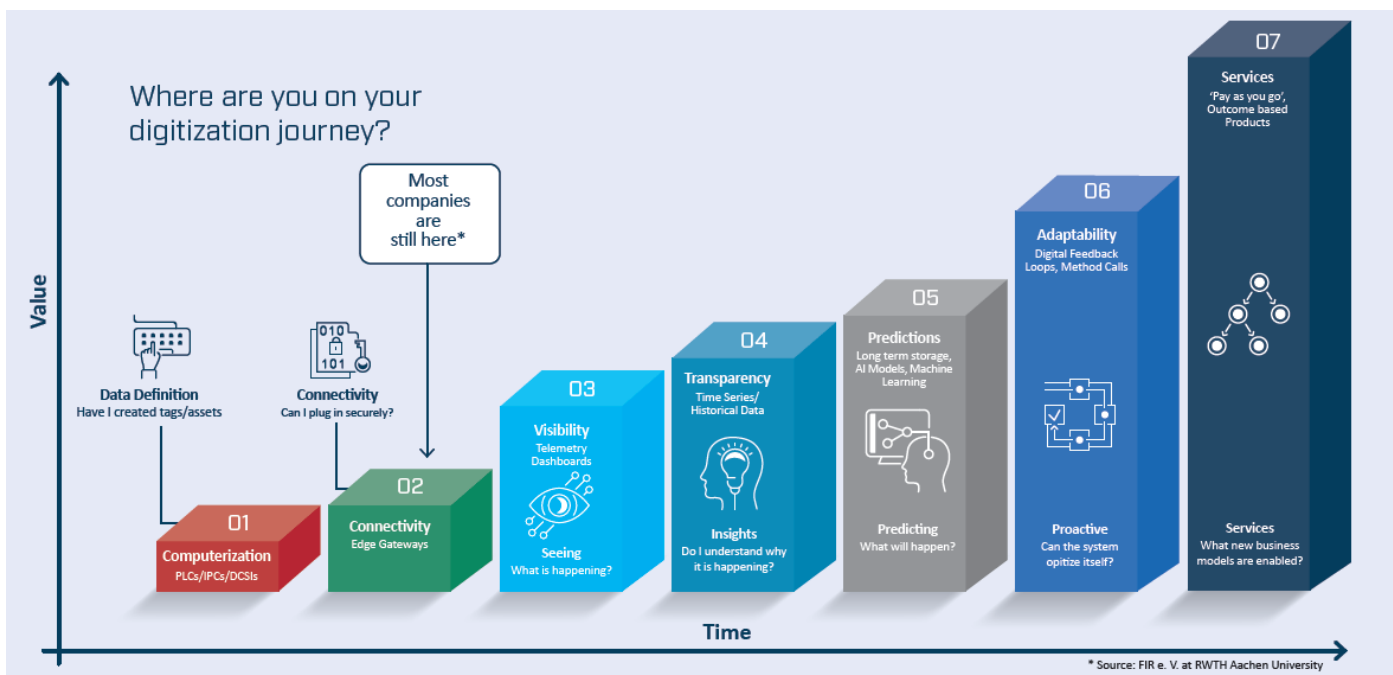
And what about ROI?

Another risk perceived for digitalization in OT environments is the unclear ROI, and that is because there is still a small number of cases that justify investment in both CAPEX and OPEX [1].

According to McKinsey, about 30% of companies that start a proof of concept end up failing to execute, mainly due to unclear business value and high costs of developing, maintaining, and scaling the solution. Of the 70% of companies that move forward in the pilot, 4 out of 5 companies get stuck in "pilot purgatory."

Purgatory means that they either don't make progress on the project or have trouble making progress with their target customers. And finally, some initiatives never get off the ground and get stuck due to data security concerns.

That is why HMS has made sure that our products and solutions are not only reliable and secure, but also easy to configure, deploy, use, and maintain. In this way it is very feasible- and it is our recommendation- to develop proofs-of-concept at affordable costs both economically and in terms of time.

A Proof of concept is the first step in a phased approach to digitalization projects. Addressing projects with a defined strategy is key for success, and executing it in phases will allow us to ensure the ROI for each phase (as each phase that we overcome implies a greater investment) reducing economic and productivity risks, and with the advantage of being able to evaluate different methodologies and adapt to change and needs as they arise to achieve both internal (company) and external (customers) acceptance before moving to the next phase.

Where are you on your digitization journey?

Value

Most companies are still here*

Time

01 Computerization
PLCs/IPCs/DCSIs

02 Connectivity
Edge Gateways

03 Visibility
Telemetry Dashboards
Seeing
What is happening?

04 Transparency
Time Series/ Historical Data
Insights
Do I understand why it is happening?

05 Predictions
Long term storage, AI Models, Machine Learning
Predicting
What will happen?

06 Adaptability
Digital Feedback Loops, Method Calls
Proactive
Can the system opitize itself?

07 Services
'Pay as you go', Outcome based Products
Services
What new business models are enabled?

Data Definition
Have I created tags/assets

Connectivity
Can I plug in securely?

* Source: FIR e. V. at RWTH Aachen University

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To deploy your teams efficiently and using best practices, we offer free quality training through our e-learning platform, which will also allow education to be carried out without having to travel or be tied to a schedule. For more advanced training we have our training facilities and on-site courses available.

In case you need support before the deployment of the system, our Application Engineering team will be able to help you with the definition of the project

About HMS Networks

HMS develops and markets products and solutions within Industrial Information and Communication Technology (Industrial ICT). Our products and solutions enable industrial equipment to communicate and share information with software and systems and are used to connect millions of devices and machines around the world and provide sustainable, reliable, secure, and intelligent communication solutions, often incorporating wireless technology, and cloud and IIoT connectivity.
You can check for the Challenges and Opportunities for Machine Builders and System Integrators in the Water Sector in our Whitepaper "What data can do for Water"

1 GWI, "Accelerating the Digital Water Utility"
2 https://gca.isa.org/blog/the-florida-water-supply-incident-and-ics-cybersecurit

About the author

Xavier Cardeña is a specialist in Industrial Communications, IoT and Cybersecurity with more than 15 years of experience in the water sector - understanding customer and market requirements and supporting them in adapting our value proposition to their current and future challenges.

Contact an HMS IIoT expert today.

Contact

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