To AMI, or not to AMI

Lessons learned from Global Omnium's AMI deployment, and steps to success.

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Introduction

While the US water industry is investing billions of dollars in advanced metering infrastructure (AMI), some utility executives are still asking themselves whether their organization is ready to make this transition. Is it worth the investment? Where will the ROI come from? How long will it take us to be fully operational? How can I minimize the risks?

This article aims to illustrate water utilities, providing case studies, lessons learned, and key figures from Global Omnium's large-scale AMI deployment. Located in Valencia (Spain), Global Omnium is one of the first European utilities that fully converted to AMI (2010). Today, with nearly 1 million smart meters they are also considered one of the most innovative utilities in the continent.

Much more than a meter

One of the most fundamental technological innovations of the last 50 years in the water sector is related to water meters. The evolution of their hardware, data collection capabilities, and communication systems have led to unprecedented efficiency improvements and ultimately reshaped the industry today. The early innovations was walk-by and drive-by Automatic Meter Readers (AMRs) that allowed utilities to have a faster and a more reliable method of reading water consumption.

What we know today as AMI – which has also evolved itself in hardware and communications technologies – is so much more than just a measurement device to produce customers' bill. They are not meters, but IoT sensors that can help utilities take the digital transformation to the next level. IoT, or the Internet of Things, is an enabler behind the transformation of many utilities in the US. As a result, utilities now have unprecedented streams of information made available to utility managers to make critical decisions that use to be reactive to proactive. Cisco estimates a that IoT will reach 50 billion connected objects by 2020.

Considering that today utilities only thoroughly analyze, on average, about 10% of the data they currently collect (2015 CIO Forum), these new large data streams can also pose challenges for them. They will require powerful analytical engines to translate the data into actionable information, which should allow end users to rapidly understand and act.

Case in Point

The case in point is Spain's Global Omnium utility in Valencia (Spain), which manages 400 municipalities throughout Spain and serves approximately 4 million customers. As a result of 15-years of digital transformation, the utility spun off GoAigua as an independent technology company that specializes in water management.

In turn, the benefits associated with a fully provisioned AMI system with nearly 1 million meters extended far beyond improvements in billing accuracy and the replacement of manual meter reading. The data collected empowered the utility to be proactive with customers, improve operation efficiency and increase resiliency:

1. Become proactive in customer management. Thanks to the enhanced detail of client information gathered, Global Omnium has been rated the most valued public service in the city of Valencia for the past several years. Customer complaints were reduced by over 60% compared to pre-implementation, and even industrial customers are finding additional value in Global Omnium's support to optimize the use of water intake in their processes.

2. Achieve a highly efficient operation. The Big Data platform developed by Global Omnium's spinoff, GoAigua, allows the utility to combine real time data from AMI, and other sources/systems (SCADA, CMMS, ERP, GIS and IoT sensors) to constantly improve the operation. In 2019 alone, Global Omnium saved 1 billion gallons of non-revenue water and avoided 2,000 Tons of CO_2 that would have been produced from wasted energy.

3. Obtain unprecedented levels of resiliency. Real time data connectivity, along with Global Omnium's hydraulic modelling capabilities, allowed them to develop one of the only operating Digital Twin globally. This system is being used by operators to simulate what-if scenarios in past, present, and future times, providing utility managers with unprecedented control over what is going to happen and why.

The following five phases of Global Omnium's AMI deployment encompass lessons learned and progress milestones for utilities to replicate the success.

Step 1: Realizing the need for AMI – The business case

In the early 2000's, Global Omnium found itself with commonly delayed reading processes, which ultimately extended the entire billing and invoicing cycles. This was a consequence of rising costs of teams needed to take the meter readings, with added difficulty in accessing remote households. There were also many tempered meters, which posed difficulties in client management.

However, these problems alone were not enough to justify the investment in AMI. It was through revenue assurance and customer experience how the initial business case added up. In fact, with their old manual meters Global Omnium could only read once a quarter, leading to limited knowledge about clients, unprecise measurements, undetected fraud, and increased alterations that could only be fixed every three months. Additionally, billing was a large source of complaints and negative experience to clients.

The size of the investment was such that the CEO, COO, and CIO of the company got directly involved in the decision-making process. They reviewed in detail the business case and participated in the selection of the right technology – after all, it was one of the most relevant decisions of the decade.

Step 2: Selecting the right technology

Being very aware of the potential negative consequences of choosing the wrong technology, Global Omnium started the search for the right metering partner in 2007. They evaluated most technologies in the market considering six main criteria:

- Total cost of ownership. It was crucial to consider all cost components, both Capex and Opex driven, derived from the AMI deployment which included maintenance of the network infrastructure.
- Battery life. This enable meters to run unsupervised for longer periods of time (up to 8 to 10 years).
- Data security. End-to-end data encryption was a prerequisite for all technologies.
- Open data-sharing protocols. Global Omnium considered key to have an efficient and open information integration/ re-structuring, allowing the utility to consume data when needed.
- Scalability. The ability to quickly deploy AMI without additional investment in infrastructure.
- Quality of Service and Availability. These were key decision factors, as they would determine the performance of the technology and SLAs established by contract, mainly on the requirement to receive information in a timely manner.

After analyzing field test results from technologies available at the time, Global Omnium decided not to limit the deployment to one particular metering company. Instead, they decided to select the best technology according to the conditions and context of each area of the city.

In such heterogenous environment, most decision makers would think this could create maintenance consequences, with the need for supervisors to know multiple brands and how each operated. However, this allowed Global Omnium to maximize overall network performance, constantly compare technologies available, become agnostic to metering technologies in future deployments, and be in full control of all data gathered.

Step 3: The deployment

Global Omnium based its deployment strategy in two main principles, always with the objective of capturing the highest value, as early as possible to finance future roll-outs:

- Saturate one district with AMI before moving to the next one. This allowed Global Omnium to deliver results, district by district, as the investment was being made. In other words, Global Omnium could perform all possible use cases and improvements from AMI, district by district, instead of waiting until the whole implementation was finished – and thus pay off part of the Capex as new technology was rolled-out.
- Prioritize geographically by value. Global Omnium prioritized the deployment of high value – low complexity districts, starting by the city centers (where the high density of population made the infrastructure relatively less costly), followed by large industrial customers, and then moving to the less populated areas and suburbs (see figure 1 for a time snapshot of this deployment).

This structured approach allowed the organization to adequately deploy the necessary economic resources, training, and people to the project, while learning as much as possible from each district completed.

Figure 1. Valencia City districts by AMI coverage, at a snapshot in time throughout the deployment project

Step 4: Data integration

One guiding principle of Global Omnium's Digital Transformation states "data means nothing, if it can't be turned into information". Since day one, Global Omnium's objective with AMI has been to move from a data-siloed organization to a data-centric one, having full transparency and interoperability. This means asking questions that need to be answered before the platform is conceived. The adoption of AMI allowed them to complete the GoAigua Big Data Platform, which is currently leveraged by the entire organization to take advantage of the 6 billion data points collected every year from the entire utility (including AMI, SCADAS, PLCs, IoT sensors, CMMS, ERP, and all other systems).

In AMI, the GoAigua Platform allowed Global Omnium to integrate all historical and real-time alarms and consumption data in a central data repository, independent of each client's metering technology and communications protocol. Ultimately, they can access all client consumption data as a single, homogenous dataset, which can easily integrate with other systems (CIS, website, CMMS) via webservice or APIs.

GoAigua also supports a powerful analytical engine that generates operational use cases, for example:

- 60+ machine learning algorithms to segment clients by behavior, forecast consumption at meter level, detect regular and extreme leaks, or trending down meters.
- Alarm system capable of alerting social services or the police department in case unexpected consumption patterns (e.g., high consumption in household during vacation, low consumption in household with elderly or dependent people).
- Network optimizations avoiding unbilled water of over 1 billion gallons in 2019 alone.
- Operating Digital Twin that leverages AMI data to achieved unprecedented calibration results, and forecasting network behavior through a digital representation of the network for simulations.
- Proactive communication of events to customers, reducing client service complaints by more than 60%.

Step 5: Operating a base of 1 million smart meters

One of the key lessons learned from Global Omnium's AMI deployment is that any type of smart metering base requires some degree of supervision, regardless of what agreement you sign with the supplier. In particular, the type of activities generally required include the supervision of performance quality and SLAs, alarm management and business intelligence, and continuous technology testing.

First, Global Omnium uses the GoAigua platform to constantly monitor quality KPIs between technologies. Some of them include the quality of the connectivity, number of interrupted data-sharing processes, or security of the connection (see figure 2 for a snapshot of their monitoring panel)

Thanks to this constant monitoring, Global Omnium can detect inefficiencies of a particular technology in aspects such as seasonal increased latency (e.g., slower flow of data during the summer), tampering concentration (e.g., a particular brand most tampered with), or lower battery life.

Second, the centralization of data in the platform allowed Global Omnium to develop business intelligence and alarms. These need to be centrally managed, with information in the form of dashboards catered to different stakeholders (e.g., customer notifications, operational maintenance).

Finally, as Global Omnium keeps expanding its smart metering base, and perform upgrades for the current base, it is necessary to keep performing tests and trials for each technology on a continuous basis.

What next?

Global Omnium achieved remarkable results in their digital transformation, which would not have been possible without the deployment of AMI. However, this is not the end of their journey. The Spanish utility has built a continuous innovation ecosystem that combines the commitment to standardized testing of new technologies, its data-centric architecture, and a start-up accelerator, GoHub, that brings innovative ideas to be quickly tested by granting access to a large anonymized, but real, dataset.

This model has put Global Omnium at the forefront of the water sector in Europe, allowing them (and their technology spin-off, GoAigua) to close partnerships with major European telecommunications. They have already started testing 5G and NarrowBand IoT, two radical innovations that will soon expand in the water sector globally.

Figure 2. Performance by metering technology at Global Omnium

About GoAigua

GoAigua is a pioneering tech company providing software analytics solutionsin the IoT space for water utilities.

GoAigua was born out of the digital transformation of Global Omnium, one of the most innovative water utilities in Europe Our goal is to help water utilities globally navigate their digital transformation journey and unlock all potential from their distributed data by creating connected utilities.

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