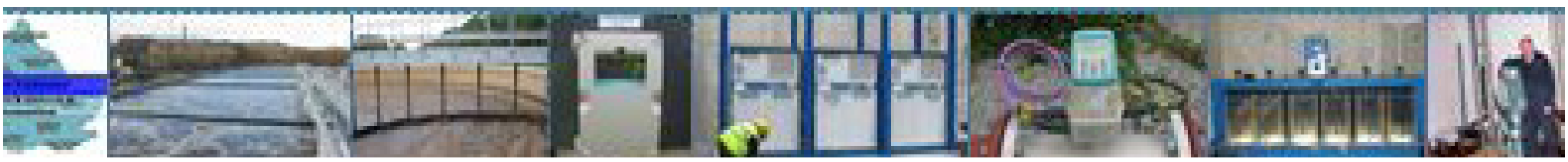

WIPAC
Water Industry Process Automation and Control

WIPAC MONTHLY

The Monthly Update from Water Industry Process Automation & Control

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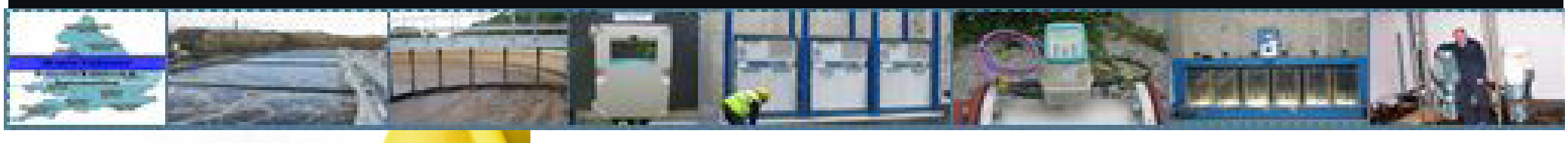
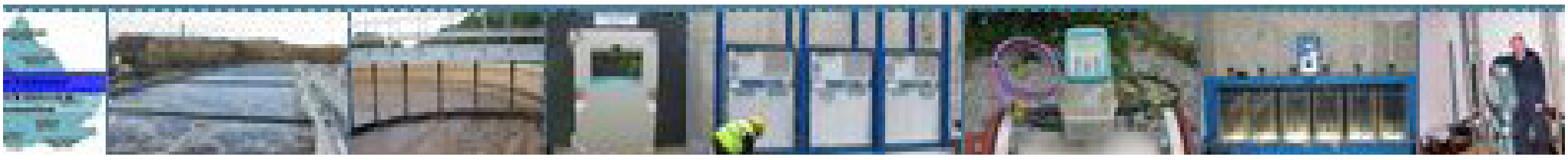
Issue 2/2021 - February 2021





In this Issue

WIPAC Monthly is a publication of the Water Industry Process Automation & Control Group. It is produced by the group manager and WIPAC Monthly Editor, Oliver Grievson. This is a free publication for the benefit of the Water Industry and please feel free to distribute to any who you may feel benefit. However due to the ongoing costs of WIPAC Monthly a donation website has been set up to allow readers to contribute to the running of WIPAC & WIPAC Monthly, For those wishing to donate then please visit **https://www.patreon.com/Wipac** all donations will be used solely for the benefit and development of WIPAC.

All enquires about WIPAC Monthly, including those who want to publish news or articles within these pages, should be directed to the publications editor, Oliver Grievson at olivergrievson@hotmail.com

From the Editor

Cyber-security hit the headlines again this month with the digital attack on the water treatment works in Florida and the further information from the Scottish Environmental Protection Agency that it may take up to a year for them to recover fully as 1.2GB of data were stolen amounting to some 4,000 files of data all of this despite the fact that the protection systems were certified to government standards. This beggars the question as to whether any standard is sufficient or whether setting a standard for this sort of thing which changes so rapidly that any standard becomes redundant too quickly. I remember having a discussion once with a member of the group who was high up in IBM that in reality you have to accept that someone will penetrate any defences eventually and in reality you need defence in depth and plans in place to react when an eventuality happens. Of course this is what the majority of organisations do, they look at where the vulnerabilities are and try to combat them whether those vulnerabilities are technological (in the physical systems) or personal (people clicking a wrong link) or something else entirely.

The impact for SEPA was to setback a regulator in some areas for some time. You could argue that they should have had more backups so that they could be up again the very next day but I am sure there has been some sort of acceptance that they could have done better and some sort of analysis and action plan on how to do better. At the end of the day though the resilience plan that was in place kind of worked and the organisation was back up and running in critical areas in a relatively short time....and then there was the incident in Florida. The SEPA attack was on the IT side of the organisation...what was worrying in Florida was that the OT layer was penetrated and setpoints that had the potential to affect people's health were changed. Now at the time of the attack the setpoint that changes the pH in the process was changed to a ridiculous amount, whether it was more of someone being curious and changing something for the sake of changing something and seeing what happens or something more serious is debatable. Anyone who knows about the water treatment process could have been more subtle about what they did, attacked a different part of the process and caused significantly more damage and harm to the public so in someways the "silver lining" was that the attack exposed vulnerabilities in the water treatment works and highlighted this to most of the global industry. The second "silver lining" was that the attack did very little damage and was obvious to the extent that operational staff on site could very easily take corrective action.

In reality of course what wasn't realised was that all water treatment plants have a "defence in depth" approach built into the way that water is treated and the process engineering that constructing any water treatment processes means that anything going wrong is found out very quickly and there are other processes in the treatment process that are designed to take over. It is called the "Swiss Cheese affect," if something gets through then the next layer of treatment is there to act as a defence. This is resilience in action and is something that the water industry is used to doing on a day to day basis. Florida makes us aware that we don't only have to do this in the core activities that the industry does on a day to day basis.

Of course the other thing that happened this month was the joint SWAN-WIPAC virtual workshop on "Overcoming Pollution," and to me the surprise of the event was the people angle in this. At the workshop we had a keynote from the Right Honourable Phillip Dunne MP and it was a fantastic presentation about how personal and emotive the pollution issue is. We heard how the Private Member's Bill is a once in a lifetime chance to make some actual change within the industry. The article that I wrote calling it a bit of a "Christmas Tree" bill was actually admitted and was deliberately done for the bill to make the most impact. We also heard from Pernille Ingildsen who last year released her book on water stewardship. From the discussion it was clear that water stewardship is a major part of how we can use this opportunity to manage the "pollution problem." There are some technological solutions too through the use of instrumentation to monitor and manage the situation to make us aware of where the problem exists and then do something about it. An interesting presentation by Nick Mills of Southern Water showed how they are doing this and the great work that they are doing. Its truly a way of looking at how we need to look at the People, Process, Technology triangle to manage the issues that the industry has.

Have a good month and of course stay safe,

Oliver

SWAN
THE SMART WATER NETWORKS FORUM

SWAN 11th Annual Conference
24th - 28th May 2011

Call for Abstracts - Abstracts for the 11th annual conference - the premium global smart water conference are being taken now. Please register at the SWAN Forum website tp register your paper

Industry News

The first joint SWAN-WIPAC event hailed a great success

This month saw the first joint workshop between the Smart Water Networks Forum and Water Industry Process Automation & Control where the two forum's discussed "Overcoming Pollution" with a global audience. With almost 700 people indicating that they would be coming to the event it was a popular hit amongst a number of people in the global audience. The keynote speaker, the Right Honourable Phillip Dunne MP, has been challenging England & Wales to improve their performance in wastewater pollution into the environment and it is a banner that many have taken up in earnest considering that the state of the rivers in England & Wales have been shown to be pretty poor in recent studies.

The workshop itself highlighted the fact that yes technology had a great part to play in monitoring where the pollution is coming from and when which is highlighted by the monitoring programs for CSOs and more recently flow to full treatment compliance across the water industry. Almost more interesting was the fact that people and their behaviours are a hugely important factor to consider and this was not only a UK problem but a global one as well. Conutries like Denmark where the resident population are more socially and environmentally responsible do not see the same levels of pollution due to customer's ethical behaviour but in reality this takes a generation to deliver across the industry.

For those that want to see a recording of the speaking and discussions sessions then please go to https://youtu.be/JPCeMoshmmg

Registrations open for BIM2021

Registrations are now open for this year's BIM conference where we will look at Digital Transformation and the accelerated adoption of BIM and Digital Delivery as a key factor in enabling us to successfully deliver in the face of unprecedented challenges. We aim will reflect on how to embrace change and share how key digital delivery tools are being applied to deliver projects as we start delivering AMP7; regarded as the most ambitious and challenging, investment period yet.

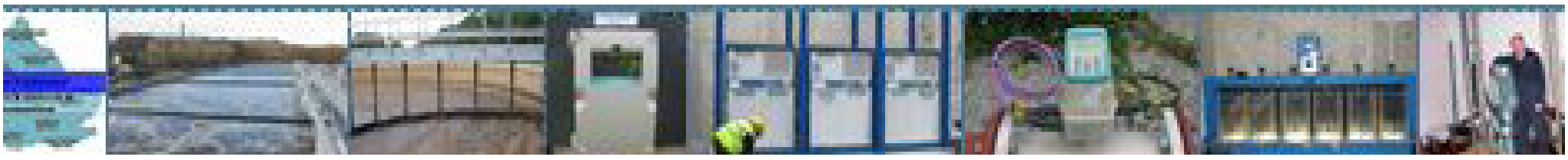
The past 12 months have seen massive changes in our lives and the way we work. To deliver our capital programmes without significant delays and disruptions through Lock-down's, Home Working, Social Distancing and Safe Working Practices we have had to evolve how we deliver projects, not only in the short term but also for the mid to long term.

Digital Transformation and the accelerated adoption of BIM and Digital Delivery has been a key factor in enabling us to successfully deliver in the face of these unprecedented challenges. This year's 8th BIM Conference will reflect on how to embrace change at both organisational and personal levels. The conference will share how key digital delivery tools are being applied to deliver projects ever more efficiently as we start delivering AMP7; widely regarded as the most ambitious, but also challenging, investment period yet.

We are once again excited to announce MWH Treatment as our headline sponsor and chair for this year's conference. MWH Treatment will present on how organisationally they have embedded Digital Delivery into their way of working. We will then hear presentations by Aveva, Barhale, EPS Water, Datum 360 and Autodesk, which will feature the challenges, benefits and proofs of key Digital Delivery tools on Survey, Model, Rehearse, Assemble and Transfer (Digital Field Management) from completed projects.

The core questions we aim to answer through this event are:

- How do we make Digital Delivery Business as Usual in AMP7?
- How do we embed Digital Delivery Transformation in an organisation?
- What are the core Digital Delivery Tools and what efficiencies do these tools bring?
- How do Digital Delivery tools enable us to change the way we deliver projects?
- How do we support our colleagues through these changes?



Scottish Environmental Protection Agency cyber attack – up to a year before full recovery

The Chief Executive of the Scottish Environmental Protection Agency (SEPA) has said it could take more than a year before its systems are fully restored, according to a report in The Times newspaper this morning. Terry A'Hearn told the newspaper it could be "well into 2022" before its systems are restored fully, although it has made a partial recovery in some areas.

The Scottish Environment Protection Agency first confirmed on Christmas Eve 2020 that it was responding to a significant cyber-attack affecting its contact centre, internal systems, processes and communications after learning that 1.2 GB of data (information) had been stolen by an international cyber-crime group.

At a later date SEPA learned that the information amounted to just over 4,000 files. On 21 January 2021 the Agency then learned that the information stolen had been published online illegally following the environmental watchdog's refusal to pay a ransom.

Cyber security specialists identified the theft of circa 1.2 GB on data despite systems being certified to UK Government security standards.

SEPA has separately said it "will not engage with likely international serious and organised criminals intent on disrupting public services and extorting public funds."

The attack is subject to a continuing live criminal investigation – SEPA's Emergency Management Team is working with Scottish Government, Police Scotland and the National Cyber Security Centre to respond to what is described as "complex and sophisticated criminality."

This week the Agency published the third in a series of weekly service status updates in response to the Christmas Eve cyber-attack which it says continues to "significantly impact" the agency's organisation and infrastructure, including its internal systems and services.

Terry A'Hearn, Chief Executive of SEPA, said:

"Whilst confronted by a sophisticated criminal cyber-attack we've been clear that we won't use public finance to pay serious and organised criminals intent on disrupting public services and extorting public funds.

"Sadly cyber-crime is an increasing challenge for Scotland's businesses and public sector partners and service recovery takes time. Whilst, for the time being, we've lost access to our data and systems, what we haven't lost is the expertise of our 1,200 staff. Since Christmas Eve, teams across the agency have been working flat-out to restore our services as quickly as possible. We've made good progress in the first few weeks and we're already seeing more come back online.

"We're issuing weekly updates on our recovery and service status to be clear on what those we work with can expect and how we'll prioritise progress and we're continuing to speak with and listen to regulated businesses and other stakeholders."

SEPA's email systems, staff schedules, some data products and reporting tools remain impacted and offline. Information submitted to SEPA since Christmas Eve, including by email, is not currently accessible. "For the time being we've lost access to most of our systems," the status update says.

Data published online may have included personal data of staff, customers and suppliers

The information that was published online may also have included some personal data of SEPA's staff, customers and its suppliers.

SEPA has disconnected its IT systems to avoid any further unauthorised access. However, the status update says:

"Unfortunately, we're unable to take down the information that is already online."

"We're working hard to assess the large amount of information that was published online. Should we need to notify anyone whose information is impacted we will do so as soon as possible in accordance with data protection law."

"It is important for us to be clear that this is a sophisticated criminal cyberattack that has had a major impact on the way SEPA works. While we have already achieved a lot in the first month, it is likely to take many months to fully recover our capacity to do all of our work."

As a first step the Agency said it had already moved to restore critical services including:

- Delivery of nationally important flood forecasting and warning products, with flood alerts and warnings being issued within 24 hours of the attack;
- Contact centre and some web self-help services have been restored, including SEPA's Floodline, 24 Hour Pollution Hotline and environmental event online reporting; and
- Maintained its ability to respond to significant environmental events

Outdated computer system exploited in Florida water treatment plant hack

An outdated version of Windows and a weak cybersecurity network allowed hackers to access a Florida wastewater treatment plant's computer system and momentarily tamper with the water supply, federal investigators revealed in a memo obtained by ABC News.

The FBI's Cyber Division on Tuesday notified law enforcement agencies and businesses to warn them about the computer vulnerabilities, which led to the Bruce T. Haddock Water Treatment Plant in Oldsmar being hacked on Feb. 5.

The plant's computer systems were using Windows 7, which hasn't received support or updates from Microsoft in over a year, according to the FBI.

"The cyber actors likely accessed the system by exploiting cybersecurity weaknesses, including poor password security and an outdated Windows 7 operating system to compromise software used to remotely manage water treatment," investigators wrote in the report. "The actor also likely used the desktop sharing software TeamViewer to gain unauthorized access to the system."

The hacker was able to use remote access software to raise the levels of sodium hydroxide in the water from about 100 parts per million to 11,100 parts per million for a few minutes, according to investigators. Sodium hydroxide is used in liquid drain cleaners and used, in small doses, to remove metals from water.

A plant manager who noticed the hack as it unfolded was able to return the system to normal before any major damage occurred, investigators said. The public was never in danger because it would have taken 24 to 36 hours for tainted water to hit the system if no one had intervened.

The FBI and other law enforcement agencies are still trying to determine who was behind the hack and any possible motives. It's unclear if the suspects were foreign or domestic, sources close to the investigation told ABC News. Investigators said they're concerned the culprit could strike again -- and the outcome could be far worse.

The FBI memo urged information technology administrators to make sure computers are up to date and that passwords are secure.

"Microsoft, the FBI, and other industry professionals strongly recommend upgrading computer systems to an actively supported operating system," the memo said. Not doing so "presents vulnerabilities for cyber actors to exploit."

On Thursday night, the Cybersecurity and Infrastructure Security Agency (CISA), the FBI and the Multi-State Information Sharing center issued an alert on the water plant hack.

They said that while no real damage was done, companies and governments should to stop using Windows 7 out of an abundance of caution, as it could be compromised.

"Windows 7 will become more susceptible to exploitation due to lack of security updates and the discovery of new vulnerabilities. Microsoft and other industry professionals strongly recommend upgrading computer systems to an actively supported operating system," the agencies wrote in the alert.

They added that the threat isn't a new one, as they've observed others using "desktop sharing software to victimize targets in a range of organizations, including those in the critical infrastructure sectors."

In the alert, the agencies also offered recommendations for internet users -- especially those who use Teamviewer, the software the water treatment plant used, which creates random passwords for login -- such as using two-factor verification and keeping logs of the people who use each system.

Environment Agency – new consultation on water stress to inform decisions on compulsory metering by water companies

The Environment Agency (EA) has today launched a new consultation on its approach to determining areas water stress to inform decisions by water companies on whether they can introduce compulsory metering in those areas.

The consultation sets out the Agency's latest method and initial outcomes for determining areas of water stress in England. The determination is specifically to inform whether water companies, in areas of serious water stress, can consider charging for water by metered volume for all customers. Compulsory metering is one of the options they can consider in their water resources management plans to manage water supplies.

Introducing the consultation, the EA commented:

"A lot has changed since we last revised the classification in 2013. The National Framework for Water Resources and water companies' water resources management plans (WRMP19) were published in 2020. Using the latest data from these plans has improved our understanding of water resources needs. This includes the impact of climate change, pressure on the environment and how to meet the challenges they create. Water stress applies both to the natural environment and to public water supplies. Both will be affected by climate change. Public water supplies are under pressure from reductions in abstraction to make them more environmentally sustainable. There is also a need to make public water supplies more resilient to droughts and meet additional demands associated with development and population growth."

"The determination will show where we believe there are or, are likely to be, environmental impacts caused by public water supplies or the need for major water resources developments. It will indicate where these could be reduced by improving water efficiency through metering."

Water stress is defined in regulations - the Water Industry (Prescribed Conditions) Regulations 1999, amended in 2007, as where:

'The current household demand for water is a high proportion of the current effective rainfall which is available to meet that demand. Or, the future household demand for water is likely to be a high proportion of the effective rainfall which is likely to be available to meet that demand'.

Water stress assessment method takes a long-term view

The Agency said that rather than taking a snapshot of shorter or peak periods, its proposed water stress assessment method takes a long-term view of the availability and the demand for public water supply and accounts for:

- future population growth
- climate change
- environmental needs
- increased resilience

According to the EA, it also reflects and supports the commitments that water companies have already made to reduce leakage and water consumption.

The consultation paper explains that as water supplies come under increasing pressure, there is a need for water companies to better manage the volume of water they distribute. To help with this, water companies in areas which are under serious water stress are able to charge all customers for the volume of water used. Advice from the Environment Agency enables the Secretary of State for Environment Food and Rural Affairs to determine which water companies are in different levels of water stress taking Minister Rebecca Pow asked the Agency in November 2020 to update its advice. The EA said it is using the latest available evidence to review how we identify the areas of England that have different levels of water stress, including interim water resources position statements produced by regional groups and information in WRMP19 produced for the National Framework for Water Resources published in 2020.

Key questions include:

- Do you think that the approach using water available for supply, environmental needs together with future demand for water effectively supports the determination of areas of water stress in England? If not how could it be improved?
- Do you agree that the proposed classification results effectively reflect the levels of water stress in England for the purpose of metering? If not, why?
- What is the right size of area for the classification of water stress?
- Do you agree that classifying water stress according to 2 levels, serious and not serious is still the right approach?
- Are there any water company areas you would like to be included or excluded?

The Agency will use the results of the consultation to revise its approach if required and then advise the Secretary of State of its recommendations on which areas they should determine as areas of serious water stress. The Secretary of State will then decide on which areas should be determined as an area of serious water stress.

"Climate change will have a significant impact on flows and water availability by 2050"

A separate Appendix published alongside the consultation paper says that climate change will have a significant impact on flows and water availability in 2050. Under the climatic scenario used by the EA the north east, north west and the south west would see the greatest change in low surface water flows. While the south east would be less affected due to its geology and the buffering capacity of groundwater in the region, it would also see a decrease in natural flows in most catchments by 2050. It also says that at low flows there would be no surface water available for abstraction in the north and west without reservoir storage and very limited water available across most of the south and east. Deadline to submit responses to the consultation is 11th March 2021.

Cleaning up CSOs with better monitoring and stronger policy

New measures to address combined sewage outfalls are set to have a big impact on UK water quality with a big increase in monitoring a key first step. Although designed as an emergency measure for extreme weather events, discharges from combined sewage outfalls (CSOs) are becoming far more regular in the UK. Under the influence of climate change, increased urbanisation, and limited infrastructure investment, CSO discharges have occurred some 3000 times over the last year in the UK, according to research from the campaign group Surfers Against Sewage (SAS). The latest development has seen a new objective to prevent damage from storm agreed between a joint industry and UK government taskforce, comprising Defra, the Environment Agency, Ofwat, Consumer Council for Water, Blueprint for Water and Water UK overflows. As part of this goal, water companies are to increase transparency around when CSO storm overflows are used at bathing sites. Part of the River Wharfe in Ilkley will be the first UK river to be designated as bathing water when it is added to the list this year and will therefore be monitored far more closely under the new regime.

“We’ve seen bathing water quality applications at Ilkley and other inland sites across the UK,” said Tom Williams, CEO and founder of water technology and innovation consultancy Enebio.

In addition, the task force has agreed with water companies that they will publish annual monitoring data on the use of CSOs. This data will make it possible to record progress in reducing such discharges. Under the terms of the plans, the Environment Agency will compile this data into an annual publicly available report. Water companies will have to publish on their websites each year. Having agreed to make real-time and annual data on CSO discharges available year-round, water companies have also made a commitment to accelerate on the installation of monitoring devices.

This massive expansion of the monitoring programme should allow a complete picture of CSO activity to be available by 2023.

To put the current situation into perspective, only around 7000 of the 17,000 CSOs across the UK have any kind of monitoring. Water companies are responsible for ensuring serious water pollution incidents do not occur, and they have committed to a significant programme of improvements to CSOs over the next five years at the cost of around £1.1 billion. Since 2010, 884 storm overflows have been improved with a further 798 improvements planned for the period 2020 – 2025. However, Surfers Against Sewage said that three of the seven water companies in England “do not provide year-round information outside of the official bathing season”.

“Publishing easily accessible data is an important step to reversing the overuse of storm overflows, but disclosure is only ever the beginning. People want to see progress,” said Emma Howard Boyd, chair of the Environment Agency.

Amy Slack, head of campaigns & policy at SAS, said there needs to be rapid action from government, business and regulators. She called for an enhanced regime which would see water companies “provide real-time monitoring information for all discharges, not just those which discharge into bathing waters”. This could include all discharges into rivers and other inland waters. This cautious welcome was also echoed by other environmental NGOs.

“Ending pollution from sewage overflows would be a great boon for people and wildlife,” said Mark Lloyd, CEO of The Rivers Trust, which also campaigns for an end to sewage pollution in rivers and lakes. “The current level of spills is unacceptable and has contributed to the UK failing to meet water quality targets.”

Williams data being made available in the public domain will ensure educated decisions can be made.

“The key is the information,” he said. “Once we’ve got that there will be pressure on water companies to address these issues. What we’re going to see is pressure to deal with, certainly, the more serious CSOs.”

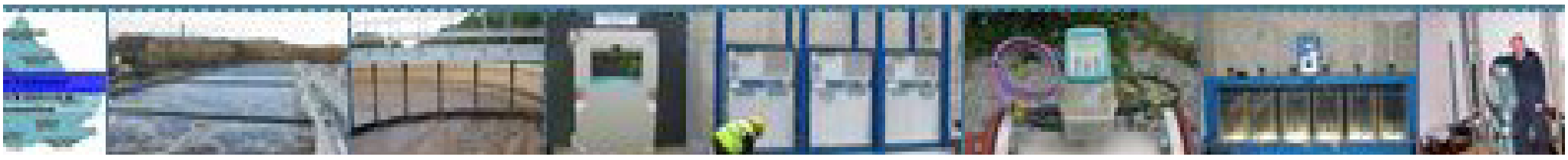
Hailing the new measures as an important step towards greater transparency by government and water companies, Lloyd noted that it nonetheless falls short of explaining how the government will meet the objectives of the taskforce in the long term. The latest move to protect both inland and offshore water quality comes as the Sewage (Inland Waters) Bill has been delayed for a second time following the global pandemic. The Bill, introduced by Conservative Party MP Phillip Dunne, was due to be voted on by MPs earlier this month. This required progressive improvements in infrastructure and revoked the automatic right for new developments to connect to the sewage system.

“Poor water quality has a very damaging impact on aquatic species which depend on clean rivers, and risks healthy enjoyment of our rivers by the public. I am really pleased this government has recognised that this has got to change.It's very disappointing that the Bill has been delayed yet again, but this issue is not going away, parliament is listening, the government is listening, and even water companies are starting to listen," said Henry Swithinbank, Policy Officer at Surfers Against Sewage.

This is a point picked up by Williams, who says: “There's large cross-party support so it will be driven through, but how do we actually achieve the goals in the Bill. We're still gathering our experts." The Environment Bill, introduced in late 2019, is a second Bill that is also expected to place a statutory requirement on water companies to produce drainage and sewerage management plans, among other measures to protect water resources from pollution.

However, this Bill has also been delayed in its passage into law. The Storm Overflows Taskforce was set up in August 2020 to bring together water companies, regulators and environmental NGOs to accelerate progress on clean water. “Water companies are passionate about protecting and enhancing our nation’s rivers, and over the next five years we will invest £1.1 billion in improving storm overflows as part of our £5 billion environment programme,” said Christine McGourty, chief executive of Water UK. Even so, Lloyd noted that this problem could not be overcome by water companies alone, nor by simply monitoring, adding "we need a holistic approach that involves a wide range of organisations and sectors to manage stormwater and waste more intelligently”.

However, while legislation is still on the back burner for now at least, measures from the task force that will see increased monitoring are clearly a significant step forward to improving water quality.



Open Data Can Open Up Opportunity

An open data approach can help water utilities drive efficiencies across their entire operations, says Matthew Hawkridge, chief technology officer, Ovarro

Advances in digital technology mean that siloed data from legacy IT systems within water utilities can now be more easily shared across many platforms. Utilities and municipalities have much to gain from opening up their data and a roundtable discussion at the World Water-Tech Innovation Summit on 23 February is an exciting opportunity to explore the potential an open data approach offers.

Asset data, usually held in an asset management system, can be blended with data from many other sources to generate deeper insights into infrastructure, operations, investment and even customers and human resources. Along with operational data from SCADA systems, data from GIS, leak detection, weather stations and business information systems can be combined to provide true situational awareness in real time.

This richer databank can identify not only cause and effect in many areas of business and operations, but also determine what is likely to happen in the future. Such insights can drive efficiency on many fronts, for example, in scheduling predictive maintenance. Accessing alarm data on water networks has certainly helped advance Ovarro's thinking and innovation in this area.

Of course creating a more comprehensive and effective databank also makes it more valuable. The water sector is custodian of critical infrastructure and resources, so it is essential that while data is made available, that is done securely so that sensitive information does not fall into the wrong hands.

Optimatics Appoints Joshua Cantone As New CEO

International water and wastewater utility software company Optimatics has appointed Joshua Cantone as its new CEO. Corey Williams, the company's President and Founder, will move on to an endeavour outside the SUEZ family of companies after 8 years at Optimatics. Dr. Cantone previously held the position of Optimatics' COO.

In his years at Optimatics, Dr. Cantone has been a critical part of the company's growth, especially in leading the transformation of Optimatics' business processes and developing relationships with clients and companies across the globe. In his role as CEO, Dr. Cantone will continue to grow and lead Optimatics within SUEZ Smart and Environmental Solutions.

"I'm honoured to follow in the footsteps of a great leader and mentor," said Joshua Cantone about his new position and predecessor, Corey Williams. "Corey has played an integral role in the growth and evolution of Optimatics; I can't thank him enough for his support and confidence. I look forward to leading Optimatics to success in 2021 and beyond."

Previously, Dr. Cantone attended the University of Adelaide in South Australia and the University of Illinois at Urbana-Champaign. He is currently enrolled in the EMBA program at the University of Chicago Booth School of Business; he also serves as an Adjunct Senior Lecturer at the University of Adelaide.

Vancouver-based firm Copperleaf wins second UK water sector client

Affinity Water has selected a decision analytics solution to optimize its investment planning from Cananadian-headquartered firm Copperleaf.

Copperleaf® will provide Affinity Water with a value framework to objectively compare projects, programs, and portfolios, and identify the optimal investment strategy within the bounds of its operational and regulatory performance requirements. The solution will also help ensure investment decisions are aligned to Affinity Water's strategic goals and commitments.

The contract is the second win in the UK water sector by Copperleaf, which is based in Vancouver, BC. Anglian Water selected the Copperleaf® Decision Analytics Solution in late 2015 and went live in March of 2017.

Commenting on the new contract, Stefan Sadnicki, Managing Director for Copperleaf in Europe, Middle East and Africa (EMEA) said:

"We are excited to welcome our second client in the UK water sector to the growing Copperleaf Community."

"Our solution will enable Affinity Water to collaborate, control and manage the investment planning process, and create a living plan, which will greatly simplify its regulatory submission process."

Copperleaf provides enterprise decision analytics software solutions to companies managing critical infrastructure. The company is a member of The Institute of Asset Management and actively participates in a number of standards committees and industry associations to help shape the future of asset management standards, including ISO 55000.

Sarah Sayer, Investment Planning Manager, Affinity Water said:

"We are delighted to be working with Copperleaf to enhance our investment planning and portfolio optimization capability," said "We are confident that the Copperleaf solution will support and inform our decision making by allowing us to balance trade-offs between costs, risks, and performance to deliver maximum value for our customers."

The largest water-only supplier in the UK, the company provides approximately 950 million litres of water each day to a population of more than 3.6 million people in parts of Bedfordshire, Berkshire, Buckinghamshire, Essex, Hertfordshire, Surrey, the London Boroughs of Harrow and Hillingdon and parts of the London Boroughs of Barnet, Brent, Ealing and Enfield.

Yorkshire Water - smart network pilot could be 'game-changing' for leakage and customer bills

Yorkshire Water is carrying out the UK's most advanced smart water network pilot in Sheffield and has so far installed almost 2000 upgraded meters and reduced leakage in the area by more than 90,000 litres per day.

The innovation pilot is a collaboration of 18 partners using state of the art technology such as acoustic loggers, pressure loggers and flow meters to monitor for leaks on the water network. The pilot dashboard monitors for abnormalities and flags it to Yorkshire Water technicians to investigate.

Early findings have shown 32% of all leakage coming from just 1% of properties in the metered area, suggesting that there are sometimes large leaks that customers are unaware of. Such leaks are often found on pipes on their way into buildings or in bathrooms – with data showing that almost 1 in 10 Yorkshire Water customers likely to have a leaking toilet that they are unaware of.

Working closely with properties in the pilot area, the water company has helped customers to fix issues and, as a result, reduced leakage by 92,160 litres a day.

If the pilot is successful, smart water networks will revolutionise the way leaks and interruptions to supply are managed by Yorkshire Water and could help water companies save millions of litres in reduced leaks.

Martyn Hattersley, head of leakage operations at Yorkshire Water, said:

"We're always looking to take advantage of new technologies to assist us in continuing to reduce the amount of water lost through leaks.

"The smart network pilot we're currently running has seen some game-changing results. Insights from the pilot area will help us in targeting efforts to save water from being wasted – which in return, protects the environment and saves customer's money on bills."

Emasesa will integrate all its SCADA systems into an advanced operational intelligence platform

Emasesa begins its journey in Industry 4.0 with an emblematic technological project that will integrate the 6 SCADA systems used by the company for the real-time supervision and control of all the facilities into a single SCADA platform.

The project is configured as an Operational Intelligence platform with advanced data analysis capabilities that contemplates not only the unification of multiple control applications, distributed in a new SCADA system with centralised management but also many of the latest trends in the environments of the Operation Technologies (Layers 7 of operation and maintenance in the BIM model, visualisation of the application in a GIS environment, automation of communication and information flows, pre-production environments for testing and maintenance of applications, implementation of change control systems and management of the integral cycle of assets). This is a highly complex initiative that will facilitate alignment with the company's requirements for optimal asset management, high availability and security, all within a context of special attention and care for resources and the environment.

The project has been awarded to the Aquatec (SUEZ) - ICR joint venture) and the execution period is set at 3 years. During the same, the different existing supervision systems will be integrated into a SCADA 4.0 with Wonderware Archestra technology that will optimise the management of processes and alarms. The platform will be focused on support cost efficiency and effectiveness in the development of industrial control systems engineering with a single project standard for the whole of Emasesa. Continuous real-time monitoring of processes and operations through advanced analytics will enable the identification and detection of unwanted situations that could correspond to interruptions, failures or bottlenecks in daily operations. The new operational intelligence platform will enable operations to focus on the intelligent analysis of processes, allowing decisions and actions in operations to be based on real-time data.

Autodesk to acquire water infrastructure software maker Innovyze for $1 billion

Autodesk Inc. ADSK, -0.09% said Wednesday it has agreed to acquire Portland, Oregon-based Innovyze Inc., a provider of water infrastructure software, for $1 billion. There are currently more than 2 billion people who lack access to safe drinking water and more than two-thirds of the world population is expected to live in water-stressed regions by 2025. "An estimated $1.9 trillion is required to address global water infrastructure needs by 2030, and by fundamentally changing the way systems are designed, constructed, and operated, we are best positioned to overcome this challenge and realize the better world we've imagined," Autodesk Chief Executive Andrew Anagnost said in a statement. The deal is expected to close in the first quarter of fiscal 2022, ending April 30.

Water engineering expert launches new £10 million European water systems project

A University of Exeter academic is set to receive a share of £10 million pounds of funding for a six-year European research project, looking at designing the next generation of intelligent urban drinking water systems.

Professor Dragan Savic, a Professor in Hydroinformatics at the University of Exeter and CEO of KWR Water, has been awarded the grant by the European Research Council (ERC) to fund four leading scientists across the continent to reliably secure the drinking water supply in cities despite rising water demand.

The researchers are developing new technological methods for this purpose.

Professor Savic said: “I’m very excited about the Water Futures Grant. This collaborative project allows me to contribute to research that has a far greater impact than a single-disciplinary study.

“Given the importance of drinking water to people in both developed and developing countries, our interdisciplinary team of researchers will focus on the next generation of smart water infrastructure.”

The research, entitled: "Smart Water Futures: Designing the Next Generation of Urban Drinking Water Systems”, is part of the ERC Synergy Grant, awarded to a group of two to four excellent young researchers or established active researchers with outstanding scientific achievements.

The other three researchers working with Professor Savic are: Barbara Hammer, Professor of Informatics at Universität Bielefeld; Phoebe Koundouri, Professor of Economics at Athens University of Economics and Business - Research Center; and Marios Polycarpou, Professor of Electrical and Computer Engineering at Cyprus University.

The project will start mid-2021 and run for six years

Game-changing sewer tech trial to reduce pollution caused by blockages

New intelligent sewer technology is being pioneered by Thames Water in Henley-on-Thames in a game-changing drive to prevent pollution from blockages caused by cooking fat and wet wipes. As a digital leader in the industry, Britain’s biggest water company is trialling the next generation of ‘sewer level monitors’ which send data to help pinpoint emerging problems before they grow into blockages that can cause flooding and pollution. More than 300 smart devices have just rolled off the production line and are being put to the test in real-world conditions in Henley, and West Ham and Harlesden in London. If successful, there’s then the potential for a bigger trial later in the year.

In 2017 a huge fatberg was found under Hart Street in Henley town centre. The road was closed for several days as Thames Water engineers successfully cleared the blockage. Backing the trial, Henley town and county councillor Stefan Gawrysiak said: “Anything that will indicate that there’s a blockage or fatberg building up has got to be a good thing. Digging up the road is hugely disruptive to commerce and transport, and from my science background it sounds like an incredibly good, technological, solution.”

The upgraded monitors are fixed under manhole covers and measure the depth of wastewater underneath. Rising water can signal a blockage is forming in the pipe, normally caused by fat poured down the sink or wet wipes flushed down the toilet. Blockages can also be caused by debris and tree roots. Compared to older monitors, the new devices will help Thames Water build a digital model of the network in the trial zones, giving a much clearer picture of what is happening underground. The older monitors are also much bigger, meaning they don’t fit into all types of pipes. If levels begin to rise, an alert is triggered at Thames Water’s control centre in Reading so engineers can work out the best plan of action, including sending a team to the scene to clear the blockage before it impacts customers or the environment.

The monitors are another example of the tech Thames Water is embracing in the fight against leaks and pollution. In November, it was recognised as one of the country’s leading digital companies after winning four titles at two prestigious IT industry awards.

Anna Boyles, Thames Water operations manager, said: “We’re industry leaders in harnessing the latest digital tech to find and fix blockages and leaks before they affect customers or the environment. “These new sewer level monitors are the very latest bits of kit – they’ve only just come onto the market. They have a longer battery life, are smaller and easier to install. The data they provide will give us a much better picture of what's happening in our sewers and will help us to nip blockages in the bud before they cause problems.”

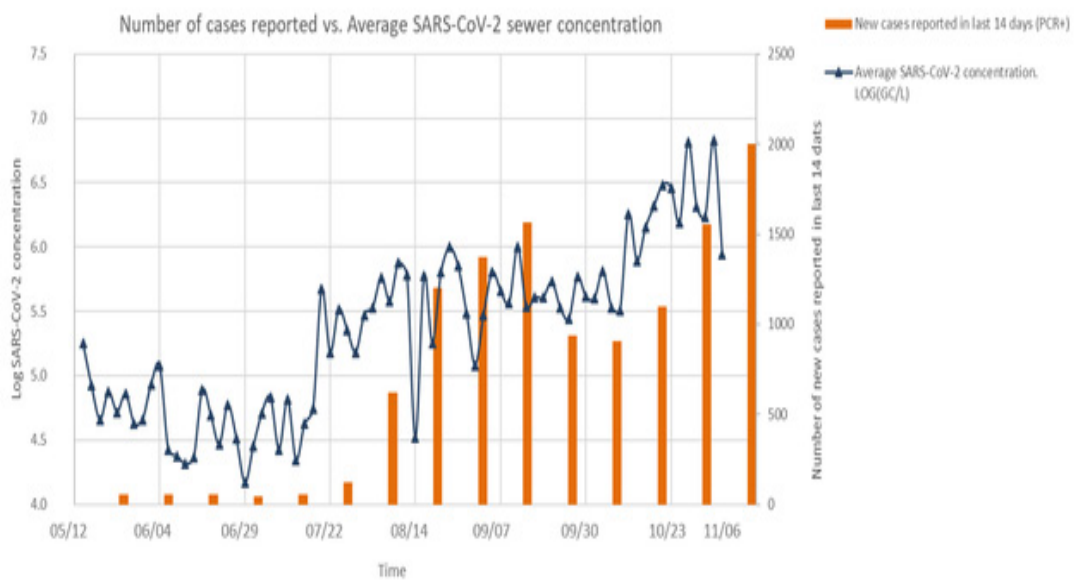
On average, Thames Water spends £18 million every year clearing 75,000 blockages from its sewers, unclogging five house blockages and removing 30 tonnes of material from just one of its sewage works every day.

GoAigua, Is Helping Communities In New England Stop The Spread

Community testing for COVID-19 has become a hot topic in the last months, especially when looking at wastewater. Since March 2020, some of Europe's largest cities have been implementing widespread surveillance systems that are efficiently testing entire cities every day, at a neighbourhood and even building level, by detecting traces of the virus RNA in wastewater. GoAigua, the leading European player in wastewater-based epidemiology, has been helping over 20 cities in Europe and performed over 20,000 tests this year to provide communities with a reliable and anticipated source of community infection assessment.

With the help of GoAigua, the Spain-based Smart Water Company and Utility Operator, cities like Madrid, Seville, or Valencia implemented sewer surveillance programs that divided the city's sewer systems into smaller catchment areas down to the thousands of residents. By testing almost every day, GoAigua provided health officials with community infection trends and prevalence. Today, amidst the widespread wave of infections in the continent, they are even targeting specific buildings and combining the methodology with pooled saliva testing to anticipate the virus from spreading. For example, since November they have been testing wastewater from more than 400 nursing homes on the Mediterranean Coast of Spain. If the analyses return positive, they alert their personnel and they proceed to test the entire population and isolate infected patients – something they cannot simply do every day due to the lack of testing resources.

The Smart Water Company went beyond analysing the virus in wastewater and developed a web-based platform that is helping these cities integrate real-time information from different sources. For example, they combine wastewater results, with water consumption levels, flow sensors, and rain data, which allow them to normalize the results for example when rain episodes take place. They also integrate demographic, socioeconomic, and health information at a block level, allowing communities to deploy targeted actions in those communities with a higher infection rates and lower access to health, or a higher proportion of elderly.



As an example, the City of Valencia, Spain's third largest city with a population of approximately 1.5 million, is using GoAigua's analytics solution to continuously monitor the concentration of coronavirus per litre water in 30 primary catchment areas and 20 secondary ones, which in combination with other parameters can be normalized to predict the prevalence of the virus in each neighbourhood. The solution also provides information about nursing homes, available hospital beds, and average income, which is of great help to the city's health officials as they make resource decisions on a daily and weekly basis.

Thanks to this revolutionary tool, health officials are getting a near-real-time picture of how the virus is spreading in the cities' neighbourhoods. They are anticipating official data up to a week, taking granular action proactively, and saving millions of Euros in PCR testing for the population as they direct testing to the most affected areas – and what is most important, lives.

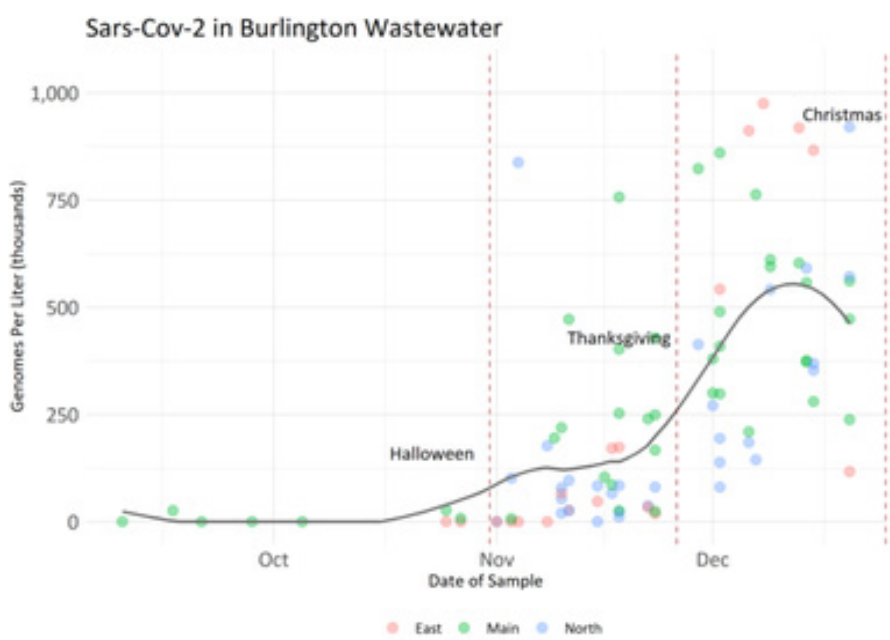
In the United States, GoAigua is already helping communities in New England with their wastewater surveillance plans. For example, the forward-thinking City of Burlington, Vermont, has already been working with GoAigua since early October to use all this data and translate it into action.

With the help of GoAigua, Burlington split the sewer system into 6 areas with similar population and started generating data with their platform. The tool helped the City detect several outbreaks that took place shortly after Halloween and Thanksgiving – and identify in which area of the city it was taking place. Mayor Weinberger is constantly updating the data in the City's website, and the City also deployed popup testing targeted at those places where the concentration of the virus and the vulnerability of the population was higher (link here: https://coronavirus-response-burlingtonvt.hub.arcgis.com/pages/wastewater-monitoring). To date, Vermont is the state with the lowest case count relative to total population in the entire United States. Burlington and GoAigua are emphasizing protecting high-risk residents by closely monitoring key areas such as nursing homes.

"After a competitive proposal process, the City of Burlington selected GoAigua to implement this phase of its wastewater-based epidemiology program because of their proven expertise in water, wastewater, and analytics. Their data-centric platform creates actionable, real-time insights that will help us make informed decisions to keep our residents healthy during this difficult time," says Brian Lowe of the City of Burlington's Innovation Office.

This program is integrated with other city-level actions and initiatives to keep the population of Vermont's largest city safe. This program has been scaled up quickly to ensure it is in place before the winter months, given expert opinion that the coming months may be exceptionally dangerous with the combination of COVID-19 and the seasonal flu.

Since the early days of the pandemic, GoAigua has been rapidly deploying this program in cities around the world. To date, GoAigua is monitoring over 10 million citizens in over 20 cities and has the largest global wastewater-based epidemiology program in operation.



Olea Edge Analytics expands partnership with City of Atlanta

Olea Edge Analytics, an intelligent edge computing platform for the water utility industry, announced an expanded $3.9 million partnership with the City of Atlanta - Department of Watershed Management that is expected to recover millions of dollars in revenue for the utility by monitoring high-value water meters.

The partnership between Olea Edge Analytics and Atlanta began in 2018 as a pilot program that placed Olea Edge Analytics sensors on 20 meters. Those sensors identified malfunctioning high-value water meters and helped the Department of Watershed Management executives prioritize repairs. In three months, Olea had found over a million dollars in recoverable revenue for the water department.

Encouraged by those initial results, the program grew to 700 meters, with Atlanta devoting $1 million to the project. In less than 12 months, the program identified $10 million in potential revenue.

For the latest phase, Atlanta's City Council has approved legislation to add 1,600 additional Olea endpoints. The project is expected to recover tens of millions of dollars that can be better used for other infrastructure-related projects.

"Atlanta has been at the forefront of incorporating innovation and technology into business practices," said Dave Mackie, Olea Edge Analytics' CEO. "Having the ability to utilize the abundance of data Olea's solution allows for more informed decision-making regarding asset management for Atlanta's commercial and industrial meters. Olea's Meter Health Analytics helps utilities recover revenue, which is vastly important during a time when many municipalities are experiencing revenue shortfalls."

Large commercial and industrial water meters can represent 40%-60% or more of a utility's annual revenue. And under normal conditions, commercial water meters can lose accuracy by more than 10% per year. The meters are large, difficult to maintain or replace, and can fail at any time regardless of age or cumulative service volume. Working with Olea Edge Analytics, water utilities can optimize metering and associated services to ensure revenue for delivered water is fully realized.

MWH uses Bluesky modelling tech to drive efficiency in water construction

MWH Treatment is using the latest 3D computer modelling technology to improve the delivery of major construction projects across the UK. Created by aerial mapping company Bluesky International, models are used throughout the lifecycle of projects; from the production of animations at the concept stage right through to Virtual Reality (VR) simulations for health and safety training.

Derived from the most up to date and accurate aerial photography the 3D models are helping MWH Treatment drive efficiency and collaboration and have already been used on a number of developments including the Winchburgh upgrade works for Scottish Water and Thames Gateway Desal upgrade for Thames Water.

"The Bluesky 3D models provide us with a crucial understanding of locations we are working in," said Stephen Kennedy, head of digital & innovation at MWH Treatment. "They provide initial site intelligence and inform true visualisations for our Visual Project Initiation activities - part of the concept and planning stage of most projects. We also use the 3D detail to facilitate collaboration, concept design and planning and, by taking the data into other platforms, as the basis of our design."

A leading Design and Build water sector solution provider with a 200-year legacy, MWH Treatment converts and incorporates the Bluesky models into a range of software packages including gaming, engineering and collaborative planning solutions.

The data creates the project backdrop, providing context for animations and interactive applications. Reducing the processing time and manual resource required to create sites features such as trees, building and roads, sections of the Bluesky models can also be removed or enhanced to incorporate new design and survey information.

"The final outputs of the Bluesky models are integrated with our digital tools to enhance workflows including animations, still images, 3D CAD models and interactive applications and VR experiences. Used to engage the engineering and construction teams, as well as the client, at key stages this drives efficiency and promotes safe systems of working and collaboration," added Clare Kovacs, National Rehearsal Lead, at MWH Treatment. "The Bluesky models are cost effective and easy to acquire and the team behind them is approachable, efficient and helpful with a dedicated point of contact."

Photogrammetrically derived from stereoscopic aerial photography, the Bluesky models are fully rendered and are provided as either wireframe or block models in a format suitable for use in both CAD and GIS software. All Bluesky 3D models are supplied complete with a Digital Terrain Model (DTM) depicting the topography of the underlying surface.

Workshop recap:

Overcoming Pollution with Data & Collaboration

On Feb. 18th, 2021, over 400 participants tuned in to a virtual SWAN-WIPAC Workshop sponsored by Siemens to discuss "Overcoming Pollution - From Monitoring to Solutions." The event opened with a keynote address by UK Member of Parliament Philip Dunne, who recently introduced a Private Member's Bill to address sewage river pollution and water quality issues in the UK. Mr Dunne felt there was a timely opportunity to leverage political legislation to improve water quality and make a sustainable, environmental and public health impact.

Our keynote speaker Rt Hon Phillip Dunne MP

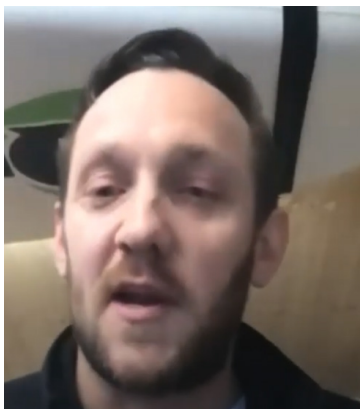
Although Parliament has not yet convened to pass this bill, Mr Dunne pointed out that currently available technologies should provide accurate pollution data and be accessible to the public. Currently, 135 MPs support the bill and it has widespread support from the NGO community, water companies, and regulators.

Throughout the Workshop, two key themes emerged from the diverse global perspectives:

1. Educating the Public to Promote Behavioural Change

The role of educating the public on the causes and impacts of pollution, leveraging citizen science and pollution data, to promote accountability and transparency to reduce pollution at the source.

During the first panel, Helen Wakeham, Deputy Director at the UK Environment Agency (EA) highlighted the importance of understanding the systems that need to work. She stated, what worked 30 years ago does not necessarily work today, and we can assume will not work in 30 years. The panel emphasised that the challenge is not only finding the right technology but understanding the cultural perceptions and implications on water pollution. Pernille Ingildsen, Project Manager at Hillerød Forsyning (Denmark) who is also the author of Water Stewardship, claimed that water is a "personal matter," but is often cloaked by technical jargon making it more difficult to resonate with the public. She shared that her water company recently completed a cost analysis to achieve zero sewage overflow which would cost 300 Million Euros over the next five years, and they have already pledged 70 Million Euros to demonstrate this isn't an eternity issue and could be resolved in our lifetime.



Dr Nick Mills, Pollution Manager at Southern Water

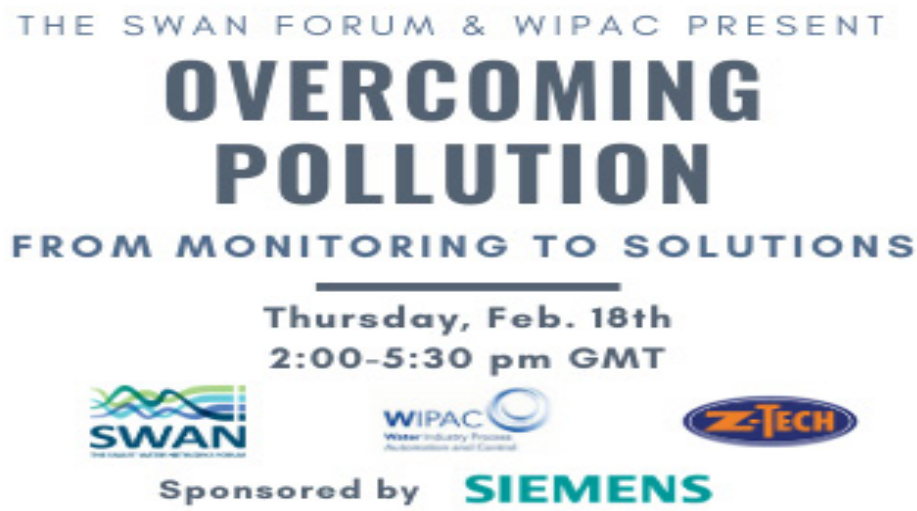
Dr Pernille Ingidlsen from Hillerod Forsyning

Nick Mills, Head of Pollution & Flood Resilience at Southern Water (UK), agreed there has been a general improvement in targeting regional investments, but that there also needs to be an improvement in analysing and interpreting data for effective decision-making. Reese Johnson, the Superintendent at the Metropolitan Sewer District of Greater Cincinnati, suggested that water companies should meet the public where they are in terms of their connection to water, (e.g., communities where children play in streams or families fish). Helen added that without proactive public discourse, regulations will be led by single-interest groups which might divert away from source control. Despite all the investments in technology, the public needs to play a larger role in the issue, which could be resolved at the source.

2. Overcoming Pollution with Data and Collaboration

Maximising the use of data (and ensuring data quality and validity) through collaborative processes to make the case for holistic investments and innovations.

The second Workshop panel, led by David Butler from the University of Exeter focused on data-driven solutions to the pollution problem. Rob Whittaker from the EA suggested that by processing overflow data, the EA can provide increased awareness, transparency and accountability for high spill frequencies and encourage more insightful regulations. Neeraj Shah, a Data Scientist at Siemens, discussed the process of developing a new innovation. In collaboration with the



University of Sheffield, Siemens was able to gather insights and build confidence in a new sewage overflow monitoring solution but noted that innovation does not end there, the collaboration must continue with the water company and their stakeholders. Dr Emma Harris, Head of the Smart Hub at Welsh Water also emphasised the importance of continued collaboration to achieve tangible results. Due to its climate, Welsh Water receives more rainfall than other areas of the UK which affects its assets. As a result, Welsh Water started a significant risk analysis programme and improvements to data governance (e.g., integrating OT with datasets), also referring to the SWAN 5-Layer Model to predict and identify risks early on. Lastly, Arun Mahadevan, a Senior Engineer at the Public Utilities Board (PUB), Singapore's National Water Agency shared that working with a technology vendor, PUB has created an innovative dashboard to account for flow, rain, and operations to understand real-time catchment data and develop a Digital Twin to increase efficiency. The panel unanimously agreed that data quality is fundamental for a solution to scale and achieve the best results.

This Workshop strengthened our view that while data-driven insights and innovative technologies are improving the water companies' capacity to monitor pollution challenges, to truly address this problem the focus should be on prevention by leveraging data transparency and promoting stakeholder education at the source. Taking a collaborative and integrated approach is critical to achieving cleaner and resilient smart stormwater systems.

Brownfield digitalisation in line with NOA

Industry 4.0 concepts are comparatively easy to realise when building new industrial process systems. But when it comes to brownfield systems that have always operated with the 4…20 mA communications standard, plant operators have difficulties to convert. The Fieldport SWA50 communications module designed for HART-capable instruments can establish a bridge to digital signal transmission without burdening the existing communications channels or impacting the system architecture.

Data is the foundation of Industry 4.0. Connectivity is one of the basic prerequisites for making it available. The challenge facing plant operators in Germany is that most of them have been operating their systems for years or even decades. As a result, they find themselves stuck in brownfield environments. This is also why Namur developed the so-called "NOA – Namur Open Architecture" and adopted the corresponding NE 175 Namur recommendation. The basic idea of the "Namur Open Architecture" is as simple as it is captivating: the transmission of additional digital data from the field level is carried out in parallel to the transmission of the measurement values across a second communications channel. This approach minimises the amount of additional data traffic and the impact on existing system architectures.

NOA as bridge technology

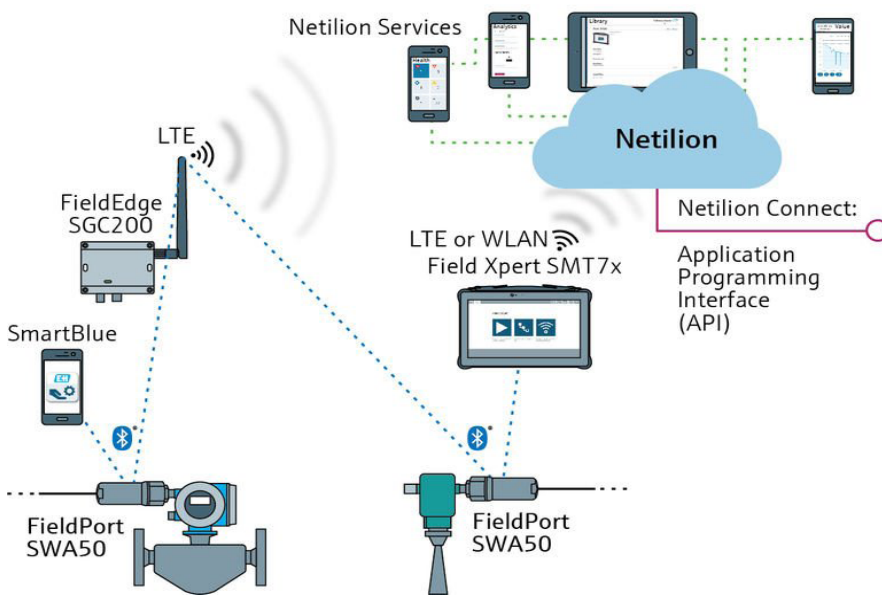
NOA serves as an important bridge technology from the strict hierarchical structures of Industry 3.0 to the fully connected, digital Industry 4.0 environments. Implementing parallel data transmission as an extension makes it ideal for existing systems. Today, 97 % of data from field instruments is not utilised. Existing systems thus contain a huge amount of potential that could be tapped into through digitalisation. It also offers users an opportunity for permanent asset monitoring since instruments can be clearly identified and the configuration parameters and correct layout reflected in the "digital twin." Thanks to state-of-the-art diagnostic functions, the health condition of smart sensors can be permanently monitored.

The second channel NOA concept provides service and maintenance personnel direct access to condition monitoring while reducing the volume of data in the core processes. Digitalisation furthermore enables comprehensive asset management and process optimisation through the additional analysis of monitoring data. To realise the NOA concept in practice – for both new (greenfield) and existing (brownfield) plants – Endress+Hauser now offers a clever and simple solution with the Fieldport SWA50.

Wireless adapter transmits HART signals

90 % of Endress+Hauser field instruments already feature a digital interface, including fieldbuses such as Profibus or Foundation Fieldbus, in addition to HART, the most common technology. In practice though, the HART signal is not utilised in most environments. With the Fieldport SWA50 wireless adapter, all HART signals can be transmitted parallel to the measurement values, including those from third-party manufacturers. The Fieldport SWA50 is intrinsically safe (Ex ia), loop powered and can be easily retrofitted to work with HART instruments from any manufacturer.

The HART signals can then be transmitted to the cloud via WirelessHART or Bluetooth. If Bluetooth is used, transmission is carried out via the Fieldedge SGC200 direct into the Endress+Hauser Netilion cloud. This provides users access to the entire range of Netilion services such as Netilion Analytics, Netilion Health and Netilion Value, which enable features such as condition monitoring and the remote display of measurement values. And with the Smartblue app, users can remotely configure the field instrument parameters. In another step, the data can also be transmitted to customer-specific clouds or ERP solutions via an application programming interface (Netilion Connect). With WirelessHART, connectivity occurs via the Endress+Hauser Fieldgate SWG70 and the Fieldedge SGC500.

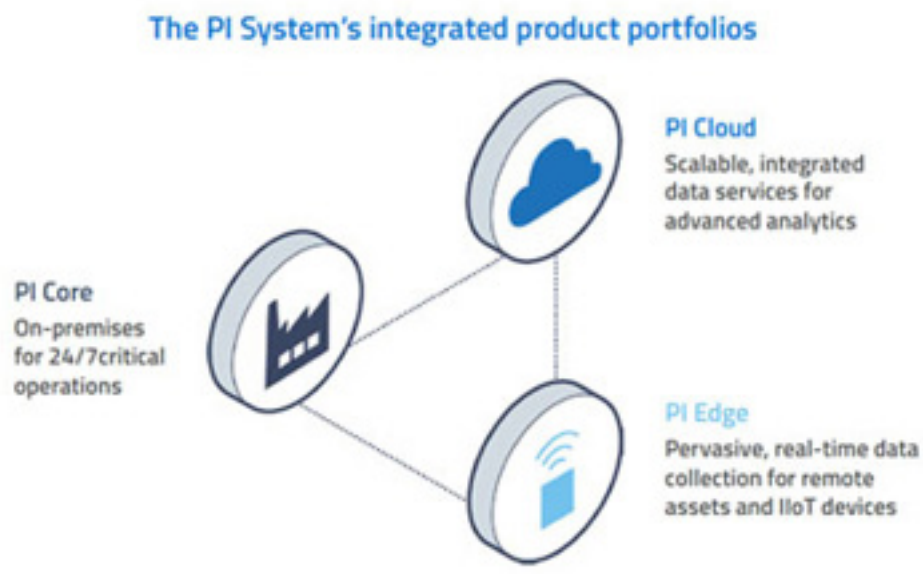


Article:

Leveraging The Data Core: How Utilities Are Optimizing Operations By Concentrating Data

Introduction

Water and wastewater utilities have often been viewed as lagging other sectors when it comes to maximizing the use of data within their organizations. That is not to say that the sector lacks data: SCADA systems collect and store data at intervals of fractions of a second; billing systems have decades of historic data on consumption, population change and demographic shifts; GIS and CMMS systems chronicle the condition of assets in time and space. The problem is there is often no unified way of accessing all this data for analysis and as a result only a fraction of data collected by utilities is analyzed and turned into actionable information.



Effective utility management is a knowledge-based activity. Unfortunately, most data systems in utilities operate in departmental silos, designed, built and operated for their specific objective, with very little cross functional use of the data. Even in advanced utilities, customer information systems (CIS), supervisory control and data acquisition systems (SCADA), billing platforms, asset management systems (CMMS), geo-spatial information systems (GIS), enterprise management systems (ERP) are often separately deployed and managed by different departments, employed for department specific reasons, and incapable of easily sharing data.

This is because data collection and use in utilities has historically grown organically, with specific platforms developed or deployed to meet the needs of individual departments or users. This results in many disparate and isolated data platforms, architectures, topologies and lexicons which impede the ability to combine, intersect, use and re-use data.

This is more frustrating because much of the value of data exists at the intersection: using SCADA + GIS + Hydraulic Model data for real-time leak detection; employing CIS + ERP + AMI data to secure utility revenue; combining CMMS + CCTV Sewer Video + Flushing Records data to establish a pipeline replacement program. In order to enjoy the potential of these value propositions, utilities need to view various data sets in relation to others with the right context.

This is the potential that a Data Core can provide.

The Data Core

A Data Core is a platform that simplifies the collection, curation and analysis of data. Specifically, it includes data infrastructure that:

- Provides a means to canonicalize various data, making it instantly useful;
- Provides real-time access to data;
- Provides context for that data in space and time;
- Provides a means of correlating disparate data sets: relationally, spatially or in time;
- Provides a scalable foundation for sharing data between systems, people, and companies, thus forging the way for autonomous decision making; and
- Provides the means to analyze and present that data to provide meaningful, relevant operational and business input.

The development of a Data Core is the foundational element of any Smart Water initiative and can generate significant returns on investment, deliver operational efficiency improvements, and improve reliability. A Data Core provides the benefits of consolidated data management, maximizes the efficiency and efficacy of data and smooths the integration of data silos. Along the way, access to a Data Core transforms the business of water – making changes to existing business practices simpler and liberating the workforce to focus on critical issues.

WINning with the Los Angeles Department of Water and Power

The dedicated staff of the Los Angeles Department of Water and Power (LADWP) exploits the value of the Data Core to bring real-time access and context to all their data, specifically to help them solve complex problems related to diversification of their water portfolio, improve their understanding and management of critical infrastructure and preserve public health and safety by optimizing the quality of their water.

LADWP's Water Information Network (WIN) maximizes the concept of the Data Core by integrating:

- Time Series Data (SCADA – GE Proficy; Data Historian – OSIsoft PI)
- Relational Data (CMMS – Maximo; CIS – Oracle CC&B; LIMS)
- Spatial Data (GIS)
- File Data (Microsoft Office)

Through this platform – developed with OSIsoft's PI system as it's foundational element – LADWP has created a single point of access to data that has effectively democratized data and data analytics tools. By combining and offering integrated data, LADWP can now unify business operations that historically have intersected multiple data silos. For example response to infrastructure failure can be tracked from inception (SCADA), to identification (analytics), to dispatch (work force management and CMMS), to repair (access to as-builts, GIS system information), and finally to close out (financial and hours reporting) – all through a "single pane of glass" user experience.

To date, LADWP has developed over 120 use cases related to goals designed to improve infrastructure management, disaster preparedness, water reliability and safety. In one example, LADWP is using OSIsoft's data core capabilities to collect data about the ground water level underneath two dams at the Bouquet Reservoir. In the past, this data was only available to field personnel at the site requiring a multi-step, multi-person process whenever managers in the home office wanted to understand current conditions. PI now make data from the reservoir available 24/7 to anyone at LADWP with an internet connection.

This democratization of data and analytics has not only increased the use of data across the utility estate, but it has increased LADWP's situational awareness. Through real-time analysis and notifications, LADWP has been able to use the Data Core to address compliance response and reporting, reaction to natural disasters, asset condition monitoring and management, and sustainability and efficiency of water supply.

Conclusion

We do not need to look very deep into utilities to see how this data inefficiency impacts operations and results in significant frustration for utility managers, and contribute to significant losses in efficiency and safety. We can all relate to the tale of exporting data from one system, coaxing it through an intermediary platform (such as Excel or Access) and importing into another system for presentment. The time spent getting the data, cleaning the data, processing the data and re-formatting it for use in another system is simply a resource sink.

Maximizing the usefulness of utility data through a Data Core strategy is launching a variety of new and exciting data collaborations – and liberating efficiencies in our resource constrained utilities. The availability of a readily accessible Data Core is transforming the industry and is truly the foundation of the smart grid for water.

About the Author

Gary Wong is a Successful business leader in real-time operational intelligence and IIoT solutions. An expert in water and environmental management with strong experience in Strategy, Consulting, Business Intelligence, and Business Development. Chairman of Smart Water Networks Forum Americas Alliance, Professional Engineer in Computer Engineering, MBA from Queen's University, and Chartered Professional Accountant.

Rotork launches a cloud-based Intelligent Asset Management system

Rotork has launched a program of advanced analytics for the management of intelligent flow control assets. Intelligent Asset Management is a cloud-based asset management system for intelligent actuators and the flow control equipment they operate. It is a system of advanced analytics to improve reliability and availability of key assets (such as valves) across all industries that use flow control processes. By collecting data and monitoring asset status, Intelligent Asset Management can lead to long-term operational stability.

Intelligent Asset Management uses the information downloaded from the data logs recorded within intelligent actuators. It is a robust, safe and secure online platform with a simple to use intuitive interface that can run on all operating systems. Summary views and colour-coded maps simplify complex analytics into easy-to-understand visuals. The key areas of information that are taken from data loggers and uploaded to Intelligent Asset Management are torque, temperature, vibration and event log information (such as open and close starts log, movement log and alarm log). Live diagnostic actuator data is available for sites that use a Rotork Master Station (via the Gateway computer), such as alerts and actuator status. The advanced analytics within Intelligent Asset Management remove the need to manually review data, saving time. Early detection of issues will allow resolution before costly failure.

Intelligent Asset Management is available both as a standalone offering and as part of a combined solution to meet individual customer needs. Performance, process criticality, product and operational data are combined to assess asset condition and determine if any intervention is required to prevent performance degradation or failure. Intelligent Asset Management is suitable for use with all intelligent actuators across multiple applications, including oil and gas, water and power, and chemical, process and industrial markets

Article:

Industrial Internet Of Things (IIoT): Identifying The Vulnerabilities Of Field Devices

The Industrial Internet of Things (IIoT) industry is growing at a rapid pace. By year-end 2015, an estimated 13.4 billion IoT connected devices had flooded the global market. The number of connected devices is forecast to reach 38.5 billion by 2020.1 But why are so many companies working to develop IIoT devices? Because most industrial processes are not fully automated, they are capital and labour intensive and need to find an effective way to identify network issues and improve performance. The main draw of IIoT devices is that they can improve safety, reliability, and energy efficiency. These devices integrate sensors that gather real-time or continuous data and connect to data analytics and control systems. Analysing data trends is essential for delivering actionable insights in order for utilities to prioritize network upgrades or monitor supply-demand mismatch. The smartest solutions not only offer data analytics software, but also integrate with existing software and industrial control systems (ICS).

For example, sewer water levels can be monitored and programmed to send real-time alerts when the water level has reached a predetermined threshold in order to prevent combined sewer overflow (CSO) events. Sensors can also be installed inside different types of equipment to monitor if measured parameters exceed predetermined thresholds. This enables predictive maintenance — maintenance that can be scheduled before an equipment failure occurs, which prevents expensive equipment replacements or repairs. Agriculture applications can monitor soil moisture levels, humidity, and pesticide usage. Farmers can use this data to implement optimal crop growing conditions.[2]

These examples are illustrative of how IIoT devices can optimize operations for the user. But connecting devices also creates a network vulnerable to attack and compromise.

As the number of connected devices increases, so do potentially devastating cyber threats. Cyber threats on critical infrastructure can have far more damaging and widespread effects than individual terror attacks. A common method of attacking consumers using ransomware, a type of malware that infects a computer and limits users from accessing the system until they pay a ransom. The Internet Crime Complaint Centre reported that from April 2014 to June 2015, damages caused by ransomware alone cost companies $18 million.[3] Ransomware attacks primarily target consumers and therefore result in individual and financial damages. However, attacks on critical infrastructure could cost billions and cause far greater damage.

An intentional shutdown or tampering with critical infrastructure data could result in power outages, toxic water levels, along with a communication shutdown preventing emergency response. The rising concern is a twofold attack, while emergency workers are responding to a water main break, hackers can attack a power plant and leave an entire city in the dark. Security experts continue to implement cyber defence strategies. However, with the increasing risk of cyber wars no strategy is completely secure.

The Cost Of Cyber Threats

Three decades ago, malicious activity and cyberattacks were rarely an issue. But now threats have become a reality and cybersecurity has become an absolute necessity. A recent study published by the Atlantic Council and the Zurich Insurance group estimates that cyberattacks could cost up to $90 trillion by 2030 if cybersecurity fails to advance at a rapid pace.[4] Therefore, every IIoT company should be aware that their device can serve as a backdoor to an industrial control system. ICS or Supervisory Control and Data Acquisition (SCADA) systems are extremely vulnerable, as they are the brain of critical infrastructure. Surprisingly, companies still create devices with insufficient security technology, lacking even basic features such as authentication and authorization.

Without proper security, attackers can use these devices as an entry point into the SCADA system. Once the SCADA system is compromised, the attackers can leak critical information and even reconfigure the programmable logic controllers (PLCs) to cause significant damage. For example, in a water utility this could be executed by setting the water network to a very high pressure, resulting in network-wide pipe leaks and main breaks. False low sewer water level data could be transmitted, resulting in CSO events which would flood the streets and result in public health and safety risks and heavy regulatory fines.

Even with cyber defense on the rise, there have been many more documented and undocumented attacks. There were over 160,000 reported attacks on SCADA systems worldwide during 2013 and over 675,000 attacks in 2014. Many of the attacks were carried out by exploiting simple buffer overflows (e.g., feeding more data than the system's temporary memory storage could hold), which can result in corrupted data, a program crash, or cause the execution of malicious code. The number of unreported attacks is potentially significantly greater, as most companies are only required to report data breaches that compromise payment or personal information.[5]

The threats to critical infrastructure are increasing, especially on infrastructure controlled by ICS. As our world becomes more connected, the potential scale of damage to critical infrastructure begins to boggle the mind. In 2003, the infamous Northeast Blackout left 50 million people in eight states without power. It cost around $6 billion and resulted in 11 fatalities.[6] The power outage was caused by a software bug. Imagine the severity and scale of damage that could have transpired had the blackout been caused intentionally by a hacker.

Securing An IIoT Device

As an IIoT company, Ayyeka developed a device that incorporates current best practices in cybersecurity. This paper will cover the key steps to securing an IIoT devices and understanding device vulnerabilities. These include: embedding cybersecurity into the IT architecture, securing communication protocols, and implementing additional security measures for delivering data to SCADA systems.

The most basic security level is to install a firewall along with an intrusion detection system (IDS). Humans cannot be programmed to detect when a suspicious person is looming on their property, but firewalls can. A firewall is run by security rules that control the incoming and outgoing network traffic as protection from unauthorized attackers.

The next step is to encrypt sensitive data. For utilities, it is a given that hackers will try to intercept the communication from field devices. Therefore, it is crucial to think like a hacker and identify the weakest link in the network and implement additional security measures. For example, encrypt all communications between field devices and the SCADA system.

Investing In Cybersecurity

Devices that communicate from the field to a SCADA system create an entry point into the SCADA system. The most notorious example of a digital weapon attacking a SCADA system was a malicious virus known as Stuxnet. The virus silently took over Iranian uranium enrichment plant for over a year without being detected. Stuxnet manipulated the SCADA system and damaged the centrifuges as well as the enrichment process. Many believe the attack was carried out via infected USB drives, clearly demonstrating the vulnerability of SCADA systems.[7] After the attack made headlines, world leaders began to worry about their own critical infrastructure and started to implement cybersecurity task forces to regulate security requirements.

Although these issues are under the radar for some private companies, the U.S. Federal Administration is investing in and enforcing stringent cybersecurity regulations which will quickly spillover into the private sector. In the U.S. alone, the 2016 proposed national cybersecurity budget has reached $19 billion. The budget includes a proposal for a National Centre for Cybersecurity Resilience where companies and organizations can test security measures by initiating a cyberattack on a replica power grid, investing in enhanced cybersecurity, and securing the personal data of its many citizens. While government is taking a more proactive approach, cyber-attackers continue to become increasingly sophisticated. Cyberattacks come in many forms.

After an IIoT company secures all the endpoints, the next step is securing the data. For example, in a water treatment plant, attackers could inject false chlorine readings and then feed the false data to the SCADA system. It is very difficult to detect tampered data, which is why critical infrastructure operators need to implement preventative security measures. A useful tool for preventing false data injection is an automated system to detect suspicious activity. For example, when monitoring drinking water, if the pH level spikes, the chlorine levels are likely to drop. Machine learning algorithms can automatically learn such relationships between various parameters and warn if one parameter deviates from its expected behaviour.

Cloud Storage And Reverse Entry Points

While cloud storage is the most common data storage method in the consumer market, many industrial end users prefer to bypass third-party cloud storage and ensure the data is securely stored and delivered from field devices to their closed networks or SCADA systems. This can only be achieved by investing in cybersecurity and ensuring seamless SCADA integration for end-users. Some government offices worry about the security of cloud storage when considering the damage that could result if the data was accessed by someone intending to do harm. For this reason, companies should offer secure data transmission with on-premises servers in addition to cloud storage. Non-critical data can be viewed on the cloud and used as an auxiliary system, entirely outside a SCADA system.

IIoT Devices: A Step-By-Step Security Strategy

It is critical to develop multilayered cybersecurity solutions that reduce the risk to the ICS. IIoT devices that deliver data to ICS need to have a communication pathway that is secure and difficult to intercept. Ideally, devices should not be connected via a fixed IP address and wait for incoming connections — such devices are sitting ducks begging to be infiltrated. Instead, devices should use dynamic IP addresses and initiate the data sessions to the SCADA system only when needed. The logic is simple — it is easier to protect the SCADA side from malicious incoming connections than it is to protect the device side.

Authentication is just as important; it guarantees that unidentified devices cannot intercept the communication. An additional level of security is restricting the device's communication to short intervals and as soon as the data transmission is complete, the device shuts off the communication channel. Hackers looking to attack a field device would have a narrow window to do so. They would need to call into the private network at the right time, successfully proceed past authentication, and decipher the encryption, which is difficult to achieve.

Endpoint Security For Cellular IIoT Devices

Endpoint security is just as important for IIoT devices. The device must meet certain criteria before transmitting data to an internal server or cloud storage. Since many IIoT devices communicate over cellular networks, they use SIM cards. Many end users rely on cellular operators to provide them with a 'secured' Access Point Name (APN). They assume the information is secure and therefore do not encrypt their data. But how can one secure something one does not control? APNs lack full security monitoring capabilities, thus securing the endpoints and encrypting the data is vital. If an unauthorized user gains access to the SIM card, they could easily access all the devices under the same APN.

IIoT is built upon a device to device communication, or Machine to Machine (M2M) communication. Sensors enable us to measure and monitor almost anything. Integrating sensors with IIoT devices enables equipment (like a water tank) to become a smart device and transmit data to an internal server or cloud based software.

When considering reverse entry points to ICS, many overlook the vulnerability of sensors because they have yet to be reported in malicious attacks. A cyber-attacker can easily uninstall a sensor from an IIoT device and reinstall a malicious sensor to feed false data to the control system. Worse yet, an attacker could use the sensor as an entry point into the SCADA system and carry out an attack and damage critical infrastructure. The best way to protect the sensor is through sensor fingerprinting, which provides an additional layer of authentication. Moreover, sensors with built-in alarms can be programmed to send an alert anytime a sensor is tampered with. These two security features are designed to prevent unauthorized users from accessing or tampering with the sensor.

Best Practices In Cybersecurity

Cybersecurity is not a one-time investment. Each and every utility and critical infrastructure operator needs to take into account every device that has communication capabilities. Cyber protections require a holistic approach; a customized solution should be designed for each utility and operator. It begins with assessing every component in the internal network and identifying the devices with communication capabilities supplied by external vendors.

Ayyeka researches and invests in implementing best practices in the IIoT industry: this includes encrypting data, using a private network or subnet for field deployed devices, authentication, minimizing the usage of the device's communication channel, restricting the communication between the device and the ICS, and securing the sensor. Security features should be designed to protect the SCADA system and to secure every connection point where data is being collected and delivered. Today, more advanced sensors are being developed and integrated with autonomous IIoT devices. Cybersecurity must evolve and anticipate more sophisticated and creative attacks.

There are currently over 13 billion connected devices operating in the field; each device likely has at least one loophole or backdoor that could serve as an entry into critical infrastructure data. Therefore, we have a pressing need to secure all these devices before we continue to flood the market with additional IIoT devices. Advanced cybersecurity practices need to be implemented now; before we reach a point of no return, with the predicted 38.5 billion insecure IoT devices deployed in the field.

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Conferences, Events, Seminars & Studies

Conferences, Seminars & Events

2021 Conference Calendar

Due to the current international crisis there has been a large amount of disruption in the conference calendar. A lot of workshops have moved online at least in the interim and a lot of organisations are using alternative means of getting the knowledge out there such as webinars popping up at short notice. Do check your regular channels about information and events that are going on. Also do check on the dates provided here as they are the best at the time of publishing but as normal things are subject to change.

Sensor for Water Interest Group Workshops
The Sensors for Water Interest Group has moved their workshops for the foreseeable future to an online webinar format. The next workshop is on 3rd February 2021

10th March 2021 - Monitoring wastewater flow

WWT Innovation Conference
3rd - 4th March 2021
Ofwat's vision puts innovation at the heart of industry strategy and this event will showcase how this can be actively delivered in 2021 and beyond. Building on the success of the last eight years, the 2021 WWT Water Industry Innovation Digital Conference will bring the industry together online to share best practice, align stakeholders and drive an innovative, resilient and collaborative water sector for the future.

WEX Global 2021
28th - 30th June 2021 - Valencia, Spain

The WEX Global Conference. Sponsored by Idrica is currently due to take place in Valencia in Spain in June 2021. The conference concentrates on the circular economy and smart solutions to resolve some of the global water industry's issues

Water, Wastewater & Environmental Monitoring Virtual
13th - 14th October 2021

The WWEM Conference & Exhibition has been changed to a virtual conference and exhibition for 2021 and a physical conference and exhibition in 2022. Details on WWEM Virtual will be released in the coming months but it is sure to include huge amount of technical workshops and events for attendees to enjoy.

International Water Association Digital Water Summit
15th-18th November 2021 - Euskalduna Conference Centre, Bilbao, Spain

In 2021, the first edition of the IWA Digital Water Summit will take place under the tag-line "Join the transformation journey" designed to be the reference in digitalisation for the global water sector. The Summit has a focus on business and industry, while technology providers and water utilities will be some of the key participants that will discuss and shape the agenda of the Summit. The programme includes plenary sessions, interactive discussions, side events, exhibition, technical visits, and social events

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