Digital Water and Smart Networks Webinar
What we do

Professional Registration
We offer all professional registrations at all levels in Engineering, Environment and Science.

Continuing Professional Development (CPD)
Career development is at the heart of everything we offer. Easily record your CPD by using our exclusive online CPD platform. We also award the best CPD of the year!

Mentoring
Our Online Mentoring Programme unlocks potential, supports career goals and develops talent in the water sector.

Events
We run national and regional events and many of these are cross-sector collaboration. Our specialist conferences for Engineering, Environment and Science are free for members.

Networking
The opportunity to network with peers from across the water sector is always rated high amongst our members as one of the key reasons they join the Institute of Water.

Information
As an Institute of Water member, you will receive our quarterly Magazine, covering the latest developments and learning from across the water sector. You will also receive a bi-yearly technical Journal.
Defining digital water and smart networks

- Exploiting data to create enhanced actionable insight leading to improved decision making
- Employing digital insight to improve business process performance
Defining digital water and smart networks

• Utilising digital techniques to enable the creation of new markets

• Enabling the creation of entirely new value-adding products or services

The UK Water Partnership “Digital Water” consultation December 2019
Why does digital matter?

- Population growth
- Urbanisation
- Climate change
- Ageing infrastructure
- Greater regulation
Beyond borders, sectors and expectations

DWF is a global legal business, connecting expert services with innovative thinkers across diverse sectors. Like us, our clients recognise that the world is changing fast and the old rules no longer apply.

That’s why we’re always finding agile ways to tackle new challenges together. But we don’t simply claim to be different. We prove it through every detail of our work, across every level. We go beyond conventions and expectations.

Join us on the journey.
Institute of Water #Midlands

Digitisation of the Water Sector

Paul Haggerty
Capgemini
Vice President,
Utilities, Head of UK Water Sector
Organisations are leveraging digital technologies to deliver next generation business AND operational capabilities.

**Digital Transformation & Industry 4.0 – The Digital Transformation of Industrial Sector Value Chains**

**Disruptive Digital Technologies**
- Analytics
- Mobile
- Communities
- 3D Printing
- Cloud
- IoT/M2M
- Robotics

**Next Generation Digital Capabilities**
- **Mobility:** Digital End-to-End Worker Connectivity
- **Situational Awareness:** Predictive Patterns and Smart Networks
- **AI:** Next generation machine learning Analytics
- **Intelligent infrastructure (Assets):** Lights Out Operations
- **Omni channel:** Next generation device, customer personalisation
- **Automation:** Robotics, M2M operations, business process automation

**Asset intensive organisations are facing radical changes – market disruption, increasing regulatory expectations & revolutionary new technologies with the potential to transform operational capabilities ... game changing times**
Though shiny new technology is not the full story …. Tooling and products are only part of any “solution”, business value and a systems thinking mindset are critical to digital strategic planning.

Connecting the Asset, Engineer and Supply Chain to the Organisation

Machine learning
daugmented reality
blockchain
Robotics
Driverless vehicles
Wearables
DevOps
Cloud Computing
IOT
Autonomics
Sensors
3D printing
Blockchain
artificial intelligence
3D Scanning
Nano technology

“Blurring the line between Physical and Digital”
At a technological level, the intensity of Digital in all aspects of assets, workers and the supply chain is creating an unprecedented opportunity to drive a step change in operational performance and efficiency.

**DIGITAL CAPABILITY LEVERS***

<table>
<thead>
<tr>
<th>AI and Machine Learning</th>
<th>Virtual Reality / Augmented Reality</th>
<th>Predictive Maintenance, Condition Based Monitoring</th>
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<tbody>
<tr>
<td>Remote monitoring of production processes</td>
<td>Internet of Things, Intelligent Industry</td>
<td>Building information modelling (BIM) / Digital Twin</td>
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<td>Tracking of assets and products, Blockchain</td>
<td>Connected machines, equipment and workers</td>
<td>Autonomous Equipment</td>
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<td>Cybersecurity, Protection and Prevention</td>
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**VALUE DRIVERS AND OUTCOMES**

- **Industrialized Asset Management**
- **Field Services Efficiency and Productivity**
- **Operational Excellence – Process Optimisation**
- **Customer Experience Differentiation**

Addressing the performance gap

Delivering 5% - 10% of Opex savings could realise £50m - £70m p.a. savings

At the centre of the shift required to meet these goals is the technological enablement of the ‘Intelligent Industry’

* Illustrative Opex/Capex p.a. costs for a WaSc

* Levers are not mutually exclusive, often clustered in initiative delivery
Where Intelligent Industry and automation has the potential to provide insight, optimisation and digitisation of core business processes within the end to end Water value chain

**Value for Money, Efficiency**

**Customer Service Excellence**

**Service Excellence – Water Quality**

**Excellence in Wastewater Disposal**

**Environmental Sustainability**

**Incentivising Innovation**

**5-10 Year Digital Transformation**

- **Portofolio Management**  
  Optimised planning to execution, reduction of TOTEX

- **Intelligent Scheduling**  
  Exploitation of intelligent devices driving productivity and optimisation of resources

- **Digital Asset Management**  
  Asset management optimised thanks to actionable insights provided by data analytics

- **Social Media**  
  Exploitation of social media and digital channel increasing customer service and intimacy

- **Cloud Based and Interfaced System**  
  Easier roll-out of IT application; cost reduction; increased productivity of employees

- **Process Automation**  
  Reduction of end-to-end cost operations whilst enhancing service quality

- **Virtual Reality**  
  More effective operations and training

- **Collaborative Intelligence**  
  Innovation and best practices shared through cloud applications; simultaneous and collaborative working

- **Mobile & Connected Workforce**  
  Efficiency, increased visibility on operations

- **Energy Cost Management**  
  Optimised energy use and cost reduction through analytics

- **Business Intelligence**  
  Streamlined reporting process, information available in real time, reduction of cost to serve

- **Water Supply Management**  
  Reduction of leakage and supply interruptions; better supply/demand management

- **Wastewater Disposal**  
  Environmental Sustainability

- **Incentivising Innovation**  
  More effective operations and training

- **Smart Networks**  
  IT/OT Convergence, Proactive, Predictive Customer interactions and lower cost to serve / cost to produce

- **Digital Asset Management**  
  Asset management optimised thanks to actionable insights provided by data analytics
Often looking to other industries provides insight into how other asset intensive organisations are leveraging intelligent platforms and tooling to drive benefits and operational resiliency in their assets and product processes.

Context
In a competitive, changing market BHGE wanted:
• Greater visibility into its manufacturing processes
• The ability to manage production in real time
• Improvements to efficiency & productivity

Solution
• BHGE implemented an industrial Internet of Things (IoT) solution that transforms shop floor process and the manufacturing execution system
• The solution gathers data from all manufacturing devices and machines to provide operators and engineers with a new level of insight and the ability to adjust production at a moment’s notice.

Benefits
• Enhanced process visibility and insight
• Real-time management of manufacturing processes provides nearly 50 users with real-time status updates, analysis of historical data, and visual metrics dashboards
• Prevention of 26,000 hours of machine downtime in 2017 (across all BHGE’s plants in Italy)
• 12% increase in machine utilization five months after the deployment of the solution
• Effective increase in machine capacity to the value of $6m
Key Takeaway – never has Digital been more relevant than now to supporting Water Utility organisations in delivering a step change in performance and capability through Intelligent Industry capabilities.

**Key Get Rights To Consider**

1. **Exploiting** what you have in parallel to exploring new opportunities

2. Speed of delivery, adoption of delivery methods that *rapidly accelerate* “solutions”, MVP mindset

3. Creation of “operational business cases” with *outcomes* linked P&L and ODI metrics

4. Industrialise the methods, tooling and governance of *innovation such that it is repeatable*

5. Business and IT interlock, with *behavioural change* a critical delivery component

Change the conversation, change the ambition, change the outcomes – **Digital @Speed in Water**
About Capgemini

With more than 210,000 people, Capgemini is present in over 40 countries and celebrates its 50th Anniversary year in 2017. A global leader in consulting, technology and outsourcing services, the Group reported 2016 global revenues of EUR 12.5 billion. Together with its clients, Capgemini creates and delivers business, technology and digital solutions that fit their needs, enabling them to achieve innovation and competitiveness. A deeply multicultural organization, Capgemini has developed its own way of working, the Collaborative Business Experience™, and draws on Rightshore®, its worldwide delivery model.

Learn more about us at
www.capgemini.com
Hadfield Smart Water Network
May 2020
Yorkshire Water
We supply water and waste water services to the people and businesses of the Yorkshire and Humberside region.

Every day on behalf of our 5 million customers we:
• Collect, treat and supply around 1.3bn litres of water
• Invest over £1m in Yorkshire’s network of pipes, pumps and treatment works
• Collect, treat and safely return to the environment 1bn litres of water

We do all of this for about £1 a day for the average customer, amongst the lowest water and waste water bills in the country.
Innovation at Yorkshire Water

Google ‘Yorkshire Water Innovation Team’ or visit
https://www.yorkshirewater.com/about-us/what-we-do/innovation/
What is a Smart Water Network?

“Digital twin is a virtual model of a process, product or service. Pairing of virtual and physical worlds allows analysis of data and monitoring of systems to head off problems before they even occur, prevent downtime, develop new opportunities and even plan for the future by using simulations”

Forbes

The Smart Water Networks Forum
Hadfield Smart Water Network
Yorkshire Waters’ Approach

Over 50 Internal Contributors

Partnering with 18 Companies

20k Customers within pilot area

£2m Investment

3834 Live Data Streams

1 Smart Networks Platform

It’s all about collaboration
Hadfield Smart Water Network

Who’s involved?

Stantec
Yorkshire Water
xylem

Primayer
OVARRO
Syrinix
Technolog

inflowmatix
ATI
connexin
Gutermann

Morrison Utility Services
HWM
Invenio Systems
Sensus

temetra
Honeywell
Arqiva
Itron
## Hadfield Smart Water Network

### Timeline

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#### Network Ancillaries (SWAN Levels 2-4)
- **Options Review**
- **Deployment Design**
- **Procurement**
- **Deployment**

#### Smart Platform (SWAN Levels 4-5)
- **Data Fusion and Analytics**
- **System Refinement**
- **Pilot In-Flight & Benefits Assessment**
Hadfield Smart Water Network

What will it look like?

Integration of all live network data sources into the Xylem platform and the development of the required operational insight including:

• A.I. prioritisation of leak detection activity including automatically created leakage packs

• Live water balances

• Live calculation of properties impacted during supply interruptions

• Ability to simply model the impact of re-zones on pressures and discolouration risk
Hadfield Smart Water Network
Pilot Ambition

20 %
Reduction in Leakage

50 %
Reduction in Visible Leaks

50 %
Reduction in Supply Interruptions

25 %
Reduction in Mains Repairs

Improved Per Capita Consumption reduction methods

A more empowered workforce
Thank you for listening
SMART(ER) WASTE NETWORKS

John Brewington
Innovation Trials
Practice Lead

WONDERFUL ON TAP
• We’re the second largest water company in the UK serving 8.1 million people.

• We supply 1.6bn litres of drinking water each day - the equivalent of 640 Olympic-sized swimming pools.

• We operate over 1,100 sites across our region.

• We run a network of water pipes which is 49,000km long.

• We’re responsible for 94,000km of sewers.
AMP6 Urban and Rural Demonstrators

Redditch – South of Birmingham
- Domestic Population ≈ 92000
- 575km of sewers and 3.25km of rising mains
- 15 pumping stations

Llys Rhysnant, Powys
- Domestic Population ≈ 60
Sprenal
Urban Catchment

- Reduce the amount of manual operational tasks
- Real-time information, E2E dashboards
- Provide early warning triggers to intervene before failure
- People focus to trust automation and data

Sprenal Effluent Factory

- Reactive
- Proactive
Intelligent Sewage Pumping Stations
Edge Processing and Optimisation

**OPTIMISE ENERGY**
- Energy Management
- Triad Management
- DOL Duty Select*
- VSD Optimisation*

**FLOOD / POLLUTION PREVENTION**
- Deluge Detection*
- Deluge Conditions*
- Pre-Deluge Control*
- Time to spill

**PRO-ACTIVE MAINTENANCE**
- Scum Reduction
- De-Ragging

* Patent Pending
More efficient pumping under similar conditions due to duty bias and self-optimization.

>20% Reduction in Energy

Number of starts reduced because of smart deluge detection protection.

>10% Reduction of Pump Starts
Llys Rhysnant
Rural Catchment

- Low carbon treatment with off-grid monitoring
- Active rainwater harvesting
Facultative Ponds and Off-Grid Monitoring
Active Rainwater Harvesting

- We installed systems in 7 of our customers’ homes in June 2019 which have;
  - Attenuated 87m³ in 121 rain days – 43% of stormwater that fell on the area.
  - Offset 42m³ of potable water – toilet flushing and garden use.
  - Performed 264 active interventions, releasing 36m³ ahead of storms.
ASSET INTELLIGENCE PROGRAMME

Key Enablers include:

- Good quality asset data
- Collection of the right data at the right frequency
- Intelligent analytics to spot and learn new things
- Great visualisation and reporting capability
- People believe and trust in our data and information
- People act on new information
- Need to look at the use of new tools e.g. digital twins; machine learning
- Great collaboration
AMP 7 Developments Underway

- **Fibre installations** for permanent monitoring in sewer and water networks
- Trials of new **sewer sensor technologies**
- Growing **use of Artificial Intelligence and data analytics** – driven through migration to the cloud and in-house capability
- Greater utilisation of **new comms infrastructure** including NB-IoT
- Developments of **digital twins**
- Investment in **insights platform**
Our wastewater treatment innovation facility – the R2IC - at Spernal is open for business.

- A plug-and-play wastewater testbed
- Influent of 500m$^3$/day crude sewage and 1000m$^3$/day settled sewage
- A fully equipped waste laboratory
- Conference room
- Opportunities to trial monitoring and treatment technology on the main works including PST, ASP, filter beds, SST, sludge digestion and connecting pipework.
THANK YOU
Any questions?
Inspiring members to reach their potential.

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