

26 AUG 2020

12PM-1PM WEBINAR

FREE FOR WIF MEMBERS

HOW COULD DIGITAL TWINS ADD VALUE TO THE WATER SECTOR?

**WITH GUEST SPEAKERS FROM ATKINS, ANGLIAN WATER,
DWR CYMRU WELSH WATER & MOTT MACDONALD BENTLEY**

LUNCHTIME WEBINAR

How could 'Digital Twins' add value to the water sector?

AGENDA

12:00	5	Introduction – Peter Drake, CEO, Water Industry Forum
12:05	10	Introduction to Digital Twins & their potential application to the water sector - Neil Walker, Asset Management Technical Director, Atkins
12:15	30	Opportunities, challenges and potential benefits - Mark Hedges, Asset Data and Information Manager, Anglian Water - Danielle Williams, Information Systems Manager, Welsh Water - Daniel Buxton, Design Manager, Mott MacDonald Bentley
12:45	15	Panel Q&A based on audience submitted questions
13:00		Close

How could 'Digital Twins' add value to the water sector?

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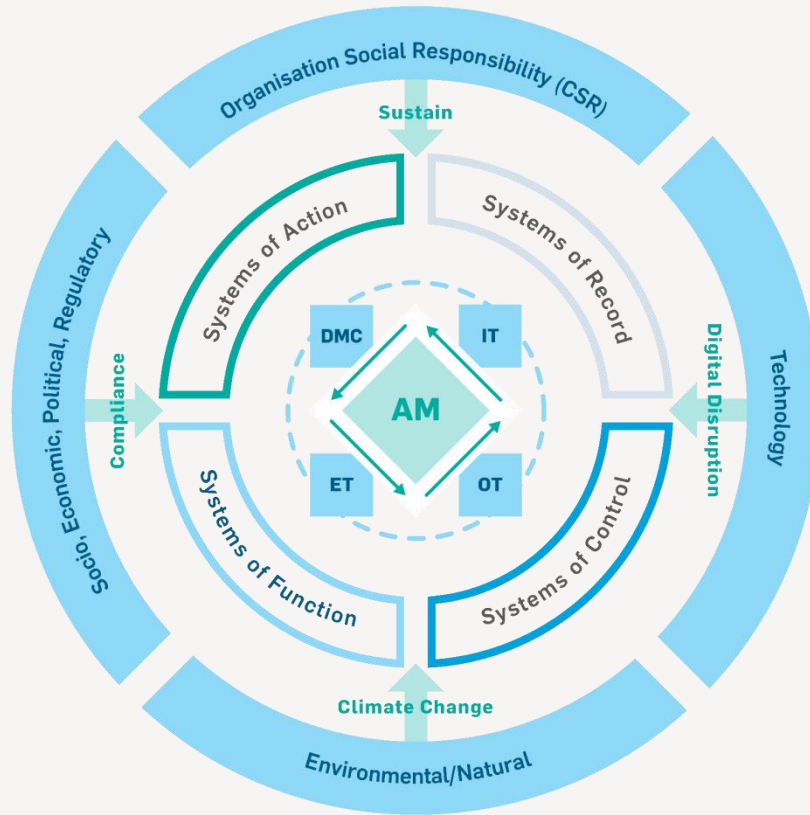
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Introduction to Digital Twins and their potential application to the water sector

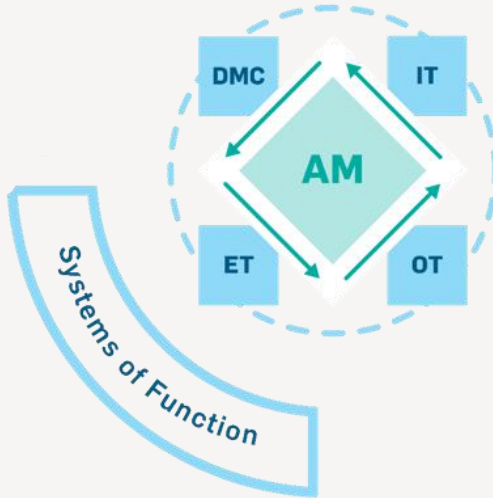
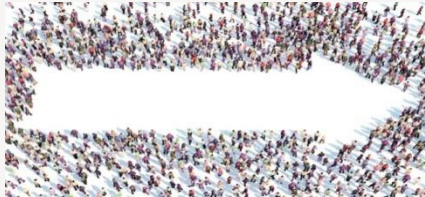
Neil Walker MSc DIPWEM MAPM



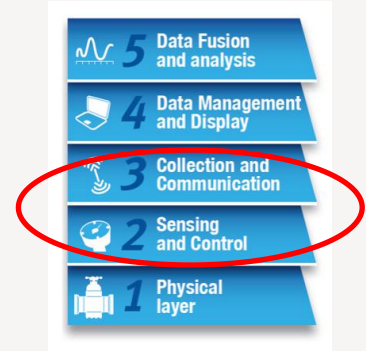
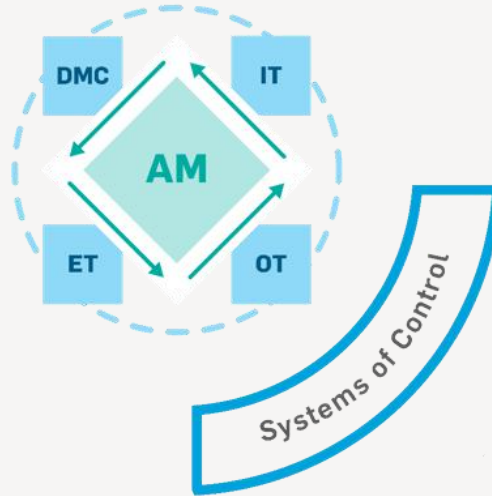


Engineering Technology – The Physical Layer

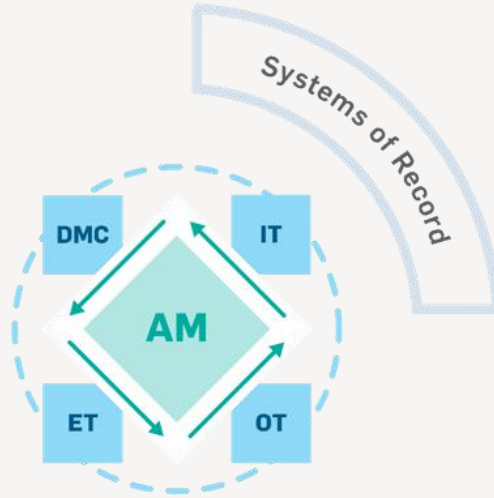
- 5 Data Fusion and analysis
- 4 Data Management and Display
- 3 Collection and Communication
- 2 Sensing and Control
- 1 Physical layer**



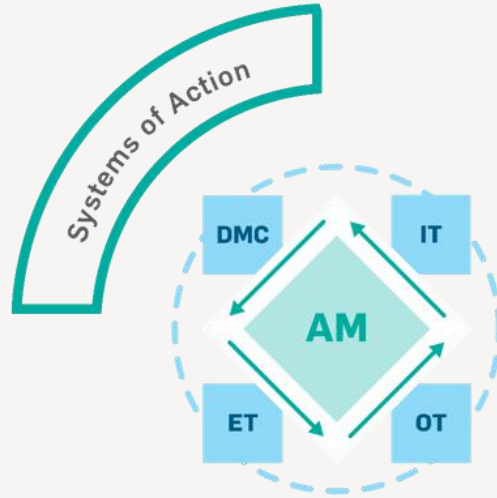
Operational Technology – Sensing, Communication and Control



Information Technology – Data Management & Display



Decision Making Capability – Fusion and Analysis



Thank you....

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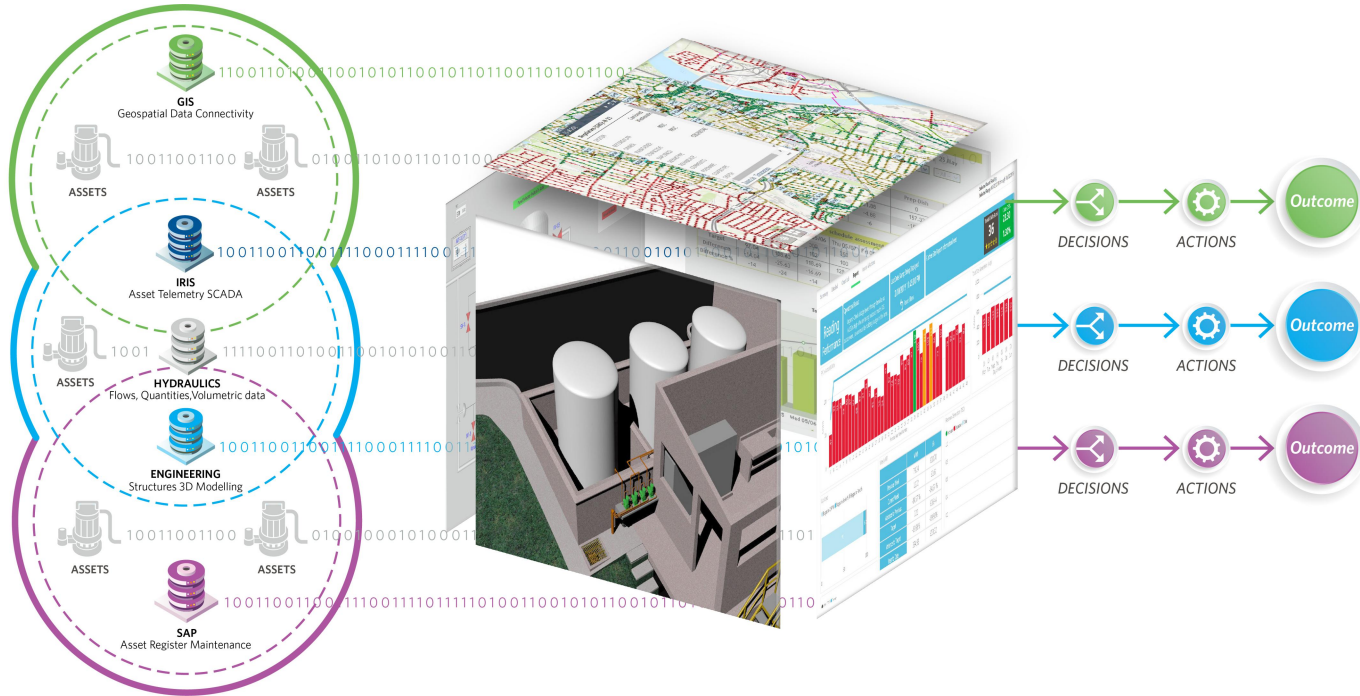
Digital Twin

Water Industry Forum

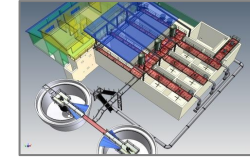
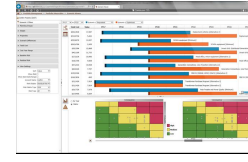
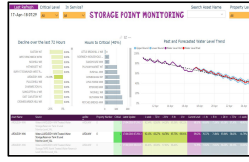
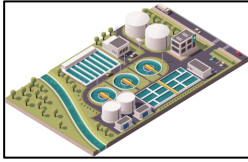


The AW Digital Twin Definition

“Our Digital Twin can be defined as an integrated accurate digital representation of our physical assets, systems and treatment processes. It will unlock value by enabling improved insights that support better decisions, leading to better outcomes in the physical world”.



What a Digital Twin means for me...



Site Manager

"I need predict and scenario plan how best to run the site to cost"

Forecast production, resourcing, energy, chemical, and resourcing needs to scenario plan operations

Social Media

Energy Consumption

Control Room

"I need to predict failures and performance deterioration to assist operations"

Predict operating setpoints and corrective maintenance interventions

Chemical Usage

Labour, Contractor and Materials Costs

Optimiser

"I need to monitor operations of the site and scenario future operating modes"

Provide specific operating guidance to operational teams at process and asset level

Noise Logging

Water Quality

Modeller

"I need to predict the repercussions of planned and unplanned work"

Enable Real-time analysis of network operational demand and quality against design

Resource Availability

Weather

Asset Planner

"I need to get the most value from investments based on dynamic asset data"

Utilise asset condition and performance data to inform future investment needs

Asset Register

Asset Failure Modes

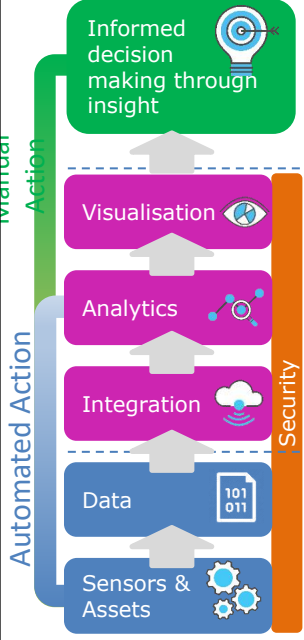
Designer

"I need to analyse and design optimal water assets through modelled options assessment"

Virtually select and design systems and assets based on accurate historical performance data

Asset Downtime

Effects of Asset Failure



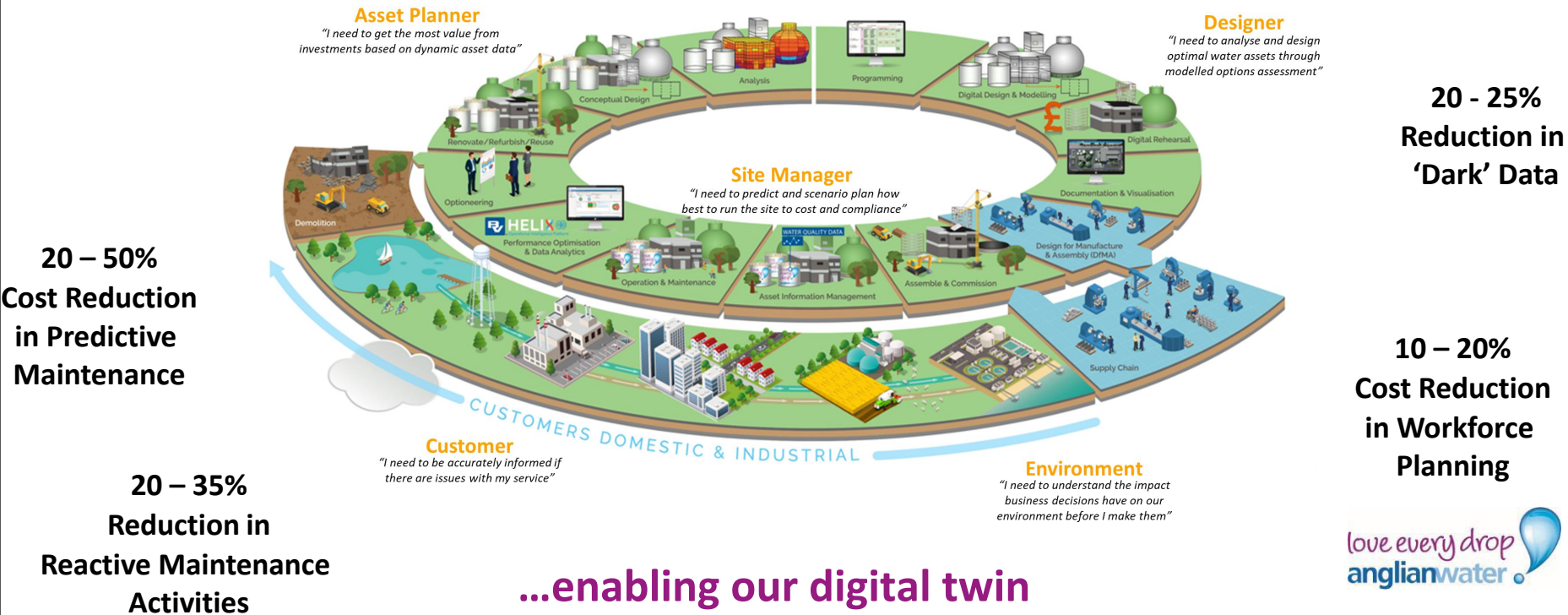


Digital Twin Maturity Matrix– People Perspective

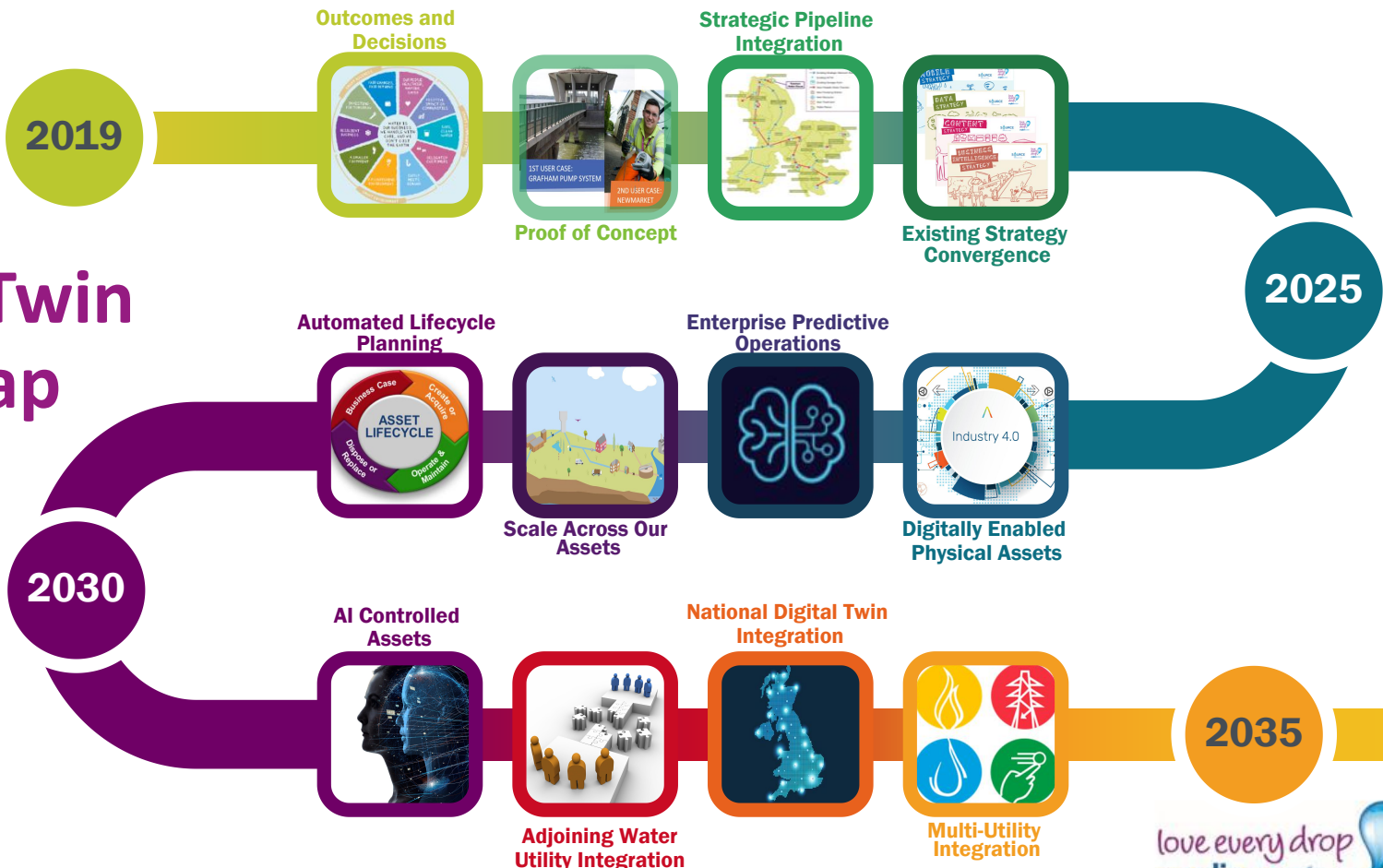
DIGITAL TWIN MATURITY LEVEL		TRADITIONAL	SIMPLE COLLABORATION	INTEGRATED FUNCTIONS AND RELATIONSHIPS	HIGH-PERFORMING ENTERPRISE	INTERCONNECTED INDUSTRY
ORGANISATIONAL ETHOS		“Just carrying on doing the same things we’ve always done – in the same way”	“Mostly carrying on the way we’ve always done but with some examples of change driven by digital innovation”	“We have a well-defined Digital Twin change programme that is sponsored by the Board”	“Our approach enables our people to use our digital infrastructure to deliver first-class customer service”	“Our digital infrastructure connects with that of others to deliver the National Digital Twin”
PEOPLE PERSPECTIVE	AWARENESS, KNOWLEDGE AND SKILLS	<ul style="list-style-type: none"> • Inductions, training and operation is based on long-standing methods with little or no digital support for people • No workforce awareness of the value of data • There may be some informal knowledge of digital ways of working • Knowledge management is people-based not system-based 	<ul style="list-style-type: none"> • As Traditional but with local pockets of digital induction and training to support discreet examples of ad-hoc innovation and trials of new ways of working • Those involved value the quality of data they consume 	<ul style="list-style-type: none"> • Digital Twin development is supported by an organisational RACI which identifies and empowers key Owners and enables an organisational approach to Digital Twin • Our people are upskilled to support the major elements of our Digital Twin programme • We benchmark what good looks like 	<ul style="list-style-type: none"> • Our people are fully informed, engaged, trained and skilled in the use of Digital Twin • Our people are driving development and continuous improvement of Digital Twin • We are measured as the sector benchmark 	<ul style="list-style-type: none"> • Our people are engaged with and learning from experts in Digital Twin from the wider water sector and beyond • Our people use their skills and experience to support the development of Digital Twin in other organisations
	PROCESSES	<ul style="list-style-type: none"> • Processes are based on long-established methods with little or no support offered to people through digital insight 	<ul style="list-style-type: none"> • Mostly as Traditional with elements of some processes affected by discreet examples of digital innovation being adapted to suit to support different behaviour • Digital is ‘back-fitted’ to traditional processes 	<ul style="list-style-type: none"> • Processes are designed around and underpinned by digital provision. • Digital platforms provide information at the right time in the right format for user requirements but with limited value 	<ul style="list-style-type: none"> • Processes and digital platform are becoming one and the same as the platforms intelligently evolve and support our way of working • AW Digital Twin seen as exemplar 	<ul style="list-style-type: none"> • Processes are no longer solely internal but are integrated across the sector
	CULTURE AND DESIRE	<ul style="list-style-type: none"> • Although using standard tools our people have little or no interest in digital innovation, trying or moving to digital ways of working 	<ul style="list-style-type: none"> • Individuals or small, discreet teams of people testing or implementing digital ways of working without the organisational strategy and support to affect the whole business • Trailblazers and mavericks shine the light on opportunity 	<ul style="list-style-type: none"> • Our recruitment approach / job adverts / agile teams contain digital focus and are aligned with what we need from Digital Twin. • There is a growing desire to be a part of the Digital Twin evolution! • Tangible sense of community is established around digital within the organisation meaning trailblazers collaborate (through it not round it) 	<ul style="list-style-type: none"> • It’s our way of working! • AW people seen and recognised as experts • Our people expect to use DT in their work and understand the benefits it will bring • Digital Twin provides connection and line of sight across the business 	<ul style="list-style-type: none"> • AW are enabling and empowering others to adopt their own Digital Twins and integrate with our own

Digital Asset Lifecycle

Provide better Data Driven Decisions across the asset lifecycle through improved data quality...



Digital Twin Roadmap 2019 - 2035



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Digital Twins in Welsh Water

Danielle Williams

Information Systems Manager at Dwr Cymru Welsh Water



Hello!

- Danielle Williams, Information Systems Manager for Dwr Cymru Welsh Water
- Passionate about improving our Information Management within the Water Sector
- Member of the BIM4Water Steering Group and Owner Operator Group

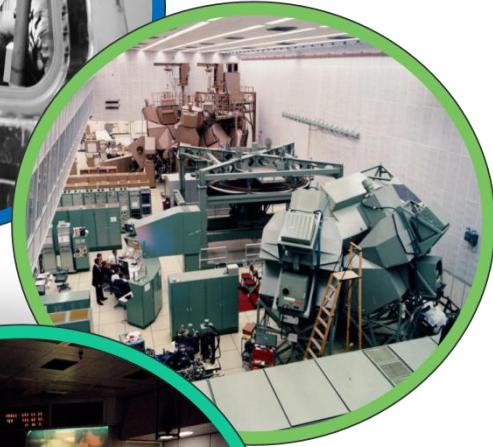


Are Digital Twins here to stay?

Digital Twins are not new- ask NASA.

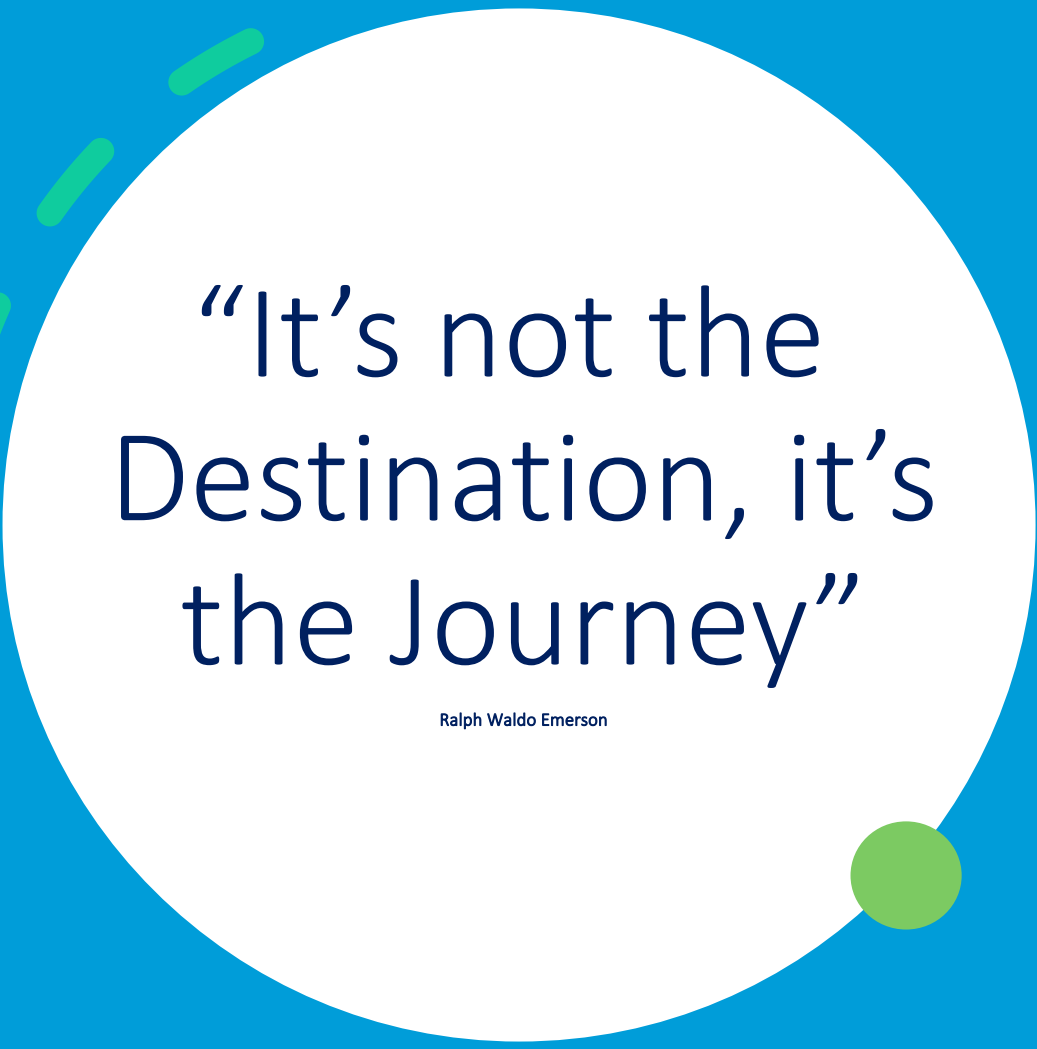
Developing and maintaining a Digital Twin is now more efficient, cost effective and value adding due to advancements in technology.

With companies such as Microsoft and Samsung using Digital Twin terminology and the Internet of things- it's safe to say Digital Twins are more than just hype.



The Water Sector are in the midst of a Digital Transformation, and there are already significant challenges to overcome. Working towards a Digital Twin will help us to overcome some of the challenges faced across the wider Organisation.





“It’s not the
Destination, it’s
the Journey”

Ralph Waldo Emerson



Opportunities

Exchange information more efficiently with both internal departments and external Organisations

- Efficiencies that translate to cost savings.
- Flexibility in working with external organisations
- Improvements in data and information quality.
- Quick and efficient retrieval and reuse of information.

Extract more value from graphical information we're already paying for

- Improved visualisation in optioneering.
- Safe environment for innovation.
- Enhanced communication medium to convey concepts to various stakeholders.
- Digital Rehearsals and 4D.
- Reuse for operation and maintenance guidance and training aids.
- Forecast costs and calculate Carbon by quickly comparing virtual designs.

Achieve several of our Strategic Responses in relation to Smart Assets as detailed in our 2050 vision

- Capitalise on technological advances using remote sensors and real time data to better control, operate and maintain our assets.
- Become an employer of choice through creating a technology rich working environment.
- Ensuring there is enough water for all through advanced modelling and simulations.

- Smart assets form part of Welsh Water's strategic responses, outlined in its 2050 vision. Digital Twins will enable us to create, maintain and operate Smart assets.

- In working towards a Digital Twin we need to use BIM processes and concepts. Benefits for BIM alone have been quantified and estimate savings of between 0.7% and 1.4% of capital expenditure. For whole life expenditure this saving is increased to between 1.5% and 3%.

(Source: PWC's BIM Level 2 Benefits Measurement report, March 2018)

- Commercial opportunities exist with a Digital Water sector fast emerging within the global water market.

(Source: Digital Water- A White Paper by the UK Water Partnership, May 2020)

- Our ability to transfer data and information to and from Partner Organisations and across the Water Sector will become more efficient through working towards a Digital Twin.



Benefits



Core Principles



Education



Collaboration



Formulation



Standardisation



Quality



Thank you for your time

BIM 4 WATER



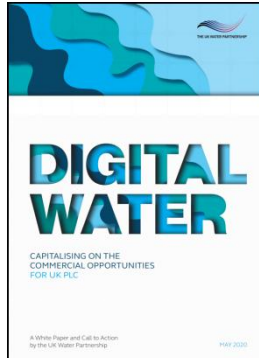
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The Gemini Principles

Digital twins of physical assets are helping organisations to make better-informed decisions, leading to improved processes.

Creating an ecosystem of connected digital twins – a national digital twin – opens the opportunity to release even greater value, using data for the public good.

This paper sets out proposed principles to guide the national digital twin and the information management framework that will enable it.



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WIF Lunchtime Webinar

Using Digital Twins to add value during Commissioning

Daniel Buxton



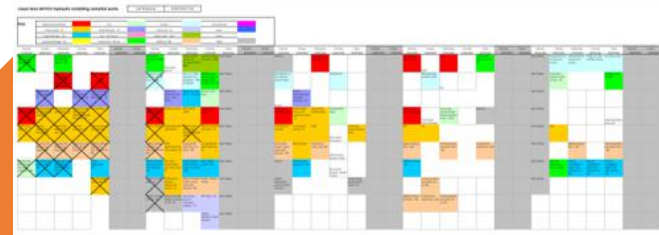
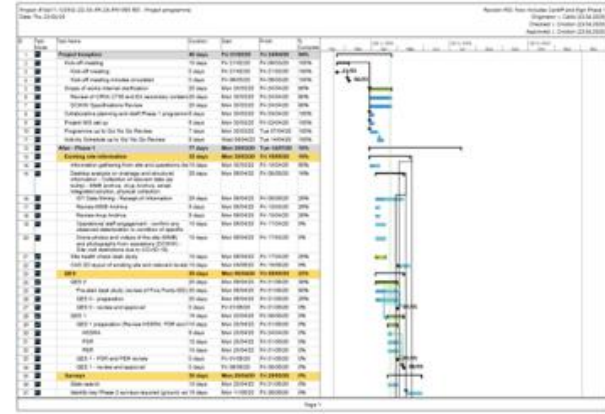
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Planning for efficient delivery is the norm

We sequence our multiple inputs, plan out our execution and rehearse our delivery

Commissioning remains critical and often the difference between success and failure

So why does our execution remain reactive?



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Opportunity – Challenge Traditional Thinking

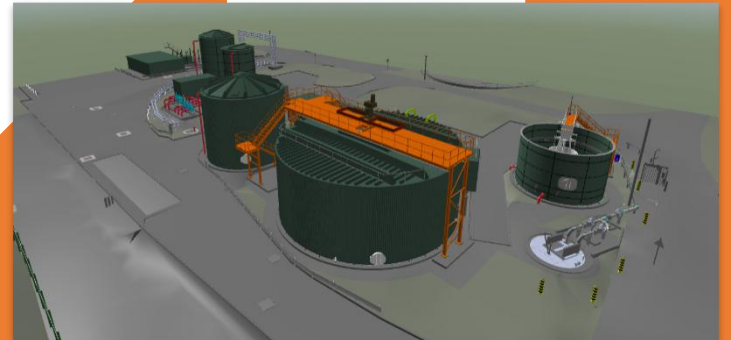
Commissioning is typically reactive and always “looking back”. This creates inevitable delay and lag in decision making. If we could make this process more proactive could we bring efficiency into our delivery and reduce our risk?



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Objectives

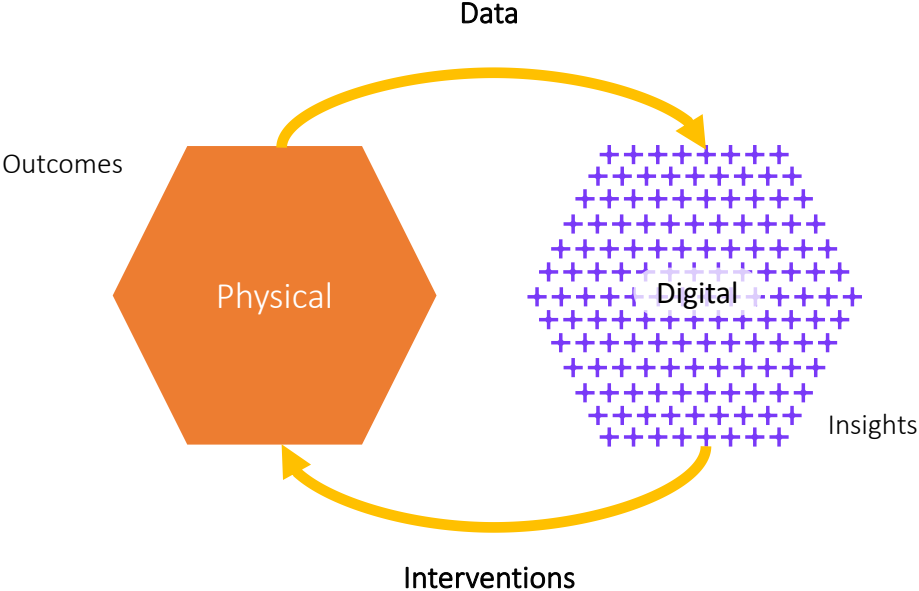
- Reduce the commissioning programme through proactive decision making
- Unlock new insight into plant performance
- Simulate alternative operational scenarios to inform decision making
- Develop a tool for 'business as usual' plant operation



Definition

“A realistic digital representation of assets, processes or systems in the built or natural environment”.

- Digital Built Britain

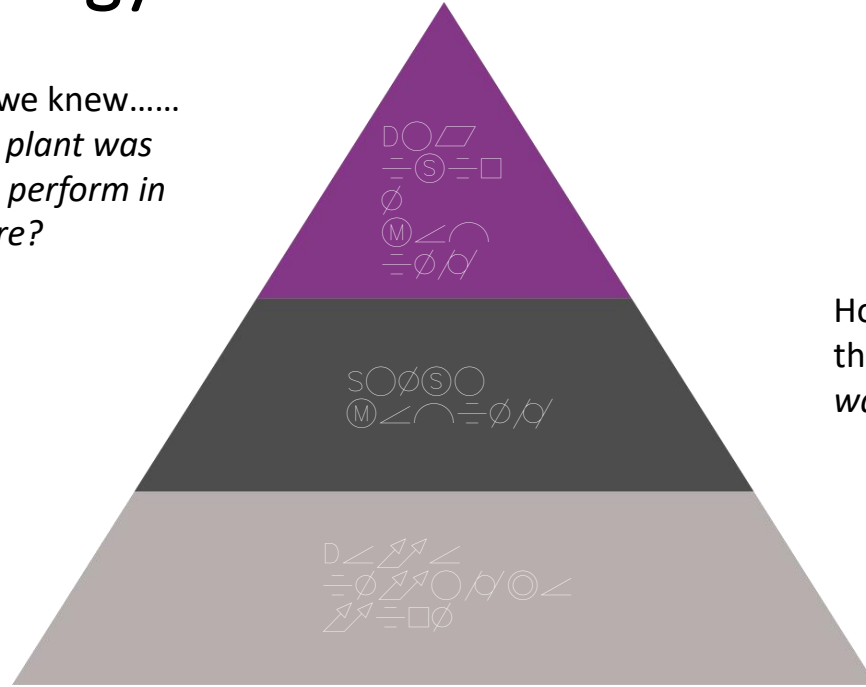


Make better interventions faster and cheaper

Proven methodology

What if we knew.....
*how the plant was
going to perform in
the future?*

What data do we
need.....
*SCADA
Lab data
Design info
Commissioning plans*

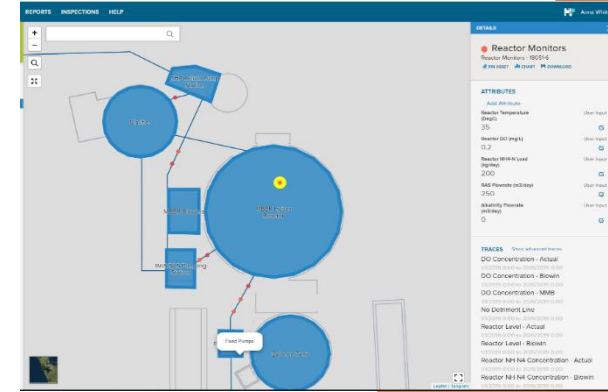


How will we do
this..... *Biological
wastewater modelling*

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Solution

- Live Plant Data
- Analytics powered by Biowin
- Visualisation and sense making – Performance Dashboard
- Actionable insights – Proactive Modeling
- All powered by MOATA



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Outcome

- An operational predictive digital twin
- The ability to simulate operating scenarios in near real time
- Improved insight and risk management through the commissioning phase

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Lessons Learned

- New ways of working
- Engagement with team
- Quality and security of data

Thank you



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