



## Why Digital Twins Are Shaping the Water Utility Status Quo

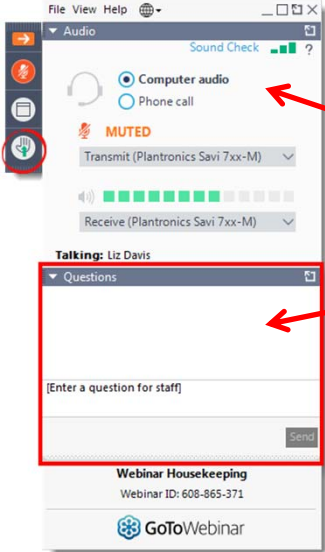
Ari M. Opdahl  
Product Manager, Asset Management



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## How to Participate Today



### Your Participation

Open and close your control panel


Join audio:

- Choose **Mic & Speakers** to use VoIP
- Choose **Telephone** and dial using the information provided

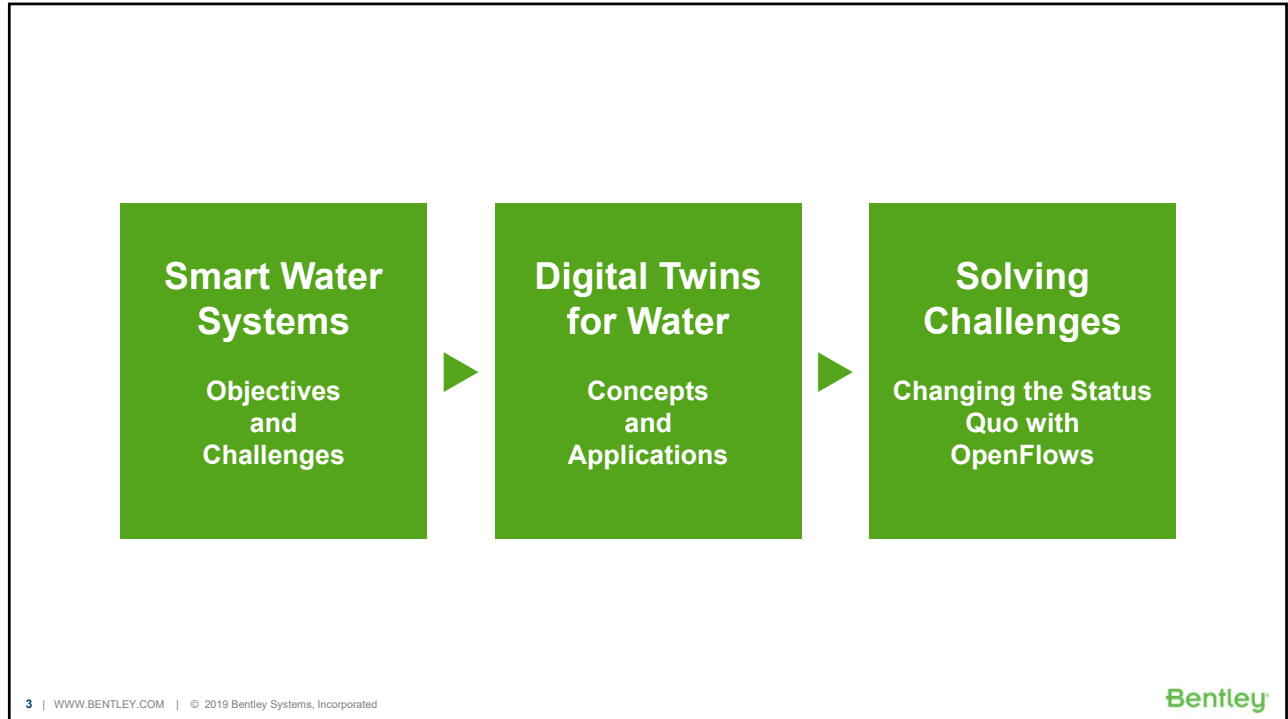
Submit questions and comments via the Questions panel

**Note:** Today's presentation is being recorded and will be available shortly after today's webcast

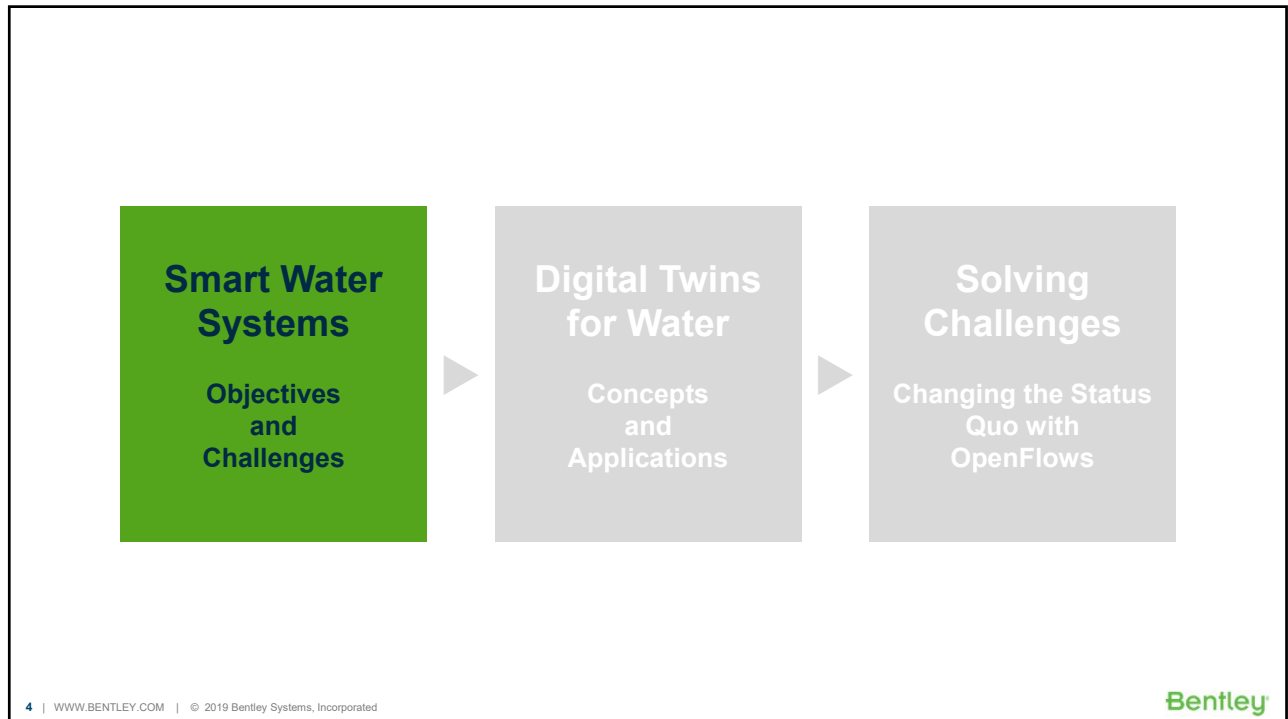
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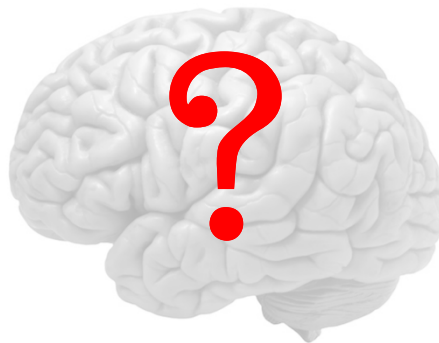


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“I want to have a  
***smart water***  
system to work with  
*big data* and the *IoT*”

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**What makes you smarter?**



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Every water utility has a clear mission...

To provide customers with:

- Safe
- Reliable
- Affordable

**Water**



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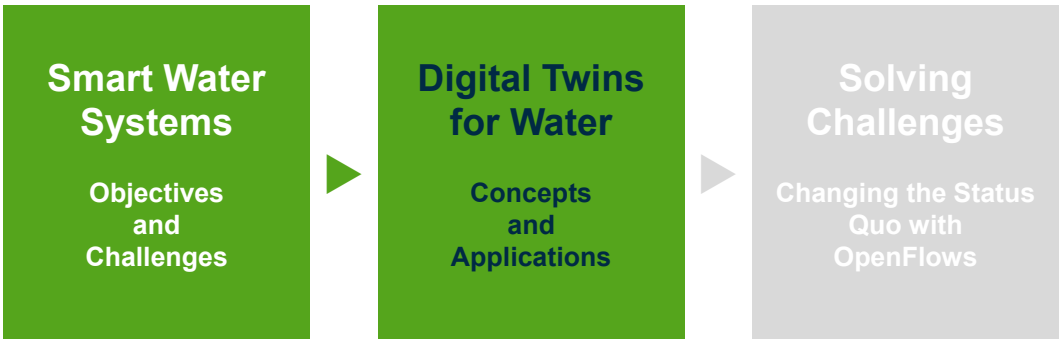


The diagram features two circular images. The left circle shows a 3D architectural rendering of a water treatment facility with a large water tower, a blue pond, and various pipes and structures. The right circle shows a young child with dark hair drinking from a clear glass bottle. Between these two circles is a horizontal arrow pointing from left to right. The arrow is split into two sections: a grey section on the left labeled "Real-World System" and a green section on the right labeled "Real-World Outcome".

**Smart *really* means:  
Making Better **Decisions**  
for Better **Outcomes****

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The flowchart consists of three rectangular boxes connected by right-pointing arrows. The first box is green and contains the text "Smart Water Systems" and "Objectives and Challenges". The second box is also green and contains "Digital Twins for Water" and "Concepts and Applications". The third box is grey and contains "Solving Challenges" and "Changing the Status Quo with OpenFlows".

**Smart Water Systems**  
Objectives and Challenges

**Digital Twins for Water**  
Concepts and Applications

**Solving Challenges**  
Changing the Status Quo with OpenFlows

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## What is a Digital Twin?

**A digital representation of physical assets, processes, or systems, as well as the information that allows us to understand and model its performance**

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## At Different Scales

Components



Subsystems



Entire Networks



*Video courtesy of MCC CERI*

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## Across Lifecycle Stages

Planning & Design



Construction



O&M



## For Different People

Engineers



Operators



Stakeholders





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Real-World System

Real-World Outcome

**Smart *really* means:  
Making Better Decisions  
for Better Outcomes**

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The complex block contains a diagram and text. On the left, a circular inset shows a 3D rendering of a water infrastructure system with a water tower, pipes, and a reservoir. An arrow points from this inset to the text 'Real-World System'. A second arrow points from 'Real-World System' to 'Real-World Outcome'. On the right, a circular inset shows a young child drinking from a glass. Below this diagram is the main text: 'Smart really means: Making Better Decisions for Better Outcomes'. At the bottom left is the page number '16' and the website 'WWW.BENTLEY.COM'. At the bottom right is the Bentley logo.

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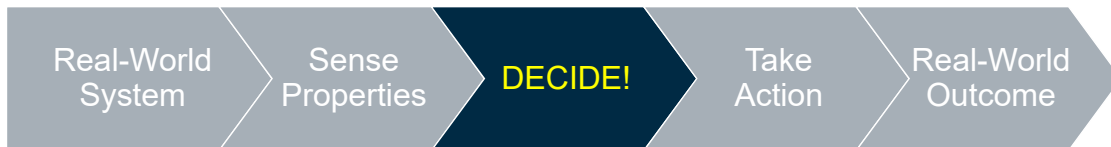
**Smart *really* means:  
Making Better Decisions  
for Better Outcomes**



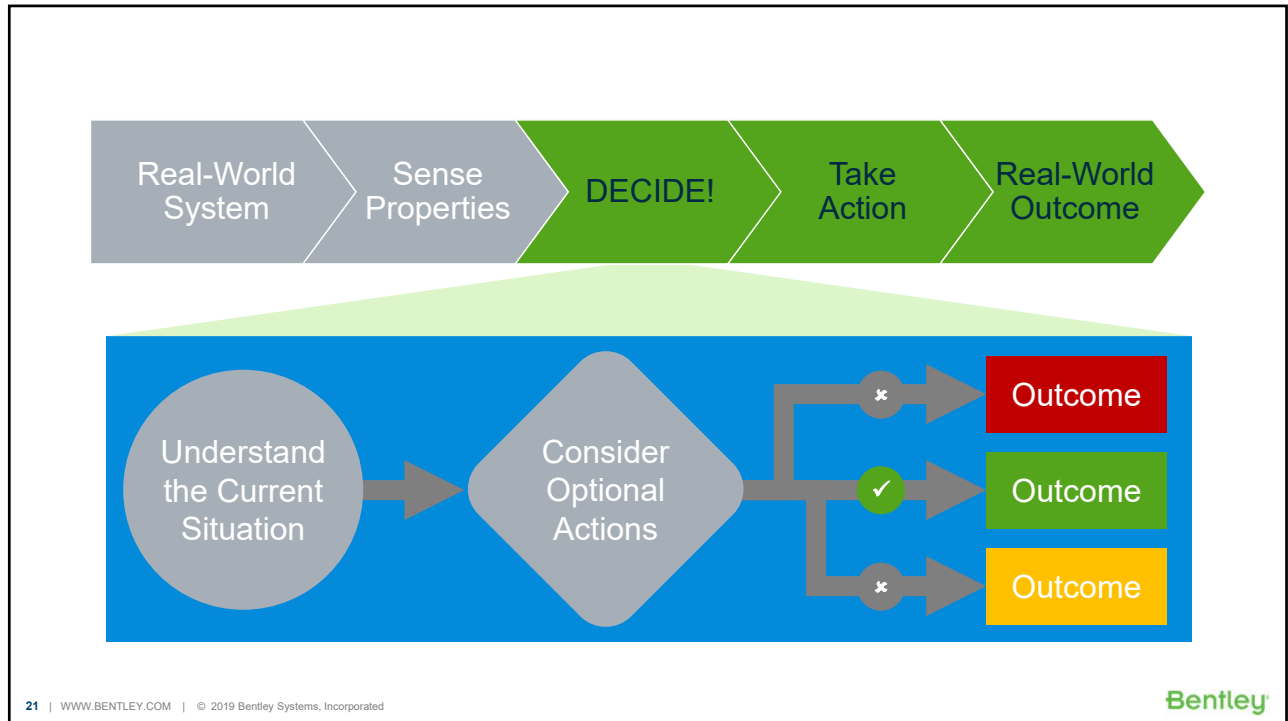
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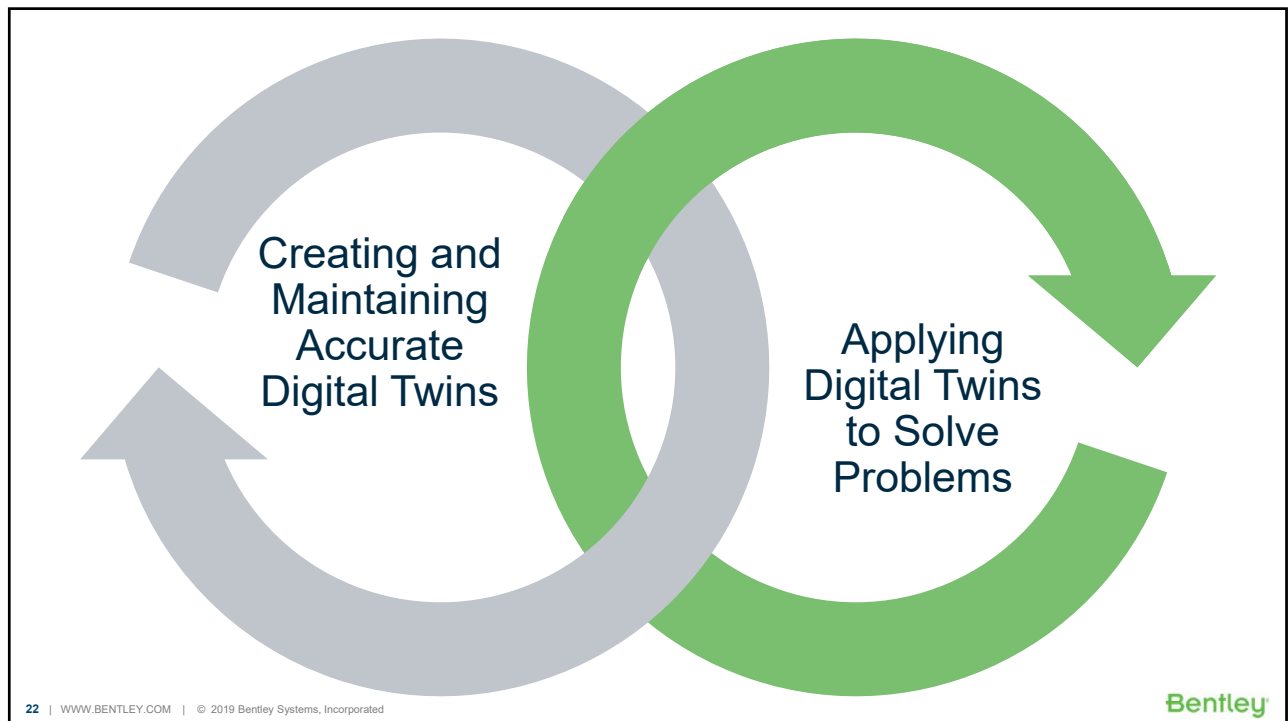
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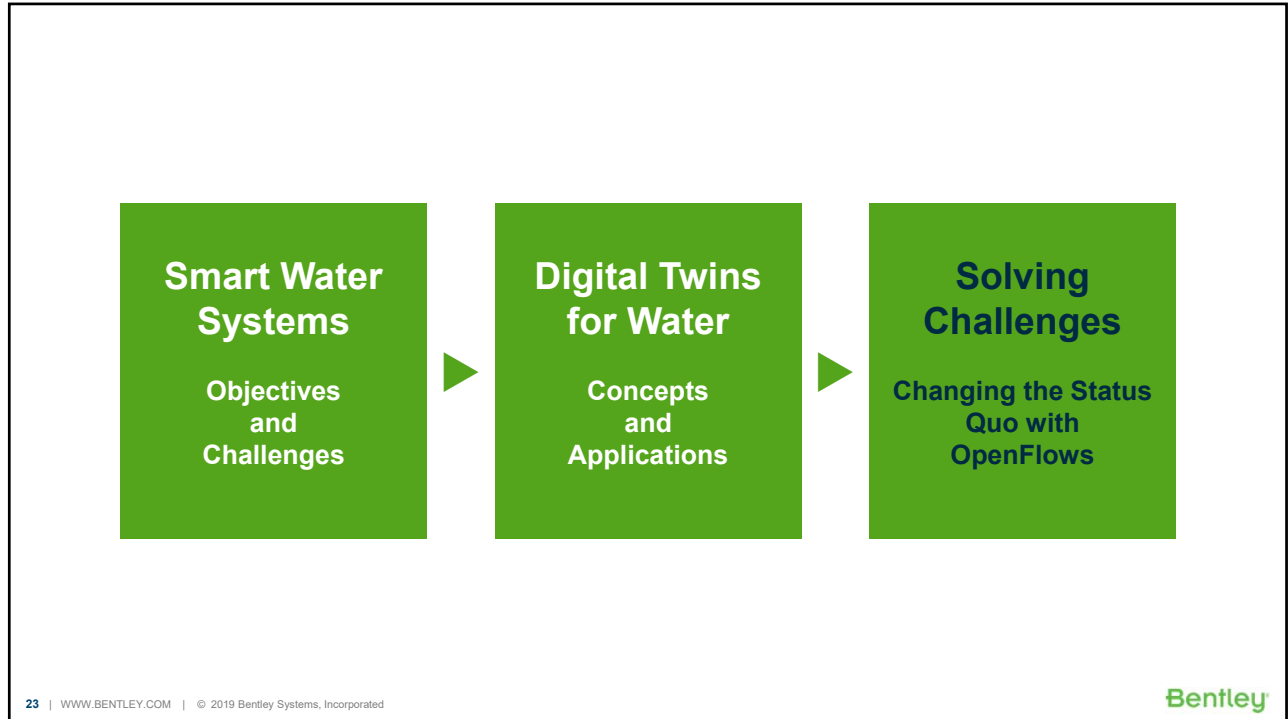
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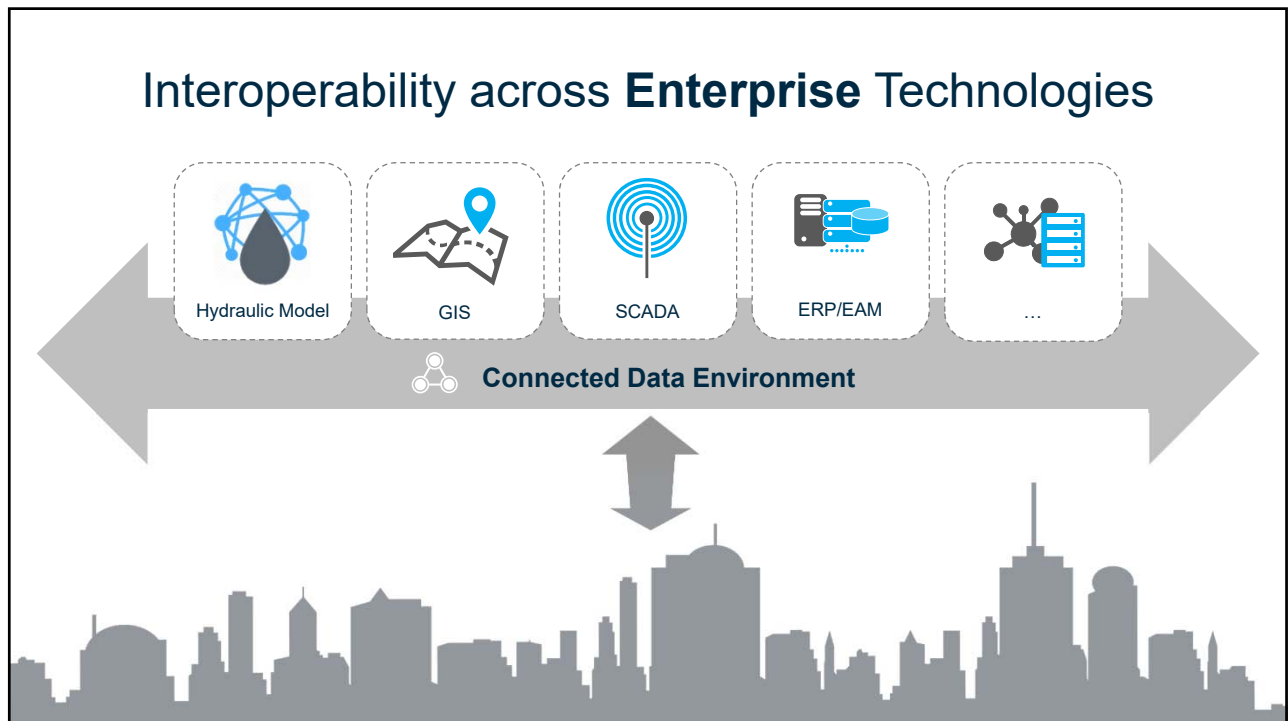
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## Challenge: Data Overload

- Making sense of mountains of disparate data can be overwhelming
- Accessing 'dark data' is difficult



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## Challenge: System Complexity

- In the real-world, everything is connected...
  - Pipes, tanks, pumps, valves, controls, meters, SCADA, ...
  - Weather, major events, demands, maintenance, ...
- Engineers, operators, and others all need to make important decisions



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**Objective:  
Meet Standard  
Performance Levels**

- Achieve minimum pressures
- Provide adequate water quality



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**Objective:  
Ensure Reliability**

- Minimize the number and impact of disruptions
- Anticipate the impact of performing standard maintenance
- Determine which hydrants to open for effective flushing



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## Objective: Respond to Emergencies

- Pipe break
- Contamination
- Fire
- Unplanned outage



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## Digital Twins for Other Water Needs

- Master Planning
- Capital Planning
- Energy Management
- Non-Revenue Water Reduction
- ...




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Meet Capacity




Maintain Service




Safeguard Quality




Ensure Reliability




Handle Emergencies



Control Costs





## Smarter with Bentley Digital Twins

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## Real-time Operational Decision Support

**Enables water utilities to:**

- Make better decisions on real-time events and emergencies
- Evaluate various what-if actions to best implement for faster & effective response
- Gain visibility into what is happening in between monitored locations for smarter decisions
- Automatically update and maintain dynamically calibrated models
- Plan and manage day-to-day operations






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## Real-time Business Intelligence Decision Support

### Enables water utilities to:

- Make better decisions about real-time issues, then alert users (situational awareness)
- Monitor asset health (condition) and performance in real time
- Automatically create KPI reports and dashboards
- Instantly view Non-Revenue Water and perform water audits
- View and compare modeling results anywhere, anytime

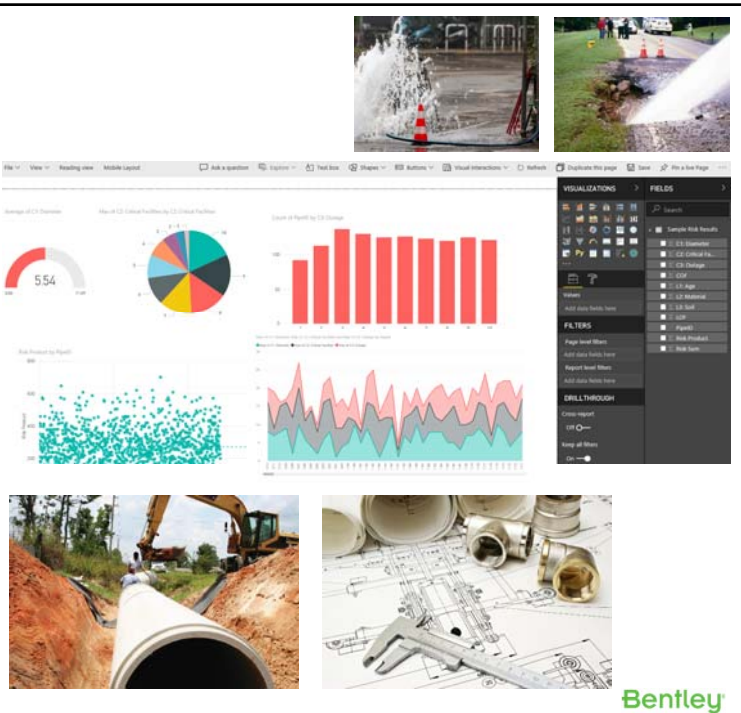


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## Risk-Based Pipe Renewal & Capital Planning

### Performed through:

- Automated Data Connections and Interoperability
- Objective, Data-Driven Predictive Learning and Failure Prediction
- Heuristic-based Risk Analysis and Scenarios
- Cross-Asset Planning
- Advanced Planning with Monetized Risk and Life-Cycle Cost Analysis
- Reach across departments with unified Reporting and PowerBI



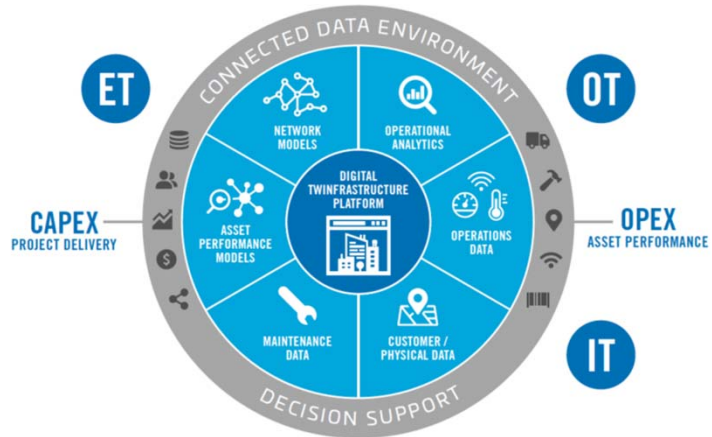
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## One Digital Twin Model, Multiple Connected Applications

**OpenFlows™  
WaterOPS™**

**OpenFlows™  
WaterSight™**

**OpenFlows™  
WaterCAP™**



## The New Status Quo

- **One Digital Twin Model, Multiple Connected Applications**

Digital is all about data

Every digital activity has the following flow:

