Digital Twin: Is it Just a Buzzword?

Unpacking the digital twin and what it means for you

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Autodesk University 2022

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Today's Agenda

1   What is a digital twin?

2   How do types of digital twins differ?

3   Examples of different digital twins

4   How does this relate to the IIJA bill?

Digital Twin

A digital twin can be used for monitoring, diagnostics, and prognostics to optimize asset performance and utilization. Sensory data can be combined with physics-based models to improve the outcome of prognostics. Therefore, complex prognostics platforms can be used as digital twins and used to find the root cause of issues, proactively addressing them, and improve productivity of a utility.

Digital Twin – Smart Water Networks (SWAN) Forum

A dynamic digital representation of real-world entity(s) and their behaviors, using models with static and dynamic data that enable insights and interactions to drive actionable and improved outcomes.

What is the Asset Twin?

Asset Management - 6 Part Breakdown

"What do you own and where is it located?"

Infrastructure

"What's the condition and remaining life?"

Inspections or Surveys

"What service are you delivering to your customers?"

Inhabitants & Investors

Info360 ASSET

"How's the network performing and how is it failing?"`

Incidents

"Where do we spend our first $, £, € ?"

Investments

Interventions & Remediations

"What are you going to do to improve performance"

Data driven risk planning

CCTV INSPECTIONS **ASSET INVENTORY**

WORK HISTORY **HYDRAULIC MODELS**

ASSET CONDITION **GIS**

INSPECTION MANAGEMENT

ML FAILURE PREDICTION

COF/LOF

ASSET CONDITION

SSO PREVENTION

RISK ANALYSIS

Info360
ASSET

KPI TRACKING

CAPITAL PLANNING

SCENARIO PLANNING

BUDGET OPTIMIZATION

REGULATORY COMPLIANCE

WATER QUALITY

Info360 Asset leverages your asset condition data to empower asset managers to make more informed decisions when creating their capital plan.

Improved Asset Planning Provides Improved Transparency at North Charleston Sewer District

Project

- **Objective:** Ensuring the right CIP dollars were being spent in the most effective areas within the both rapidly growing and aging sewer district.

Challenges

- Communicating the many factors for CIP decision making to stakeholders.

- Data integration across different data types (CMMS, CCTV, GIS, Excel) to generate wholistic evaluations.

Solution

- **Decision Tree Analysis:** Easy to create and understand analytics while still being robust to be meaningful and accurate.

- **Pipe Inspection QA/QC:** Easily audit and leverage hard earned field data properly.

Outcome

- CIP proposal process was streamlined and made more data driven – saving many work hours and reducing overall team stress.

- Board of Commissioners was able to approve multi-million-dollar plans with 'no questions asked' because the process was transparent and easy to understand.

What is the Operations Twin?

Drive smarter water decisions

SCADA
Rain Gauge
IoR
Time Series
GIS
Field Reports
Weather
Water Quality
Model
AMR/AMI
Complaints
Field Tests

REAL-TIME ANALYTICS
WORKFLOW AUTOMATION
SYSTEM FORECASTING
SENSOR HEALTH
ALERT MANAGEMENT

Info360

ENERGY COSTS
ASSET MANAGEMENT
PIPE BREAKS
WATER LOSS
MODEL CALIBRATION
WATER QUALITY
REGUATIONS

Info360 Insight leverages your data investments to empower operators and engineers to quickly monitor, analyze, respond to, and optimize their water operations.
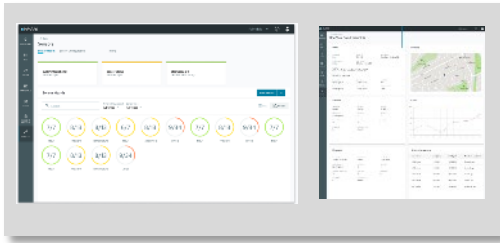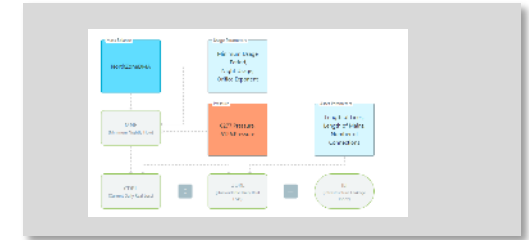
Data Integrity/Sensor Health
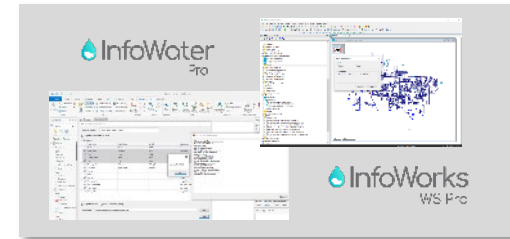
Dashboarding/KPIs
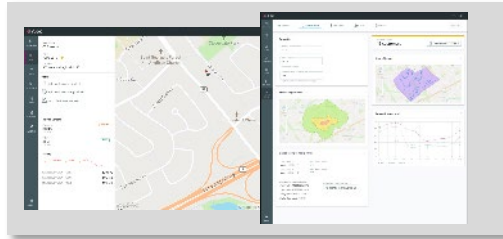
Incident Management

Analytical Tools
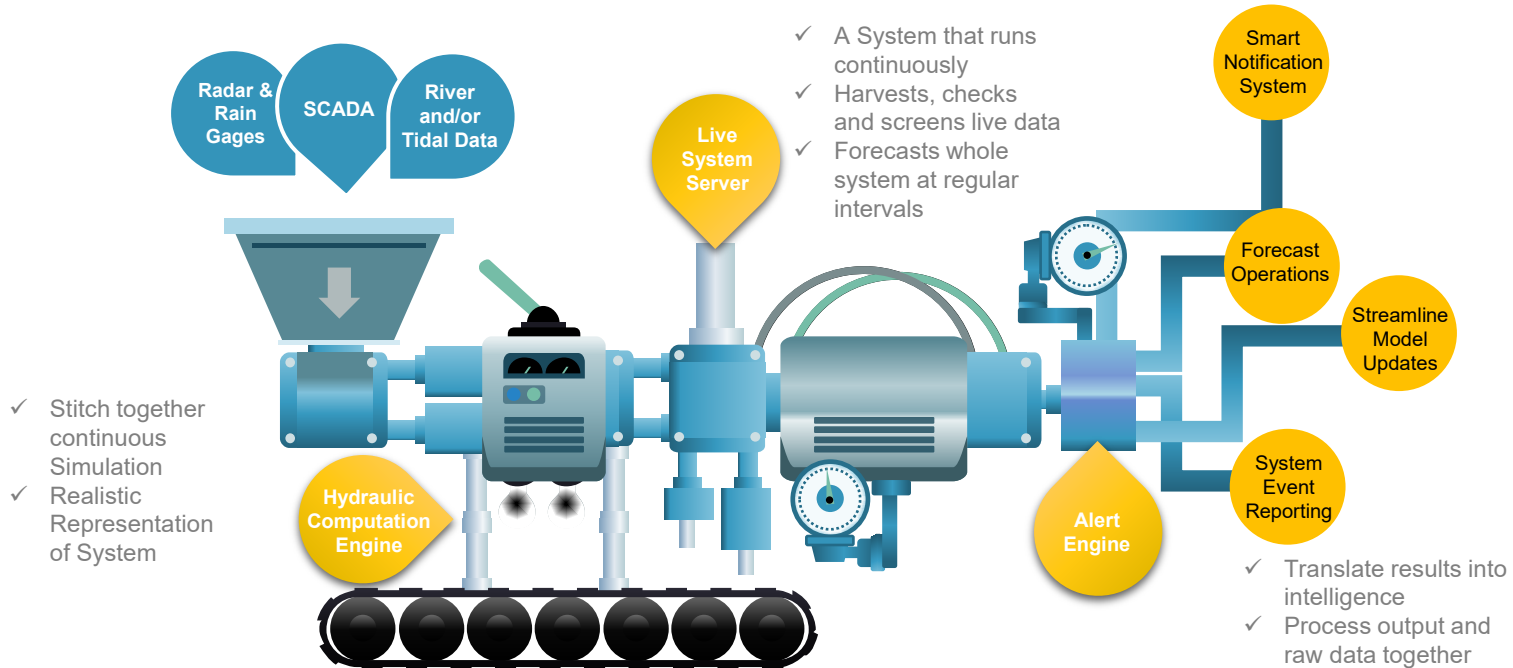
24-7 Event Monitoring/Alerts

Hydraulic Model Integration

REAL-TIME ANALYTICS

WORKFLOW AUTOMATION

SYSTEM FORECASTING

SENSOR HEALTH

Info360

ALERT MANAGEMENT

What is the Modeling Twin?
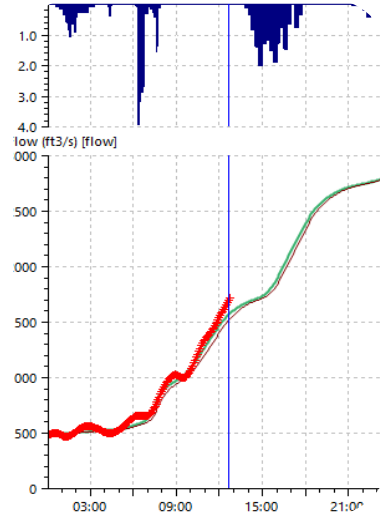
Live Modeling System

Live modeling isn't simple

Timely

Accurate

Reliable

Adaptable

Timely and Adaptable: Directly Connected Time Series Data
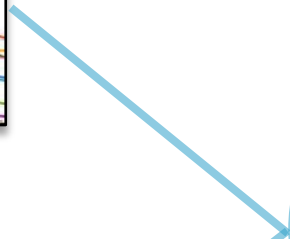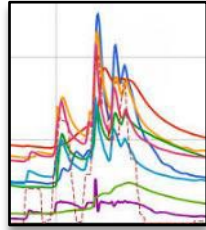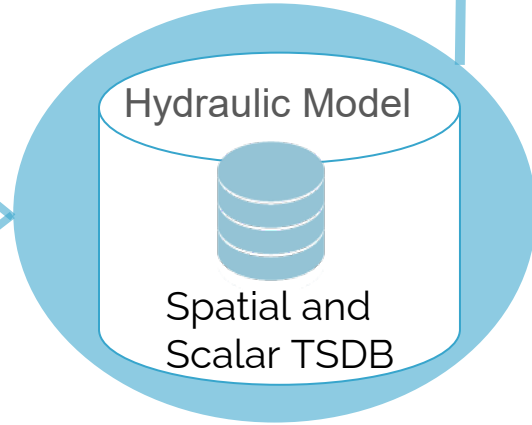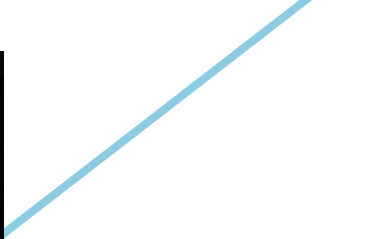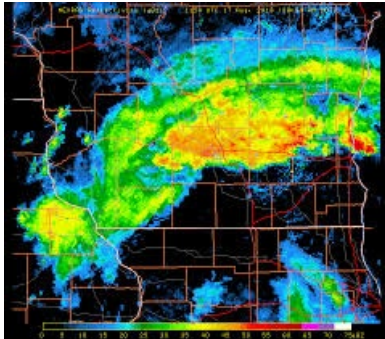
Accurate and Adaptable: Successive Simulation Approach
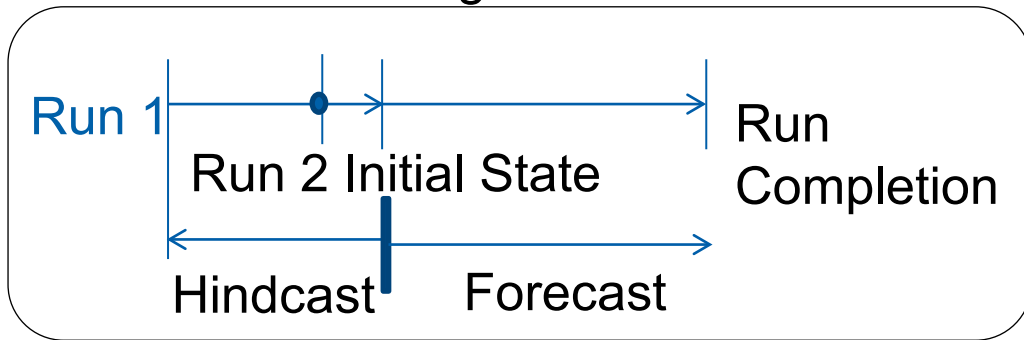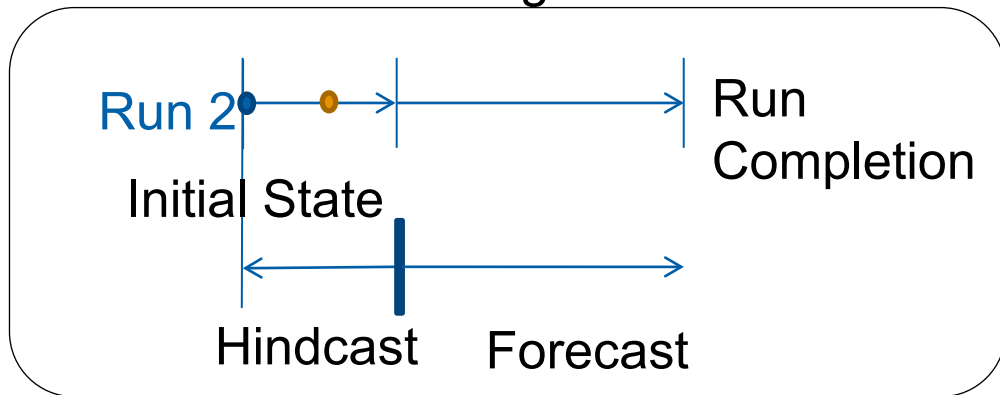
Accurate and Reliable: Problems with incoming SCADA Data is inevitable

- A Timeseries Database is essential to efficiently store all Raw Data

- Timeseries data needs to automatically scrub data and report on:
  - Data Gaps
  - Spikes and Anomalies
  - Data Conversions
  - Performs Data Smoothing
  - Sensor Aggregation
  - Etc.
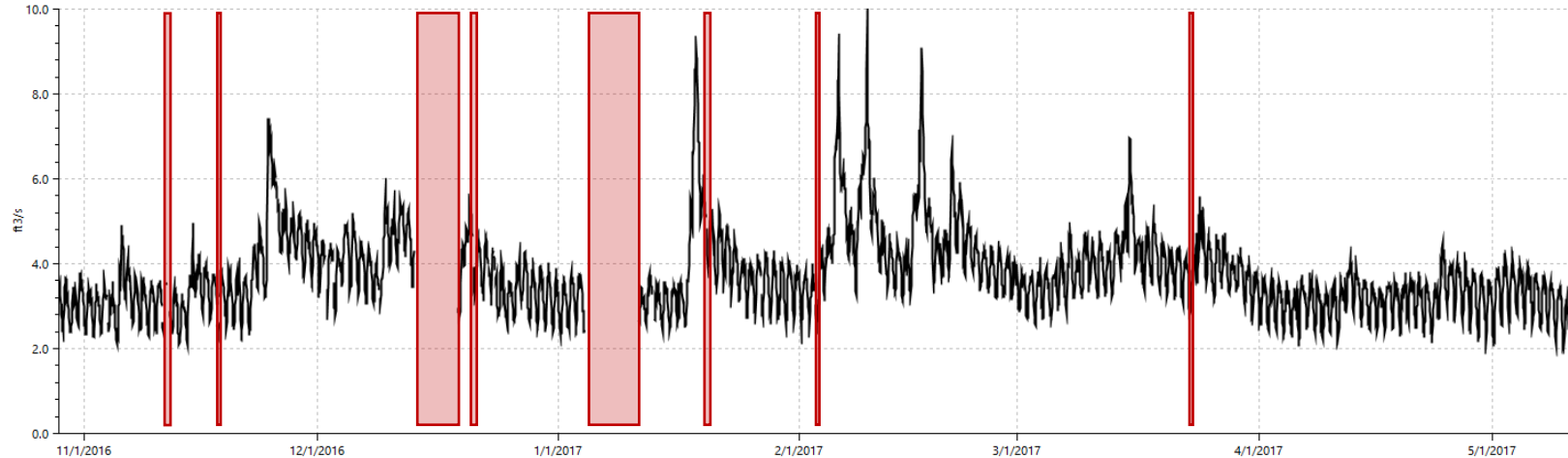
Optimizing Operations with the Glasgow Smart Canals

Project

- **Objective:** Maintain an appropriate water surface in the canal to mitigate against flooding

Challenges

- Flood risk needed to be limited with incoming rain events
- Canal had requirements to allow boats to navigate

Solution

- **Live Modeling Twin:** Live modeling system retrives forecast and SCADA data
- **Optimize Controls:** RTC optimizes sluice gate controls and exports to SCADA

Outcome

- Level optimization enables up to 2 million cubic feet of additional storage
- 270 Acres of land now accessible for development

Improving Model Accuracy with Anglian Water

⊕ Project

- **Objective:** Maintain the accuracy of a hydraulic model with a very large service area and ever-changing site conditions

⛰ Challenges

- Large number of models to manage with a service area covering 5 million customers

- Very laborious to constantly update models and keep with up to date with changing site conditions

🤲 Solution

- **Automate Model Builds:** Scripting was used to automate model updates from GIS data on a nightly basis

- **Constant Model Validation:** Scripts were used to validate and run the models, then compare them against real-time SCADA data

▤ Outcome

- Modelers can spend time on the analysis of the results rather than being concerned with updating the model and data management
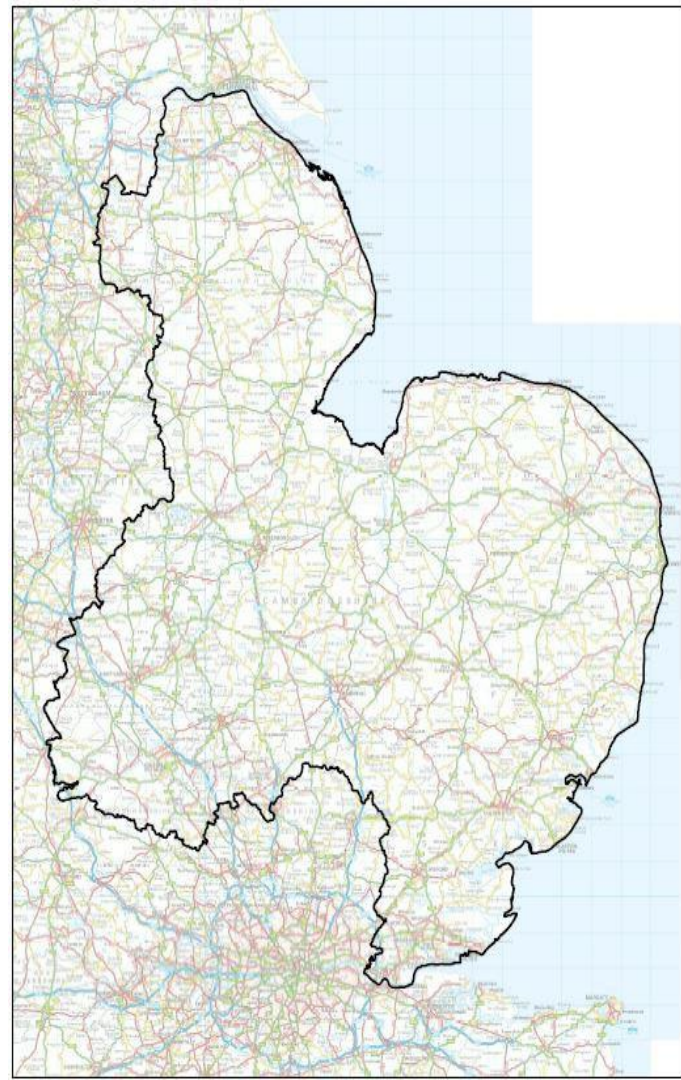
How does this relate to the IIJA Bill?

EDW21A09 WG9   S.L.C.

1995

1 SEC. 50217. STORMWATER INFRASTRUCTURE TECH-
2   NOLOGY.
3   (a) DEFINITIONS.—In this section:
4   (1) CENTER.—The term "center" means a cen-
5   ter of excellence for stormwater control infrastruc-
6   ture established under subsection (b)(1).
7   (2) ELIGIBLE ENTITY.—The term "eligible enti-
8   ty" means—
9   (A) a State, Tribal, or local government; or
10   (B) a local, regional, or other public entity

(B) IMPLEMENTATION GRANTS.—The Ad-
ministrator may make implementation grants
under this subsection for the following projects:

> (i) Installing new and emerging, but proven, stormwater control infrastructure technologies.

A09 WG9   S.L.C.

2002

(ii) Protecting or restoring inter-
connected networks of natural areas that
protect water quality.

(iii) Monitoring and evaluating the en-
vironmental, economic, or social benefits of

Infrastructure Plan Language

Drinking Water and Wastewater Infrastructure Act (S. 914)
- Sec. 112. Advanced drinking water technologies *(for small systems)*
- Sec. 213. Water data sharing pilot program *(can you say Cloud?)*
- Sec. 219. Advanced clean water technologies study *(cyber security)*

Water Quality Protection and Job Creation Act of 2021 (H.R. 1915)
- Sec. 11. Smart wastewater infrastructure technology grant program *(AI)*

![ASCE letter]

ASCE
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January 2021

On behalf of the more than 150,000 members of the American Society of Civil Engineers (ASCE), we would like to congratulate Joe Biden on his election as President of the United States. ASCE stands ready to work with President-Elect Biden as he addresses the significant challenges facing our nation, including modernizing America's infrastructure as part of the nation's economic recovery.

ASCE was founded in 1852 and is the country's oldest national civil engineering organization. It represents civil engineers in private practice, government, industry, and academia who are dedicated to the advancement of the science and profession of civil engineering. ASCE is committed to improving the nation's infrastructure to protect the health, safety, and welfare of the public. Daily, ASCE members are on the front-line of dealing with America's infrastructure crisis and know the benefits of making the needed improvements.

As we prepare for the year ahead, ASCE urges the Administration to work with Congress to prioritize our nation's infrastructure by developing legislation that not only makes critical investments, but creates jobs, protects public safety and acts as an economic recovery tool.

The Innovyze Intersection

- Innovyze has a rich heritage and reputation of managing clean water across the globe

- Innovyze leverages state of the art technology in an easy-to-use platform

- The Innovyze Digital AMP provides the recipe for healthy infrastructure management

- The Innovyze platform can provide the "collateral" for Federal. State, and Local funding (and financing…)

civil + structural
ENGINEER

Article   Water + Stormwater

Lifting a Community, a Holistic Approach
September 1, 2021   👁 2078

By David Totman

Congress and the Administration should be commended for the Senate-passed Infrastructure Investment and Jobs Act (IIJA)—a $1.2 trillion dollar proposal to fund transportation, energy, water and wastewater infrastructure, and many other critical capital projects and community initiatives.

Many times, the merit of legislation is measured by the individual programs and the level of funding for each unique effort. However, if we take a step back and evaluate the entirety of

How Far Does Your Asset Management Go?

- ASSET REGISTRY
- INSPECTION/DEFECTS CONDITION ASSESSMENT
- LOF & COF = TOTAL RISK
- REMAINING USEFUL LIFE
- RISK MATRIX
- DECISION TREE
- ASSET PRIORITIZATION
- PROJECT PRIORITIZATION
- ECONOMICS
- $

Building for a Successful Grant Application

Thank you!

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