

VEOLIA

Resourcing the world

Developing a Digital Twin at the Willamette River Water Treatment Plant

City of Wilsonville, Oregon

Kim Reid, Plant Manager & Project Leader

WILSONVILLE OREGON

What is a Digital Twin?



From Google:

A digital twin is a dynamic, virtual model that acts as a real-time digital counterpart of a physical object, system, or process. By using data from IoT sensors, AI, and simulations, it mirrors the physical asset's state, allowing for monitoring, predictive maintenance, and simulations to optimize performance without disrupting the real-world system. YouTube +3

What does it do?

From Google:

- **Real-time Synchronization:** Sensors on the physical asset feed data to the digital twin, ensuring it updates to reflect changes in condition.
- **Predictive Analysis:** AI and machine learning analyze this data to predict failures before they happen, enhancing maintenance and efficiency.
- **Virtual Simulation:** It enables testing of "what-if" scenarios, enabling users to test changes in a safe, virtual environment.

What are the benefits?

From Google:

- **Improved Efficiency:** Optimizes operations and reduces trial-and-error, as noted by Trend Micro.
- **Lowered Costs:** Identifies problems before they cause breakdowns, saving on repair time and expenses.
- **Enhanced Decision Making:** Provides high-fidelity 3D visualization for better, data-driven decisions. TrendMicro +3

Types of Twins

Individual component or part - particularly useful for equipment that is stressed due to heat, for example

→ Asset → System → Process

Functions: **Process Control**
Asset Condition Monito
Training



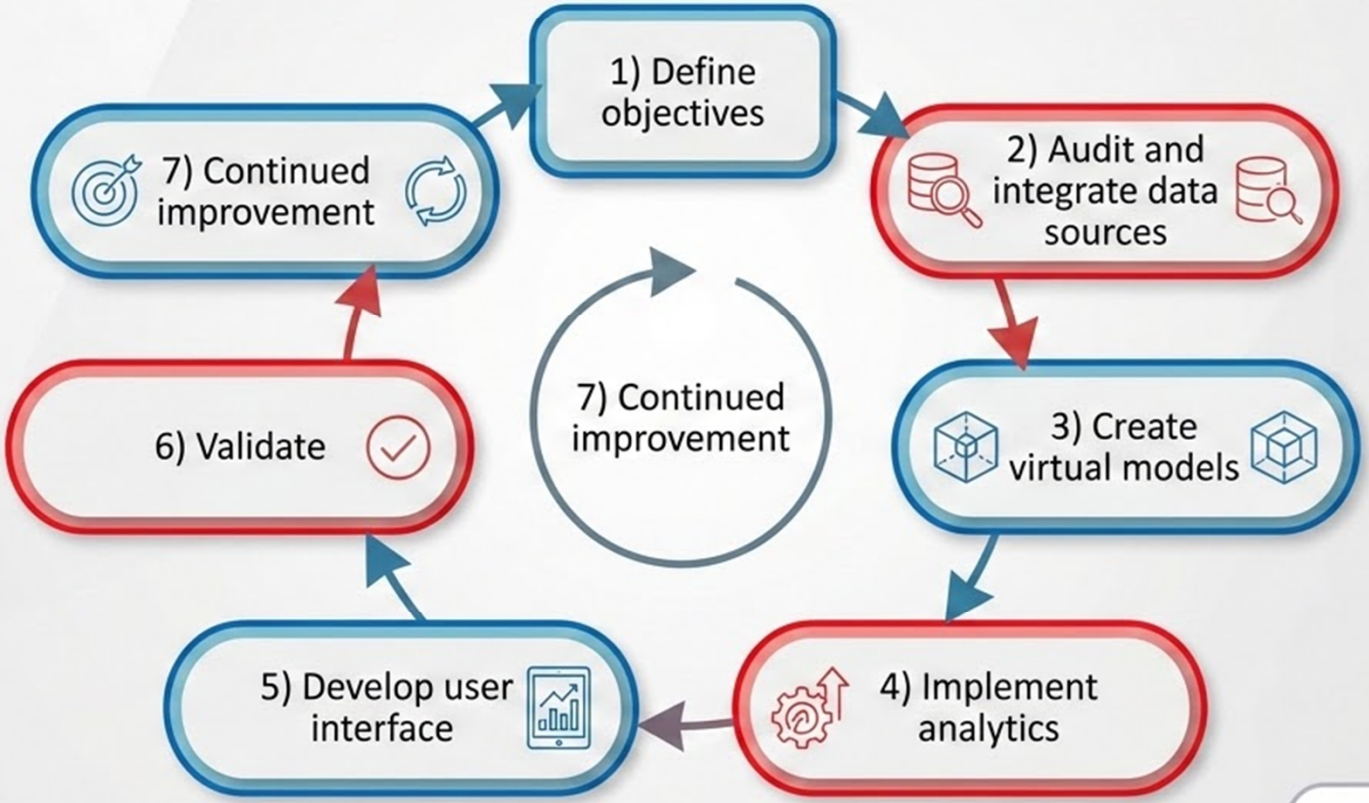
How?



"A key feature is real-time, two-way data exchange between the object and its virtual replica, helping ensure that simulated conditions accurately reflect the physical world."

From IBM

How?

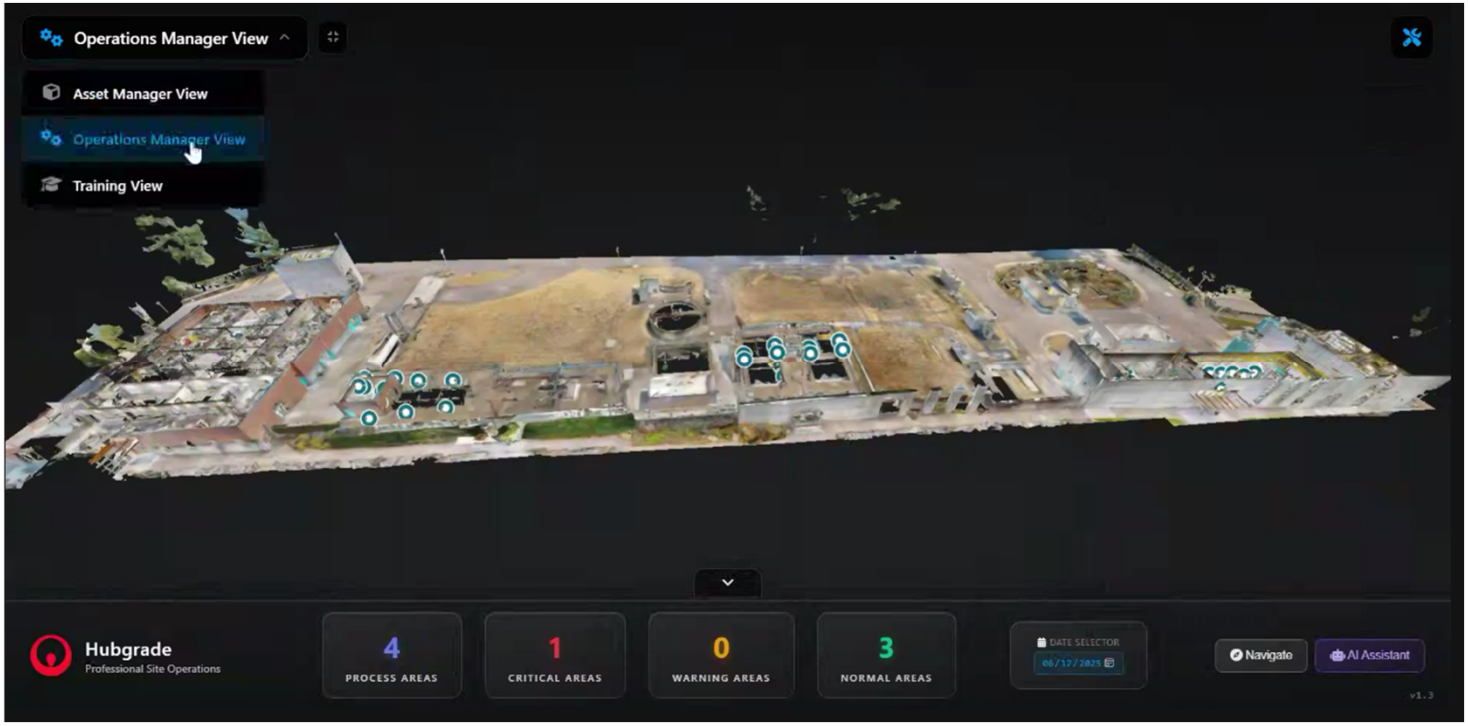

1) Define objectives
2) Audit and integrate data sources
3) Create virtual models
4) Implement analytics
5) Develop user interface
6) Validate
7) Continued improvement
7) Continued improvement

The Willamette River Water Treatment Plant and Park

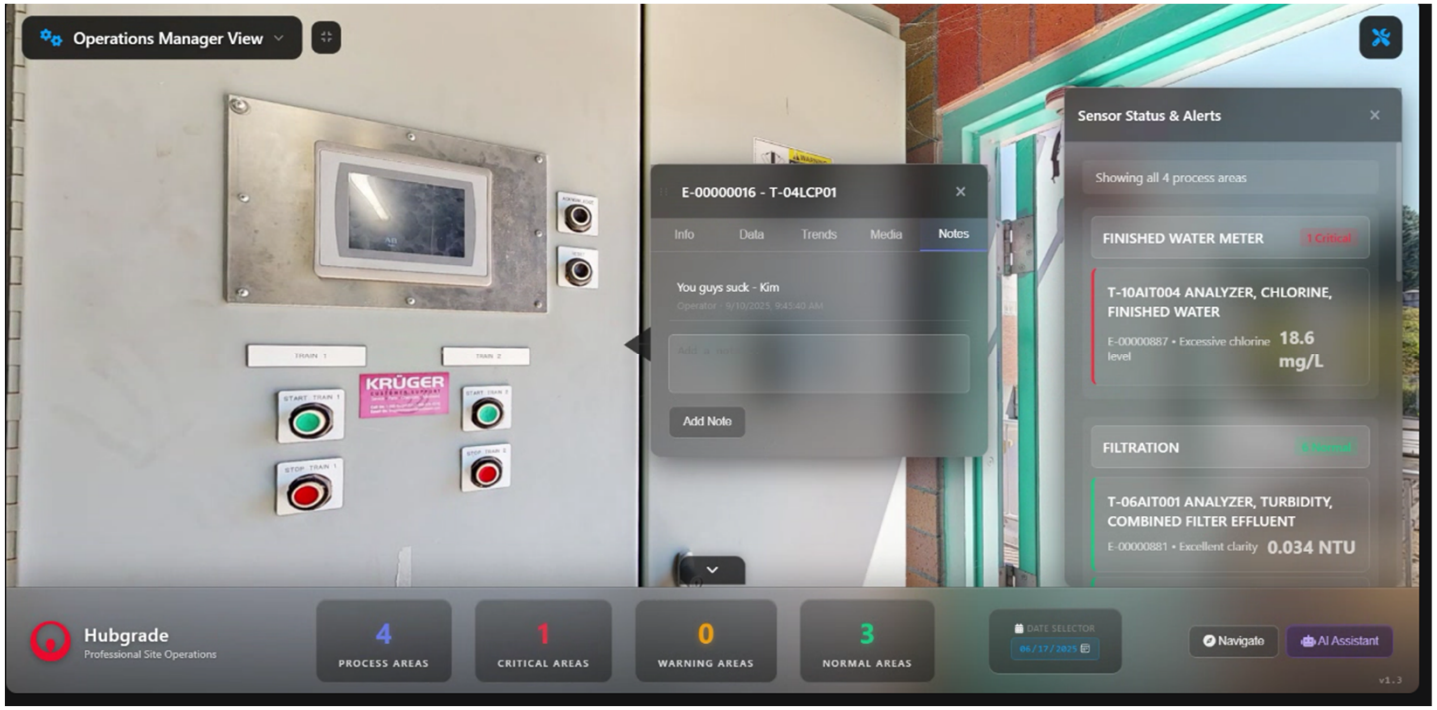


View developed from digital capture

Note the different views depending on the function



Operations or Process Data



Actiflo Process Control :

Chemical dosing

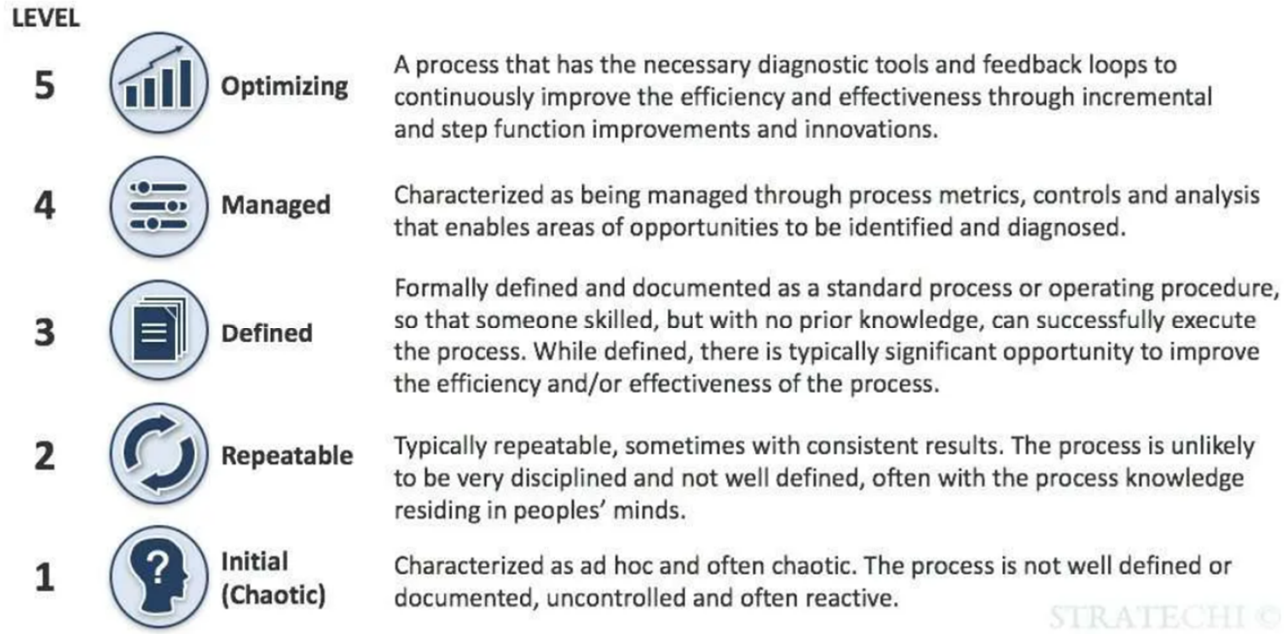
Water quality

Flow pacing

Mixer speeds

Digital Transformation!

How to transform data collection and integration into one platform that provides:
1) optimization
Leading to :
2) prediction?



Status of WTP Data in 2025

Operations data:



Original SCADA Wonderware - tags collect in 1-minute increments
In SQL database on server air-gapped from internet

Asset data:



In VAMS database - includes maintenance & asset specifications

Water quality data:



In Hach WIMS and Eurofins laboratory managed database

Potential Aspects of a Digital Twin for Wilsonville WTP

Join siloed databases: Lab and ops data from Hach WIMS, VAMS, SCADA Historian - need to add variables used for process control

Digital Twin is asset based starting with filming the plant - use for assessing equipment condition including run time from SCADA

Operations training using site specific **processes** enabled with AI

Operations training for site specific equipment like VFDs, centrifuges, ozone generators

Potential Aspects of a Digital Twin for the Wilsonville WTP

Contract required monthly operations reporting to the City - better graphics and created in real time

Operations optimization: to operate efficienciently, we must measure accurately and analyze what we find: Actiflo, ozone, filtration, disinfection

Augmented reality to enable assistance from manufacturers or other experts in the event of failure

The Strategy so far…

From the kick off meeting with the development team on 11/17

Project Team | Project Objective | Timeline | Key deliverables | Team Structure | Next Steps.. | Project Governance

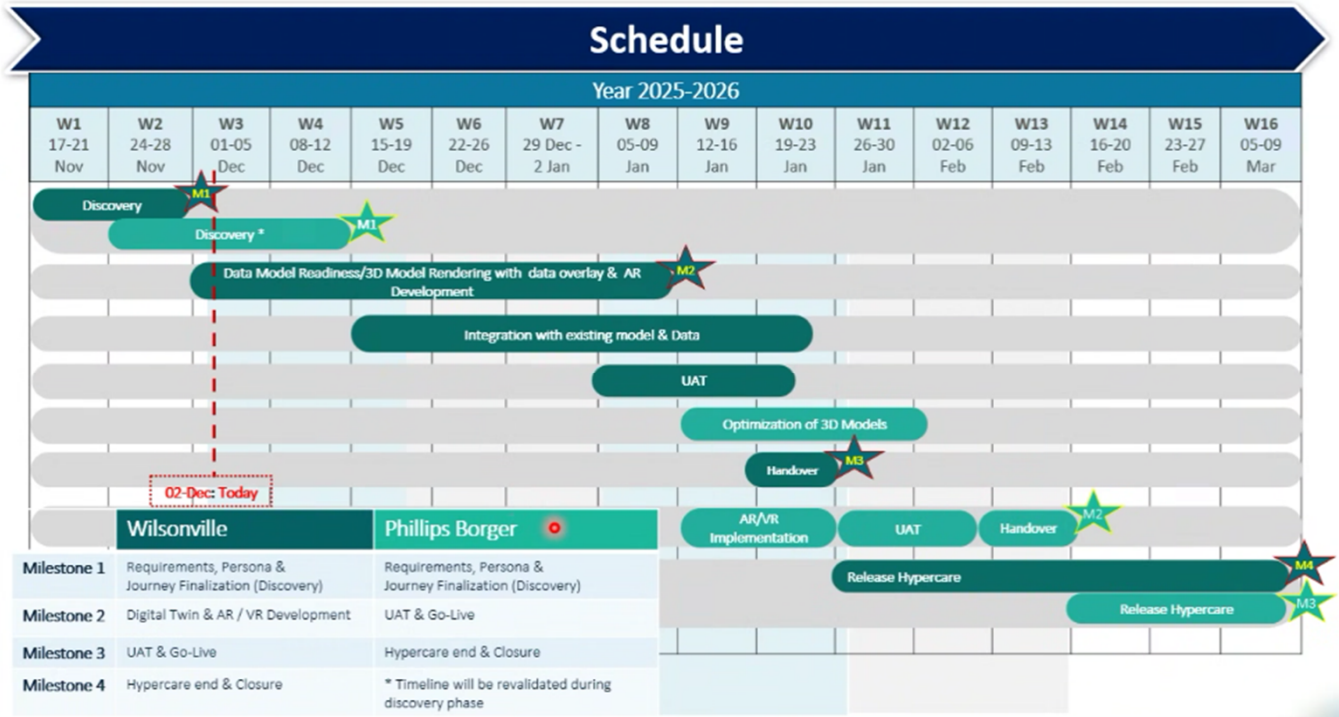
Sr.No	Phases	Milestones	Deliverables	Type
1	Discovery	Requirements, Persona & Journey Finalization	Business Requirements, User Journeys, KPI Definitions	Assessment Documentation
2.1	Development Setup	Environment & Repo Setup	Frontend Repo, Backend Repo	Setup
2.2	Digital Twin Development	Matterport Space Integration + Overlay Engine	Matterport Integration, Mixed Overlay Layer	Code Deliverable
2.3	VR / AR Development	Training module using VR-AR Indoor navigation	Training modules, Virtual assistant	Code Deliverable
3	Go-Live	UAT Execution	UAT Test Cases, UAT Signoff Report	UAT Reports
4	Hypercare	Production Release & Knowledge Transfer	Deployment Notes, KT Document, Closure Report	Training, Documentation

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Platform Delivery Schedule

Platform to be delivered by 3/6!

Inputs from WTP: Data & Documents



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In development - December:

Output is only as good as input!

Lots of updating needed to 25 year old manuals. Plus, new asset information creation.

RAID Log - Open

LOW MEDIUM HIGH

Sr. No.	Criticality	Action Description	Impact	Owner	ETA / Closure Date	Status	Comments
1	Medium	Unity Licenses, AGORA subscription	To continue the AR development	Kumar	15-Jan	In-Progress	Discussed in 11/25 Scrum call, Kumar will take it forward with Veolia authorities for discussion.
2	Medium	Training steps with location mapping information	Trainee module development	Kim and Raul	~~18-Dec~~ ~~24-Dec~~ 2-Jan	In-Progress	18-Dec: Received the process details form Kim. 22-Dec: Created the Training steps based on the shared data, Deployed the training on the POC environment. Kim and Kumar need to review. 26-Dec: Received the comments from Kumar team is working on that
3	Medium	Work order steps with location mapping information	Operator module development	Kim and Kumar	~~18-Dec~~ 2-Jan	In-Progress	Waiting for the workorder instructions form Kim. 26-Dec - Received the Work order instruction on Dec 29th from Kumar team is working that to create steps
4	Medium	UI / UX design	Web development	Kumar	~~15-Dec~~; ~~19-Dec~~ 2-Jan	In-Progress	12/11: Submitted to Kumar for review and approval
5	Medium	Logic to highlight the marker in manager view	Manager module development	Kumar	~~26-Dec~~ 2-Jan	In-Progress	Need to analyze the data Hach WIMS and understand the data availability to build logic 25-Dec: Received the Hach WIMS access and team is analyzing the data 30-Dec: Kumar will arrange the call with Kim to identify the logic
6	High	Dev deployment environment	Dev deployment and Testing	Kumar	~~17-Dec~~;~~30-Dec~~; 7- Jan	In-Progress	Frontend and backend are developed separately
7	High	Philips Borger Matterport photographer	Web development	Kumar	5- Jan	In-Progress	12/30: Kumar confirmed the Scheduled for photography 12/30, so, details expected in the week starting 01/05
8	High	Scope for the UAT testing	Digital Twin	Kim / Kumar	9 - Jan	Open	Based on inputs received for Wilsonville, scope of walkthrough, training modules and work orders will be jointly agreed upon with Kim

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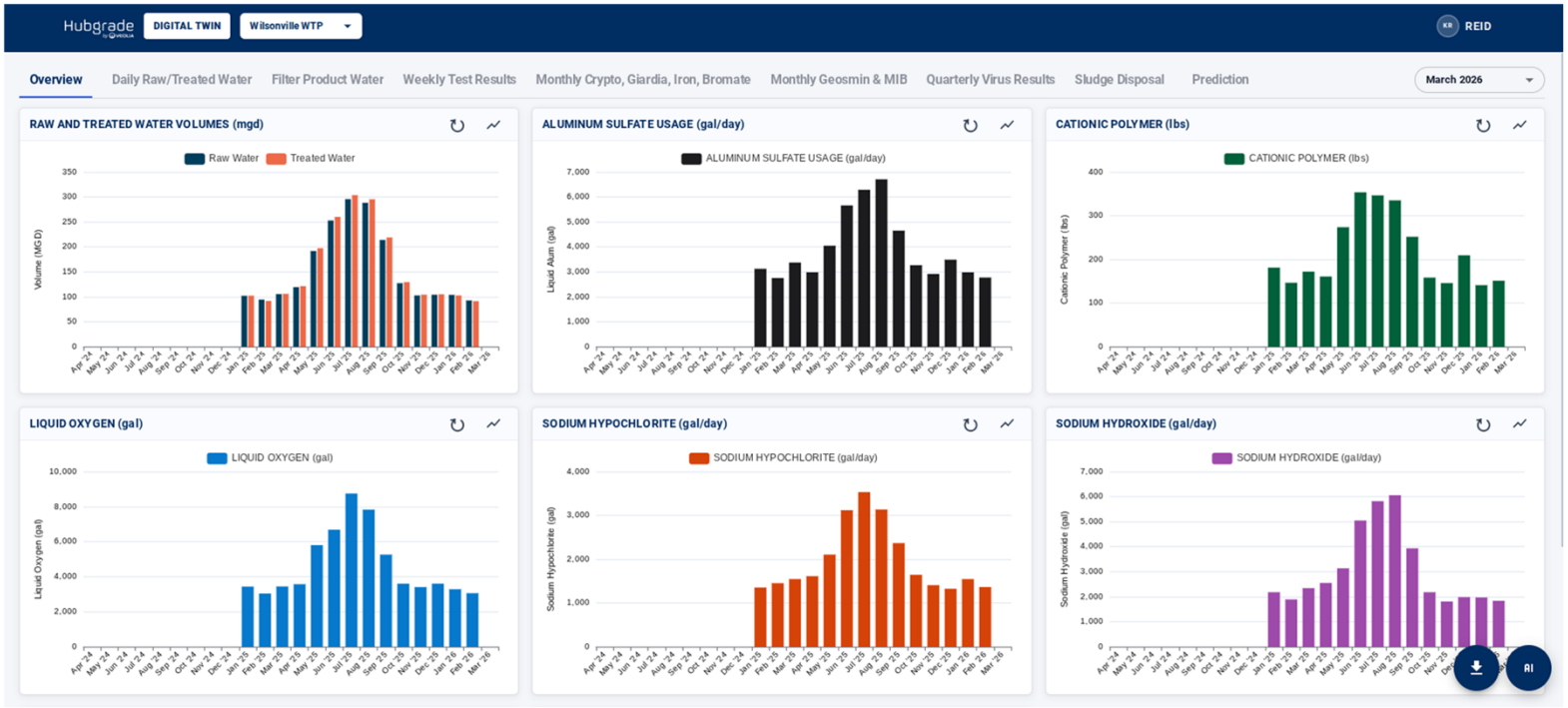
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Welcome to the Model!

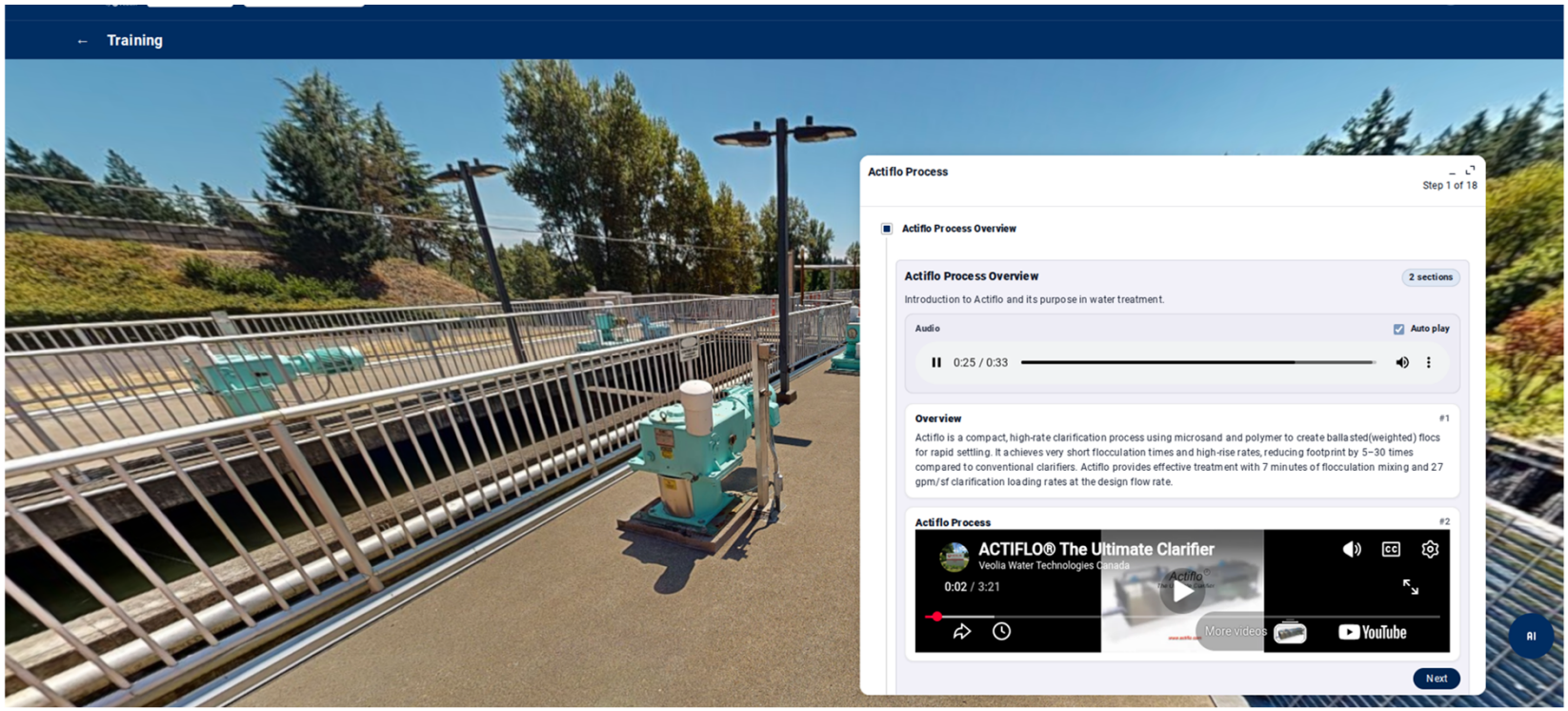


Manager View

Data is imported from Hach WIMS – Need to increase the frequency of data input to WIMS



Training View



Twin - delivered and steps to go

Status on March 10, 2026 : 6 months in development

Delivered: Plant walk through as was - would like to be able to clean up some images and get close ups of HMIs, floc basin, and inside vaults

Delivered: AI augmented training platform - would like to add content; need to provide updated documents from 20 MGD uprating construction and refine answers from AI

Delivered: Dashboard with operations tracking using Hach WIMS data

Twin - delivered and steps to go

Status on April 1, 2026 : 8 months in development

Continuing work:

- Add documents/databases for better responses from AI
- Augmented reality
- Add variables for more granular operations tracking for process control and operational optimization - currently working on WIMS
- Develop asset information to capture equipment testing for level of service determination

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Thank you for your time!

Kim Reid, Project Leader/Plant Manager

ENVIRONMENTAL SOLUTIONS FOR BUSINESSES, INDUSTRY AND COMMUNITIES