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Digital Twins with Info360

The past, present & future state of networks & treatment plants

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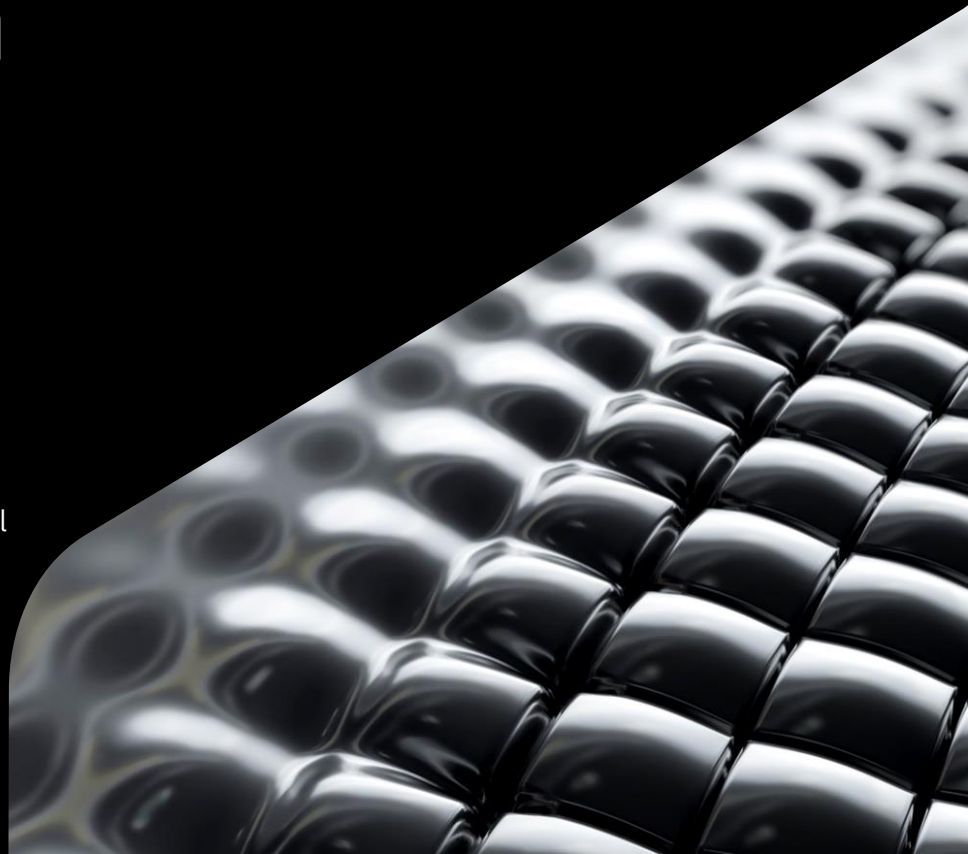

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Digital Twins with Info360 for Past, Present & Future…

- Collaborate with Operational Analytics and AI for problem solving
- Integrate your multiple data models for use across your organisation
- Evaluate the ROI of operational digital twins for the water industry
- Understand your journey to the adoption of digital twins

About Innovyze

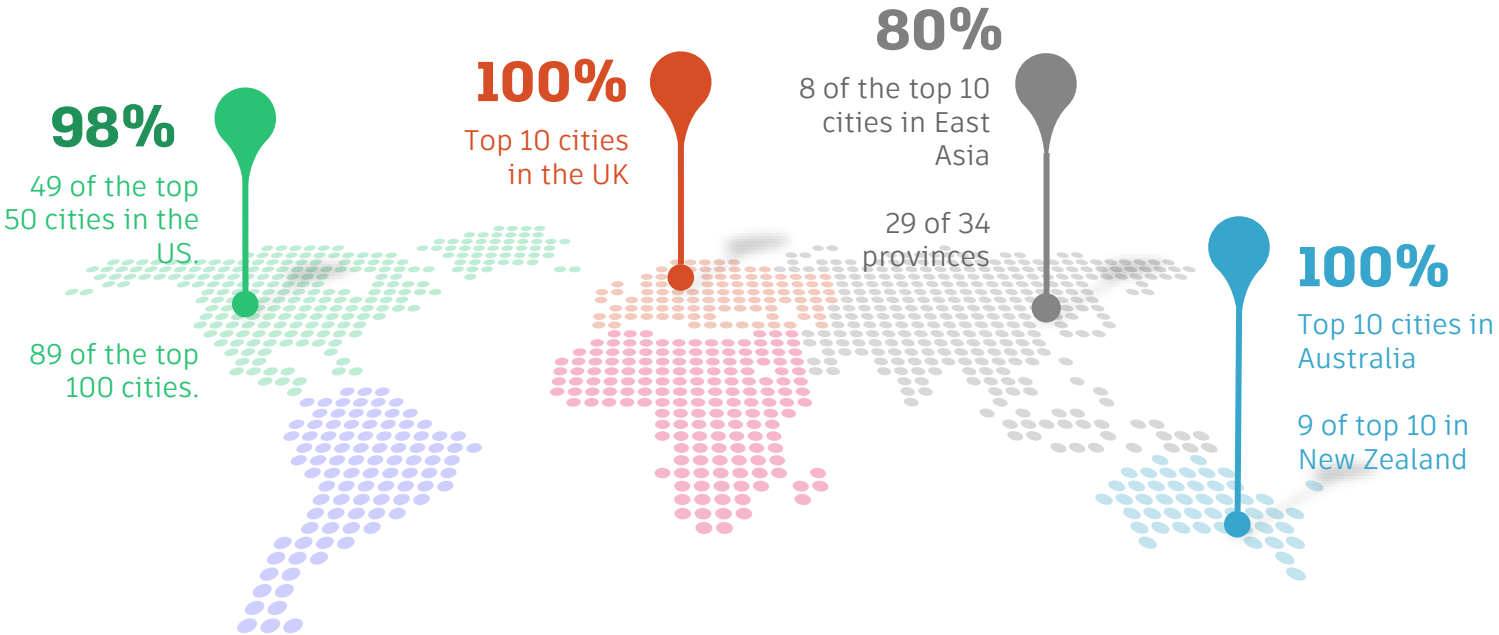
Water Infrastructure Software Experts

35+
Years

6,500+
Clients

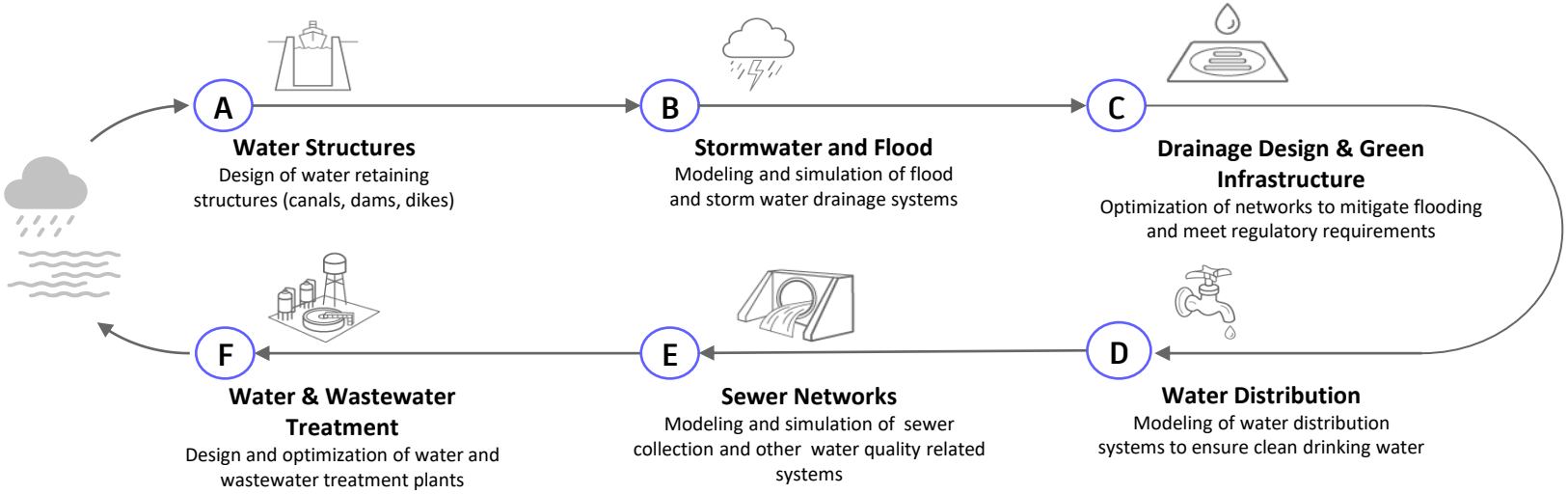
60+
Countries

Asset Management | Drainage | Stormwater, Sewer & Flood | Water Distribution | Analytics



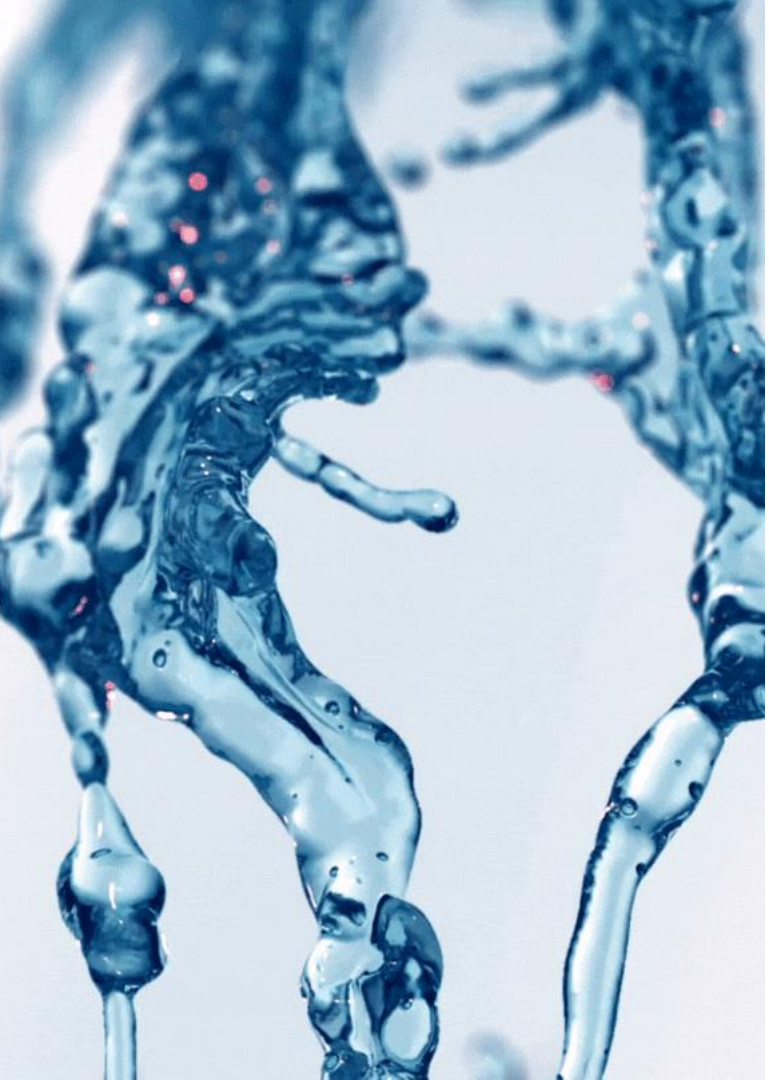
Industry Snapshot

We capture the water value chain from cloud to sea



Planning + Design & Hydraulic Modeling + Construction Cloud + Asset Management + Operational Analytics = BEST IN CLASS WATER PORTFOLIO IN MARKET

Autodesk Innovyze



Operational Opportunities for Digital Transformation

Water Distribution

- Predict service failures
- Minimize time without supply
- Identify/locate bursts
- Manage leakage
- Reduce pumping costs
- Manage pressure & water quality
- Optimize energy & cost of water treatment

Wastewater & Stormwater

- Predict/reduce overflows
- Predict/manage flooding
- Reduce pumping costs
- Optimize use of storage
- Manage wastewater treatment plant flows & efficiencies

SCADA

Rain gauge

IoT

Time series

GIS

Field reports

Weather

Water quality

Model

AMR/AMI

Complaints

Field test

Data is being underutilized

Gain control of your data investments

Improve operational efficiency with insights to your asset performance

Reduce team siloes with increased transparency across departments

Mitigate risks associated with technology investments

A Question for you

How far are you from deploying Digital Twins in the operations space?

It’s possible in the cloud

Info 360

Unified & integrated solutions to deliver a **dynamic digital twin** for water

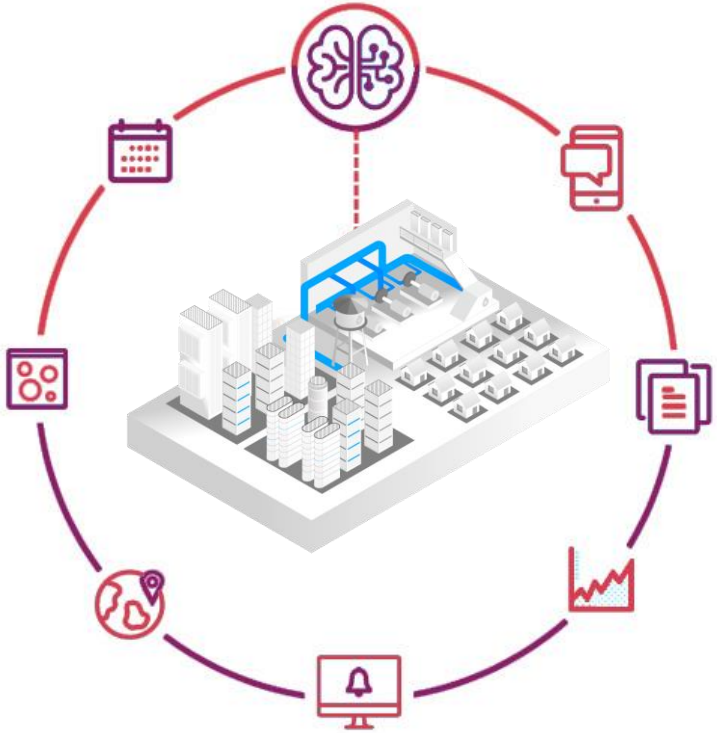
- Storm Sewer Flood
- Water Distribution
- Operational Analytics & Artificial Intelligence
- Drainage Design
- Asset Management

↑ ↑

- Hydraulic Models
- SCADA
- Reporting
- Machine Learning
- Risk Management
- Asset Planning
- Design
- Simulations
- Mapping

Digital Twins

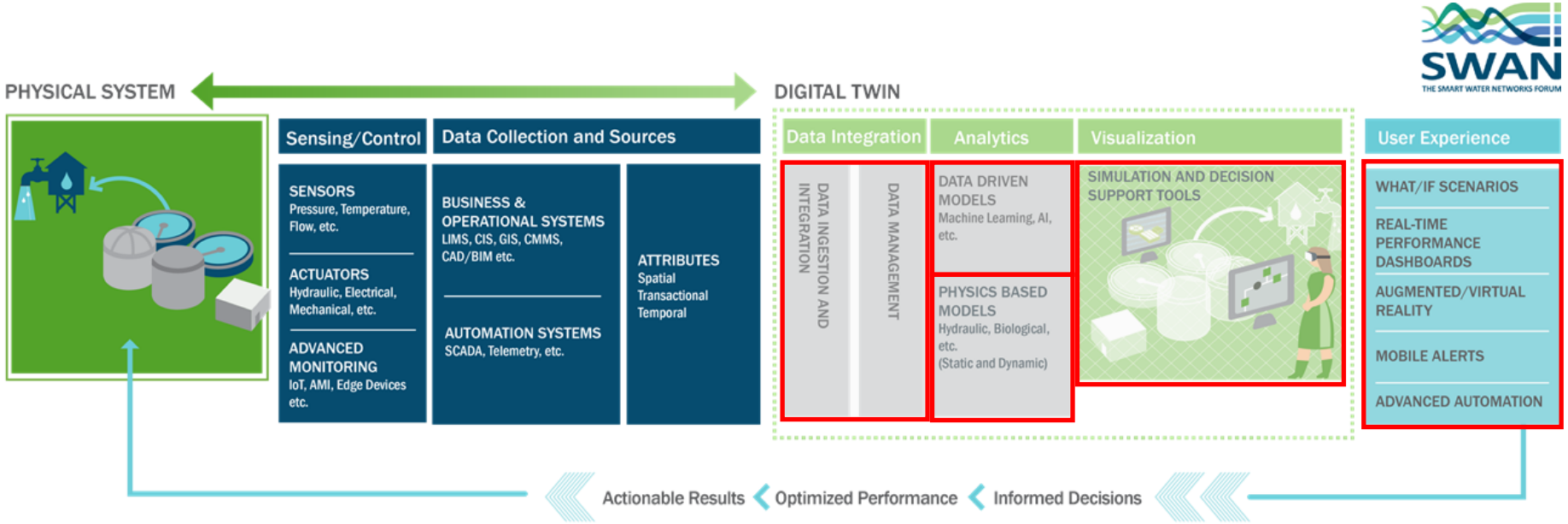
A water industry's definition



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

SWAN Forum

SWAN Digital Twin Architecture



Time Horizon, Models Utilised & Problem Solving with Digital Twins

PAST (1-24 Hours)
Incident Reporting, 24/7 Monitoring, Compliance Reporting, Pump performance, Maintenance Programs, Asset Condition & Capacity

PRESENT (NOW)
DMA and Water Loss Management, Operations and Energy Optimisation, Incident & Forensic Analysis

FUTURE (4-6 Hours, 5-7 Days)
Proactive Network Management, Contingency Planning, Energy Reduction & Maintaining Compliance

Past

Historical Data & Analysis

Wellington Water digitises preventative asset maintenance with Stantec

USER STORY

KPIs:

- Continuous monitoring & testing of pump performance
- Reduce Energy Opex

Highlights:

- Eliminate antiquated Excel spreadsheet calculations and free up time for analytics and performance monitoring.
- Utilise internal and external expertise.
- Streamline, standardise and scale analysis

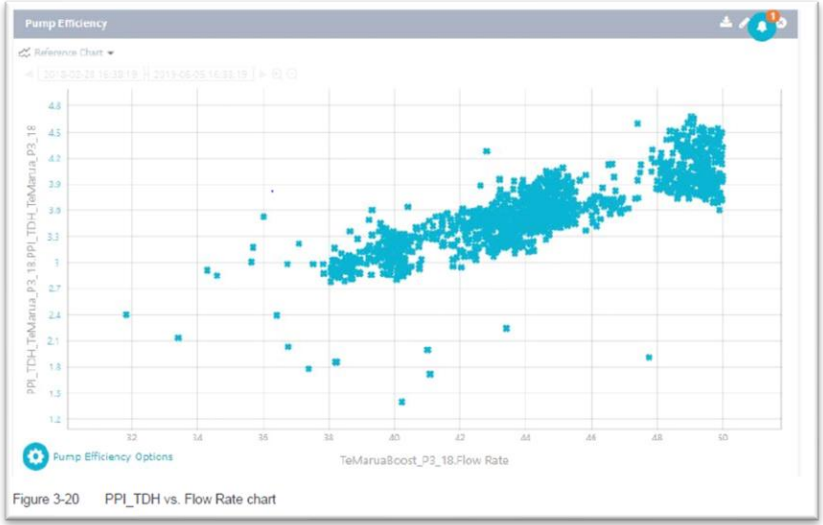
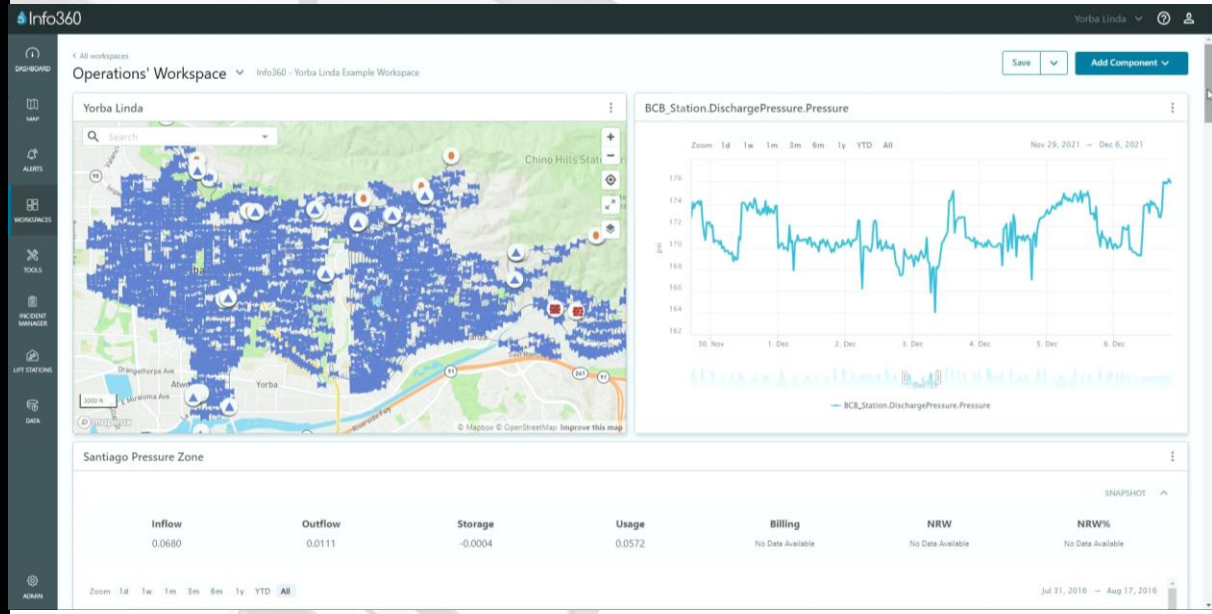


Figure 3-20 PPI_TDH vs. Flow Rate chart

Info360 Insight

A SaaS application specific for the Water Industry

Streamlined access to unified data, purpose built KPIs, customizable dashboards and managed workflows so you can focus your limited resources where they have the greatest impact.



Present

Event Detection & Rapid Response

USER STORY

Water Corporation deployment and implementation of Smart Water Network (SWN)

Operational Analytics Approach:

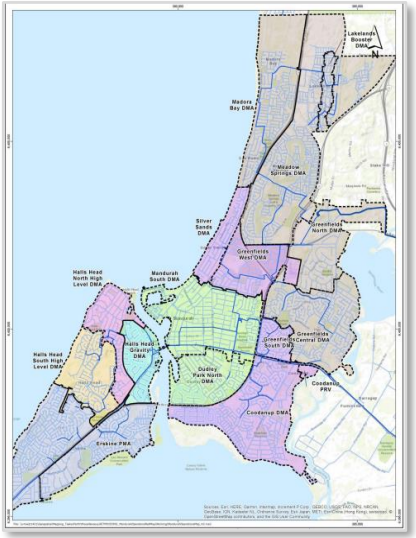
Digital platform combining a real-time network performance data dashboard and live hydraulic model.

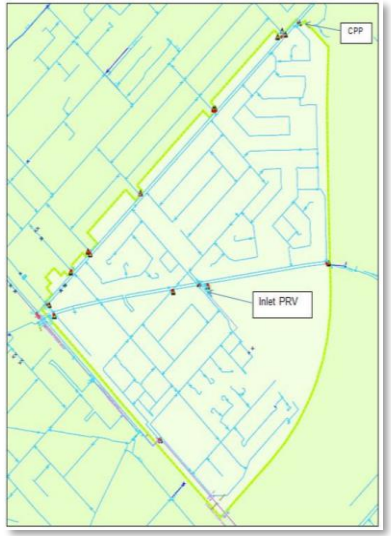
KPIs:

- Ageing infrastructure causing pipe breaks
- Water losses: NRW reported at 13% with a 2030 target of 10%

Highlights:

- Use of Smart Water Technologies (SWN) to further reduce leakage
- Optimise existing District Metered Areas (DMA) and Pressure Managed Areas (PMA)
- Cost benefit analysis of near real-time and predictive modelling



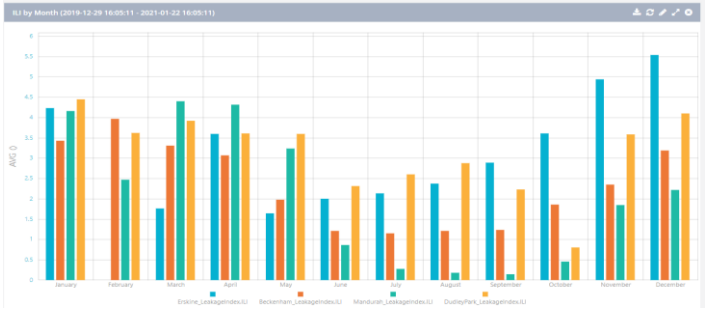


USER STORY

Water Corporation deployment and implementation of Smart Water Network (SWN)

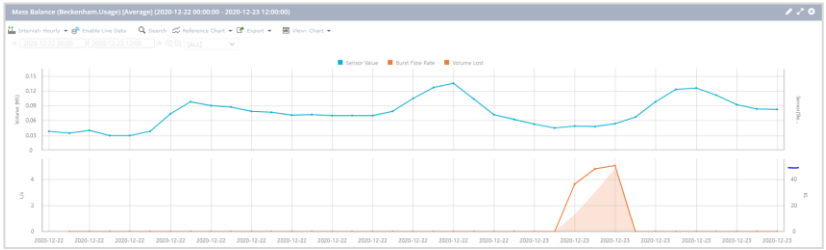
Data Driven Model with Performance Dashboard:

"Understand how the pressure & flow management might impact global key performance indicators such as ILI"



Continuous Performance Tracking

- Effectively query telemetry data to determine and rank leakage performance across DMAs



Simulated Burst Test & Detection

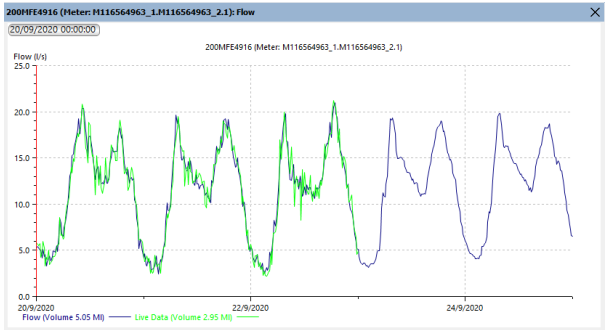
- Analytic approach was proven capable of identification and volume estimation

USER STORY

Water Corporation deployment and implementation of Smart Water Network (SWN)

Physics Based Model with Operator Interface

"Test the cost-benefit of having near real-time and predictive pressure and flow capability over and above existing practices"

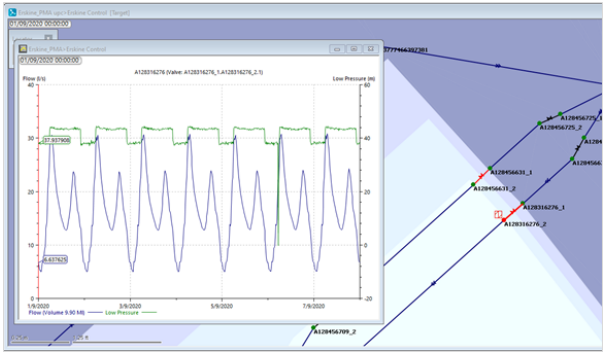


Demand Forecasting Using Machine Learning

- Fully integrated with the live hydraulics for predictive modelling

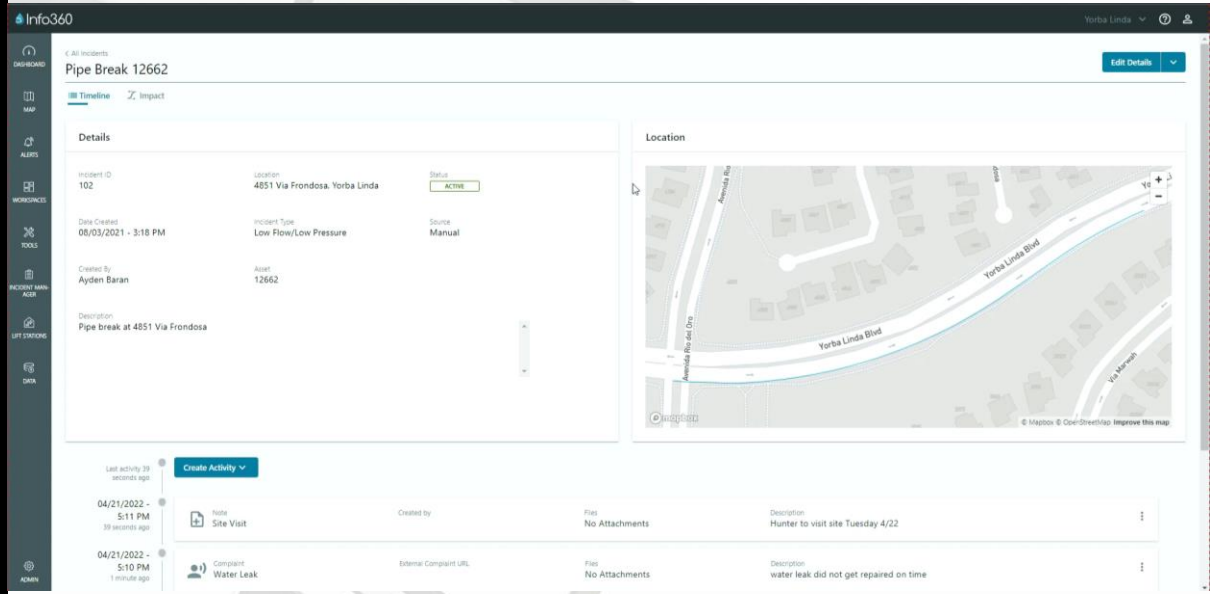
Live Model for Pressure Optimisation

- Operational scenarios prior and during control room/field implementation



Workflow for Rapid & Optimal Resolution

Experience designed workflows that allow you to apply recommended actions to improve service delivery.



Future

Predictive Recommendations to Optimize

Predictive AI recommendations for real-time optimisation of plants and networks

Prescriptive Analytics

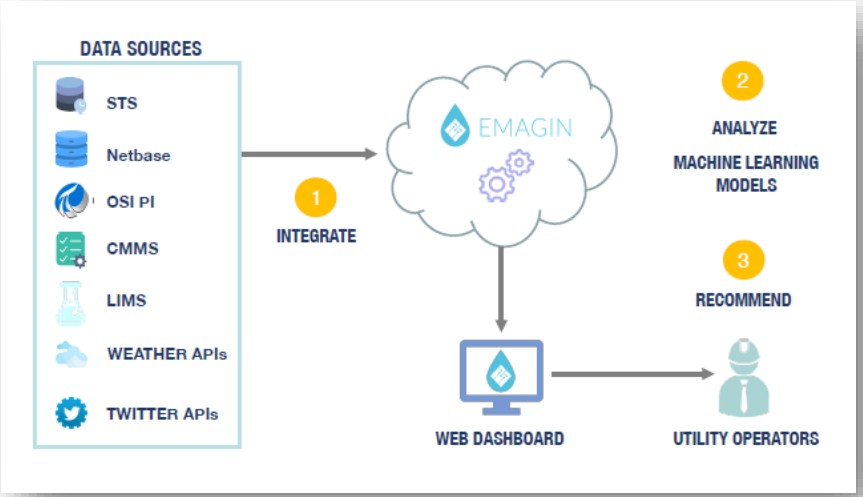
Utilising Model Predictive Controls (MPC) to provide predictive recommendations for optimising chemical and energy use at process plants and distribution networks.

KPIs:

- Reduce energy & chemical OPEX
- Improve network resilience and increase the transparency of complex operational decisions.

Application Areas:

- Wastewater Treatment/Process
- Water Treatment
- Water Distribution Networks



Reducing energy requirements by improving sludge quality

User Findings

Innovyze AI Approach:

Develop an AI-based digital twin of the dewatering facilities to identify the optimum polymer dosage rate, improve solids quality and steam production to **reduce energy costs**

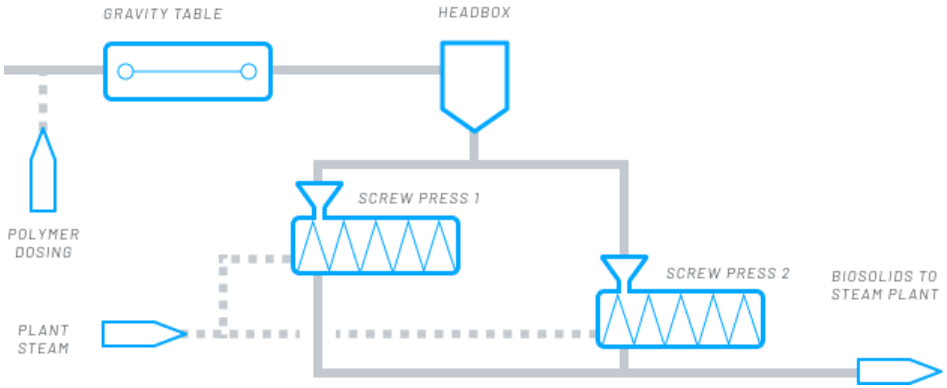
KPIs:

- Target to optimize polymer dosage and sludge quality
- Optimise energy use by improving steam production by maintaining and improving sludge quality consistency

Application Areas:

- Predictive, real-time polymer dosing recommendations
- Optimised around closed loop energy requirements
- Energy reduction
- Data driven simulations

SLUDGE DEWATERING UNIT OPTIMIZATION

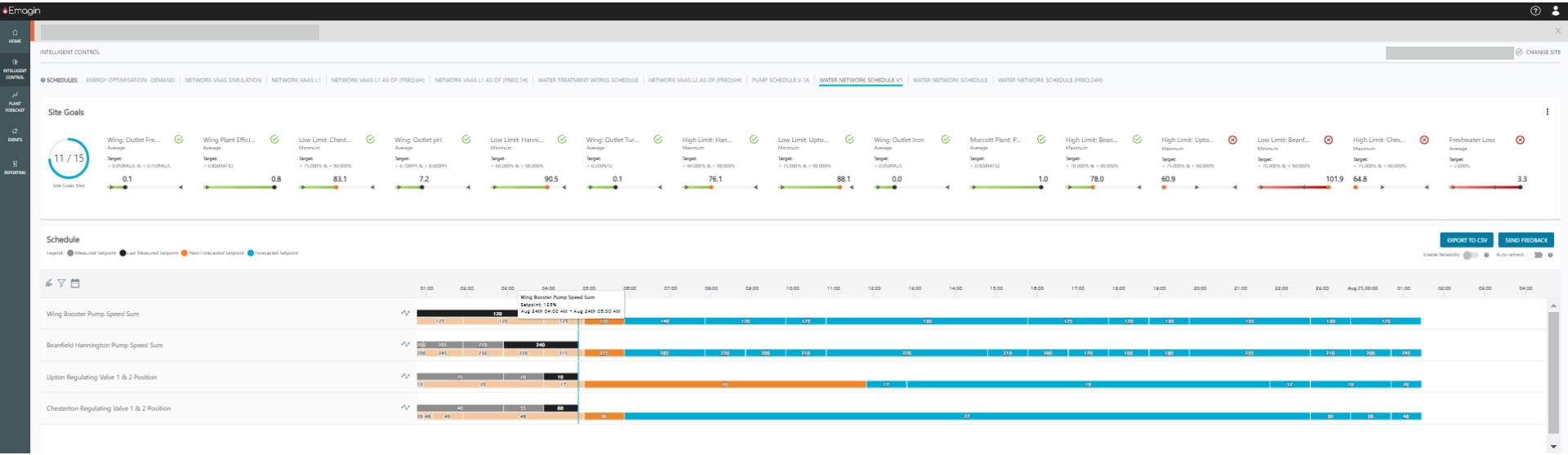


OPTIMIZATION THROUGH ACCURATE POLYMER DOSING

Key Performance Indicator	Historical Operations (Annual)	AI Optimized Operations (Annual)	AI Savings Annual
Polymer Ratio Avg	0.019	0.018	0.001
Sludge Dryness Avg (%TS)	33.42%	36.64%	3.22%
Polymer OPEX ($)	$230,592	$218,456/yr	$12,136
Oil OPEX ($)	20674.64Bbl $1,137,105.20	18857.71 Bbl $1,037,174.05	1816.93 Bbl $99,931.15
TOTAL OPEX SAVINGS FROM DRYNESS OPTIMIZATION ($)			**$112,067.15**

Recommend Optimized Schedule

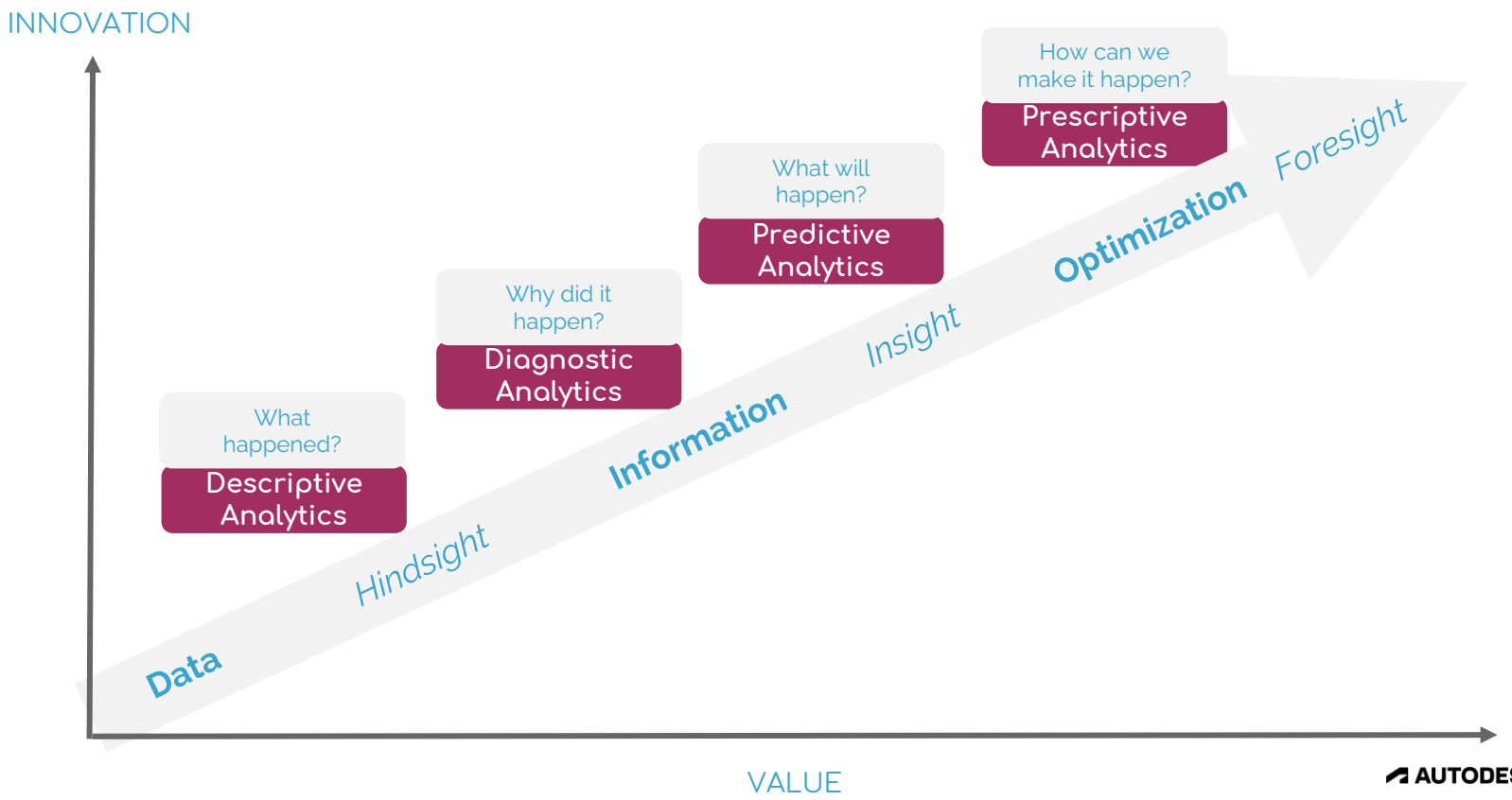
Monitor and Maintain Operations Within Control Limits



Digital Twin Maturity

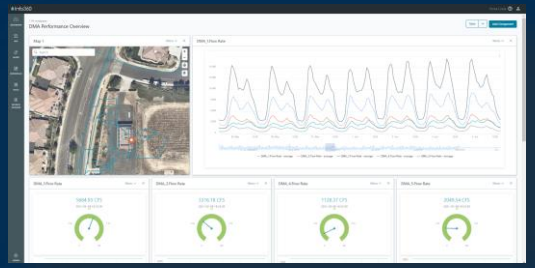
A journey within a platform

Path to Optimization



Digital Water Analytic Maturity

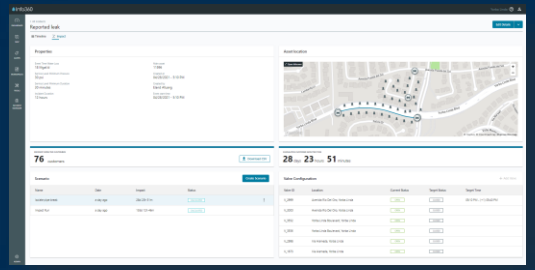
DESCRIPTIVE ANALYTICS



APM SOLUTION PROVIDERS

ABILITY TO MONITOR, VISUALIZE AND REPORT ON THE PERFORMANCE OF ASSETS ACROSS A SYSTEM

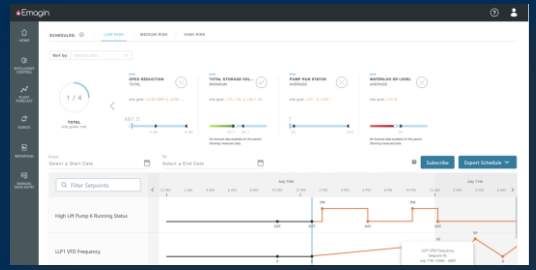
PREDICTIVE ANALYTICS



MODELLING SOFTWARE, ANALYTICS PLATFORMS

ABILITY TO SIMULATE SYSTEM BEHAVIOUR OFFLINE, PROVIDE PREDICTIVE INSIGHT INTO EXPECTED PERFORMANCE & DEGRADATION RATES.

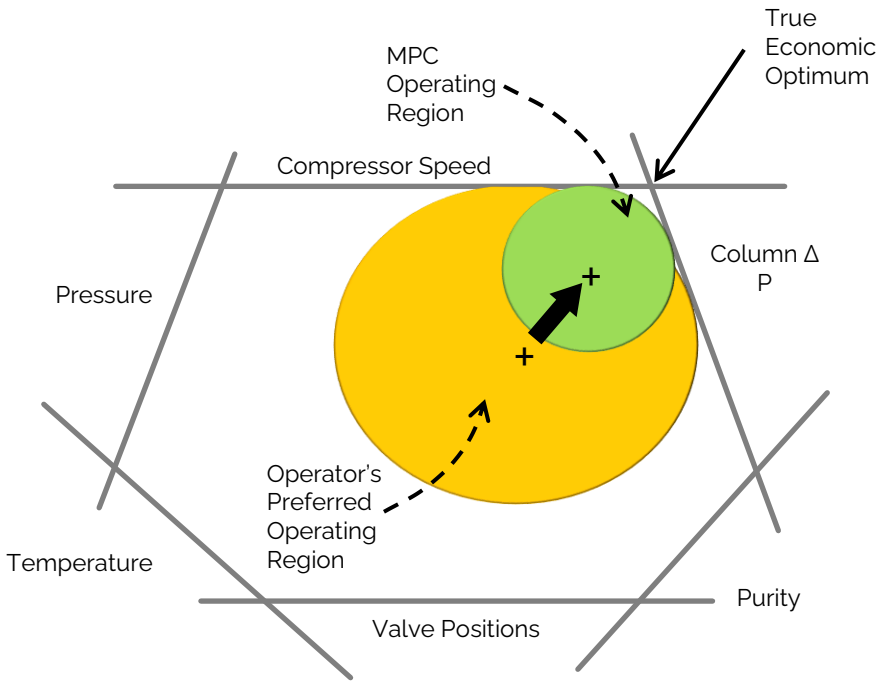
PRESCRIPTIVE ANALYTICS



AI/MACHINE LEARNING TECHNOLOGY

ABILITY TO PROVIDE SYSTEM WIDE SUPPORT AND RECOMMENDATIONS ON OPERATIONS, MAINTENANCE & PLANNING

Why Prescriptive Analytics?



Every day, facility Operators and Engineers make dozens of complex **operational decisions** based on **individual human judgement** and experience.

How do you take a **"uniform" approach** to

"Consistently delivering maximum value" in **dynamic and multivariate** process plant conditions?

Introducing...

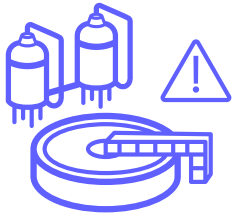
Prepare for Optimisation

What is Info360 Plant?

Real-time data analysis for water and wastewater treatment plants

Info360 Plant

Data visualization and analysis



Performance monitoring and optimization

Consistent and efficient reporting

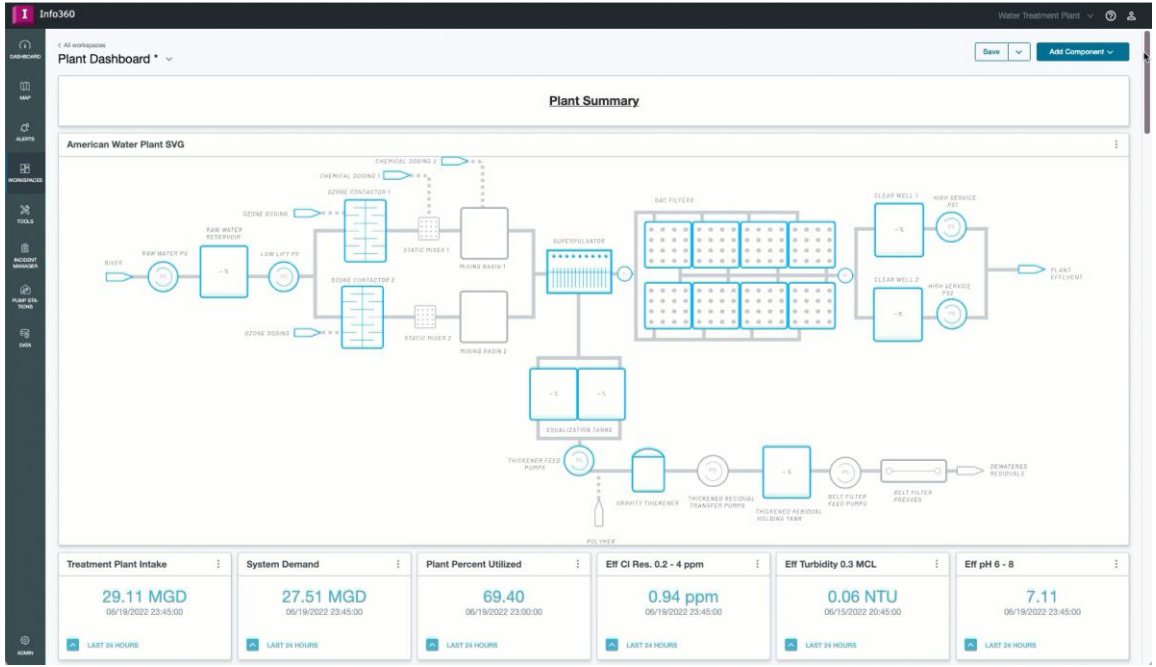
What can I do with Info360 Plant?

Product capabilities and supported workflows

Capabilities	Custom water analytics	Cost management	Performance tracking	Compliance reporting	Training & knowledge retention	Incident Management
Workflows	• Connect various data sources • Generate ongoing custom calculations • Create personalized visualizations	• Energy cost tracking • Chemical cost monitoring and optimization • Downtime cost calculations	• Pump analysis tools • Bioreactor analytics • Coagulation / flocculation efficiency • Daily reports	• Configurable monthly reports • Simplified data export features • Custom alert criteria • Issue Management	• View past events and outcomes • Record on-going best practices in workspaces • Generate facility summary	• Custom alerts • Process engineer creates workspace • Workspace gets used to track and gain insights from stakeholders
Unified data	Historian | Laboratory | Weather | Cost Items | Process & Instrumentation Diagrams | Photos | Field Data					
Insight	Dashboards · Reports · Data Connector · Performance Benchmarks					
Admin	Facilities Management· User Management Editor Viewer· Account Admin · Data Federation					

Why do I need Plant?

- One source of truth to build a collaborative data culture
- **Reduce process and workflow complexity**
  - Onboarding and Training
  - Simplifying Asset | Process Relationship
- **Improve performance and level of service**
  - Chemical Dosing
  - Energy Use
  - Improve Water Quality
- **Automate reporting processes and easily generate status and compliance reports**
  - Reduce hours spent finding, organizing, and cleaning data
  - Generate consistent status reports for benchmarking



Adopt Digital Twins

Convergence of tech + ease of adoption

Time Horizon, Models Utilized & User Interactions with Digital Twin

User Built Workspaces

Utilized on a daily basis includes mapping, geospatially located sensors, alert mechanisms and workspaces the user can build based on the needs of specific persona types within an organization.

"What-if" Scenarios

"What-if" operational scenarios: What are the implications of changing a control within the system? What valves to close for this incident? What areas of network to isolate to minimise disruption?

Predictive AI Recommendations

Predictive recommendations and control schedules for Energy and Chemical Dosage reduction.

It’s possible in the cloud

Info 360

Unified & integrated solutions to deliver a **dynamic digital twin** for water

Storm Sewer Flood

Water Distribution

Info360 Plant

Operational Analytics & Artificial Intelligence

Info360 Insight

Drainage Design

Asset Management

Info360 Asset

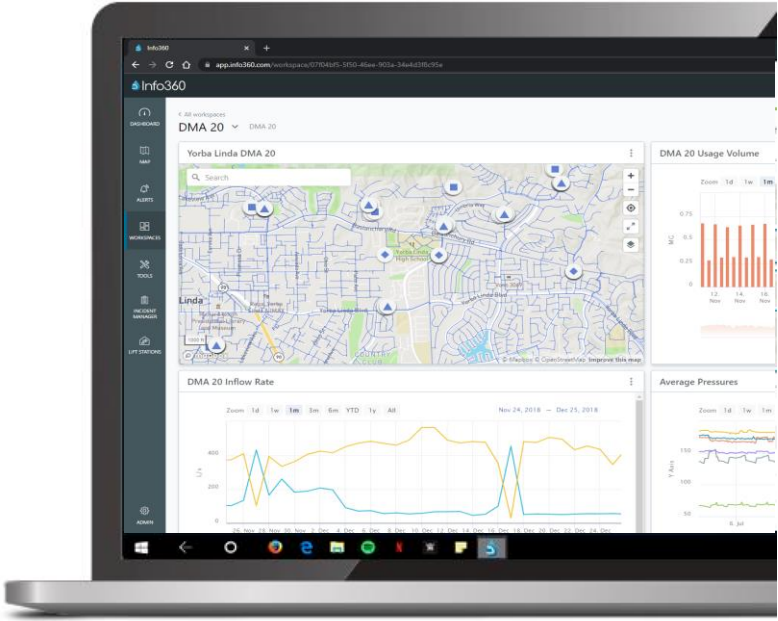
Hydraulic Models | SCADA | Reporting | Machine Learning | Risk Management | Asset Planning | Design | Simulations | Mapping

Ease of Adoption

+ **Digital Twin Scalability & Shared Services**
Increased compute power & cohesive workflows with data model combinations.

+ **Remote Install & Remote Access**
Log-in and connect to the system from anywhere.

+ **Conserve Costs on your Existing Budget**
Reduction of Energy & Chemical Costs while maintaining compliance without having to request new budget.



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