OCTOBER 25, 2023

Chemistry to the Cloud. Science meets Automation

Mike Alff, Director of Business Development , OLI Systems

© 2023 AVEVA Group plc and its subsidiaries. All rights reserved.

Agenda

- OLI Background
- Flagship Products
- Automation with Cloud API
- Use Case – CDU Overhead Corrosion Monitor

Mike Alff

Director of Business Development

An experienced advocate helping customers create automated chemistry-based monitoring systems for their operations. Mike has over 16 years of experience in Oil and Gas. Previously holding positions at SLB in account management, engineering management, and product development.

Much of his focus in the oilfield has been on electrical and fiber optic sensors, since joining OLI this focus shifted towards developing digital soft sensors to monitor customer operations.

Mike has a BA in Mechanical Engineering from the University of Texas, an MS in Engineering and Marketing from the University of Alabama and holds four patents.

© 2023 OLI Systems – Confidential & Proprietary

OLI overview

Industries	Oil & Gas	Chemicals	Metals & Mining	Lithium & REE Recovery	Power Generation	Water Treatment	Academia	Research/ Government
Computation	ENGINE OLI — **OLI Engine**: Performs calculations that accurately predict the behavior of complex and concentrated electrolyte systems, using real solution theory				**Chemistry Database**: Speciation of over 80 elements covering a broad range of industry applications			
Models	**AQ**			**MSE**			**MSE-SRK**	
Desktop Software	STUDIO OLI — Stream Analyzer, Corrosion Analyzer, ScaleChem			FLOWSHEET: ESP OLI — Flowsheet: ESP, OLI Optimizer Tool			ENGINE OLI — Developer Editions, OLI Alliance Engine	
Cloud Solutions	OLI CLOUD APIs — Engine | Corrosion | ScaleChem | Process				OLI CLOUD APP BUILDER — AppBuilder | Run Time			
Consulting & Research	Advisory and turnkey services | Implementation and integration services | Sponsored research programs							
Support	Live classroom training | Virtual instructor led and on-demand training | Installation and technical support services							

Large vertical reach | Diversity of software consumption | Support from design to optimization | Complimentary professional services

© 2023 OLI Systems – Confidential & Proprietary

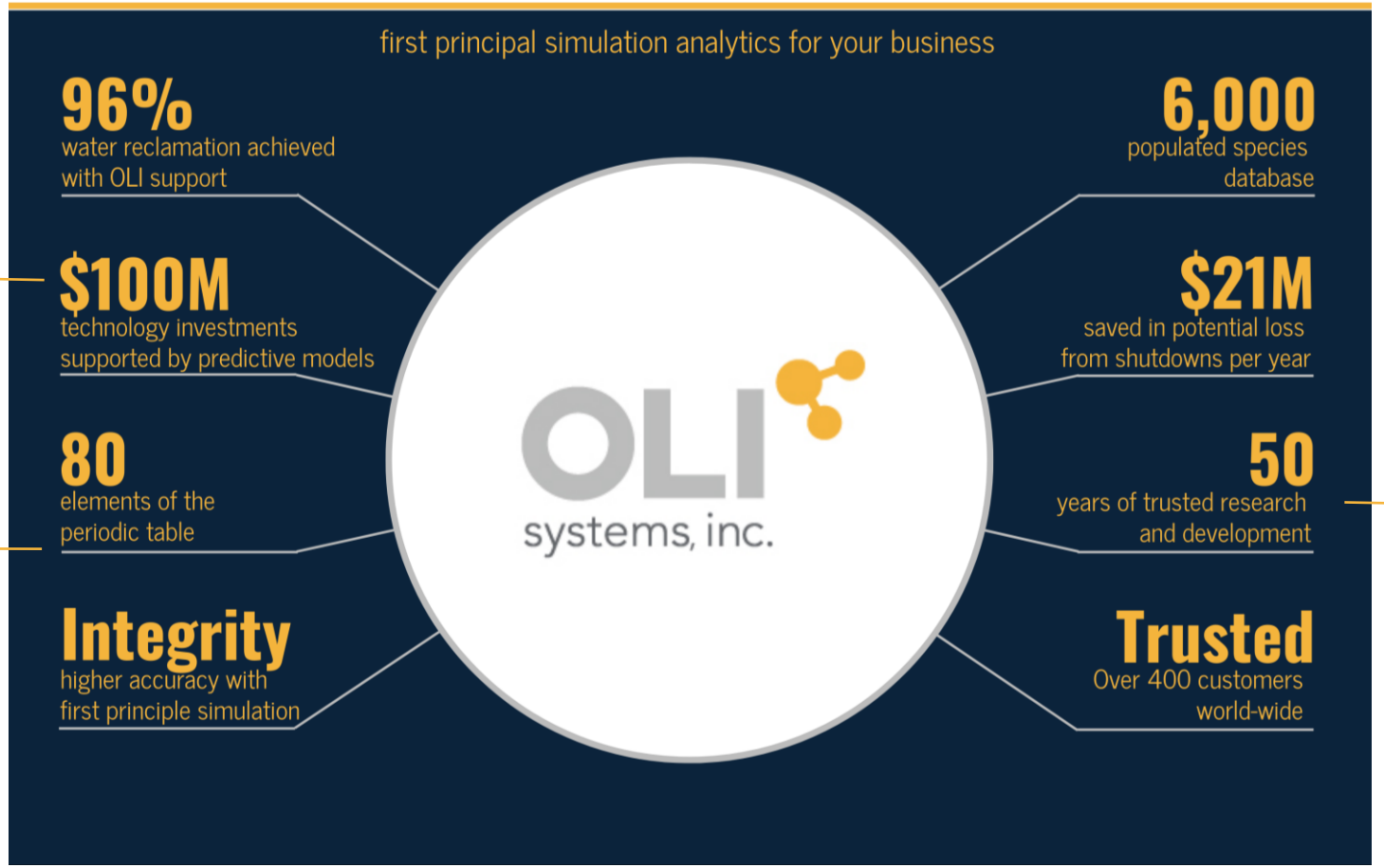
Why OLI?

DESIGN AND OPERATING DECISIONS

- Support plant improvements
- Increase sustainability by testing new designs
- Proactively monitor processes and take corrective actions

MOST COMPREHENSIVE ELECTROLYTE CHEMISTRY BASED SOLUTIONS

- 80 elements of the periodic table; 6,000 species
- Rigorous and accurate models
- Extensive data validation
- Simulation software, consulting services



SUSTAINED INNOVATION RESEARCH & DEVELOPMENT

- 30 years of modeling innovation
- 10 Joint industry Research programs
- $150M Investment in the OLI platform
- Properties database for 10,000 applications

Global recognition

- Presence in 35 countries, 6 continents
- 400 clients; 95% renewal rate
- R&D100 Award for OLI Corrosion Analyzer
- Partner integrations, Channel Partner ecosystem

© 2023 OLI Systems – Confidential & Proprietary

Global presence

Americas

- Home offices in New Jersey, USA
- 220+ customers in North, Central, and South America

Europe & Africa

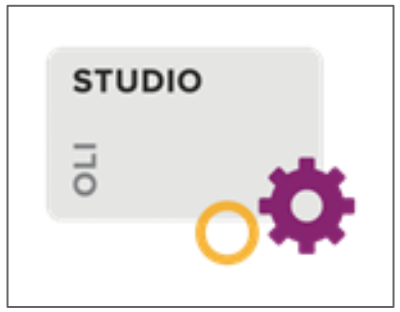
- Support located in the UK & Italy
- 110+ customers across Europe and Africa

APAC

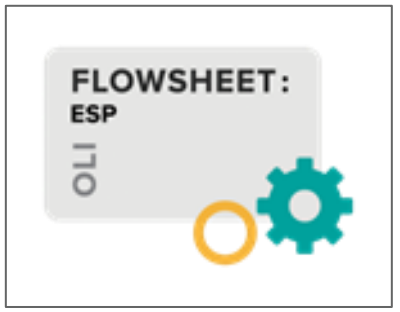
- Support located in Japan
- 75+ customers across Middle East and Asia

© 2023 OLI Systems – Confidential & Proprietary

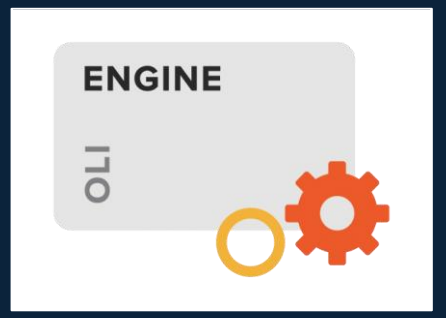
Desktop tools



- Simulation delivered as a single case model
- OLI Studio: Stream Analyzer
- OLI Studio: ScaleChem
- OLI Studio: Corrosion Analyzer



- Delivers the OLI Engine in a process simulation model



- OLI integrated with commercial process modeling software

aspentech
SysCAD Design | Operate | Optimise
PIP
KBC
Honeywell
Symmetry by VMG
PSE

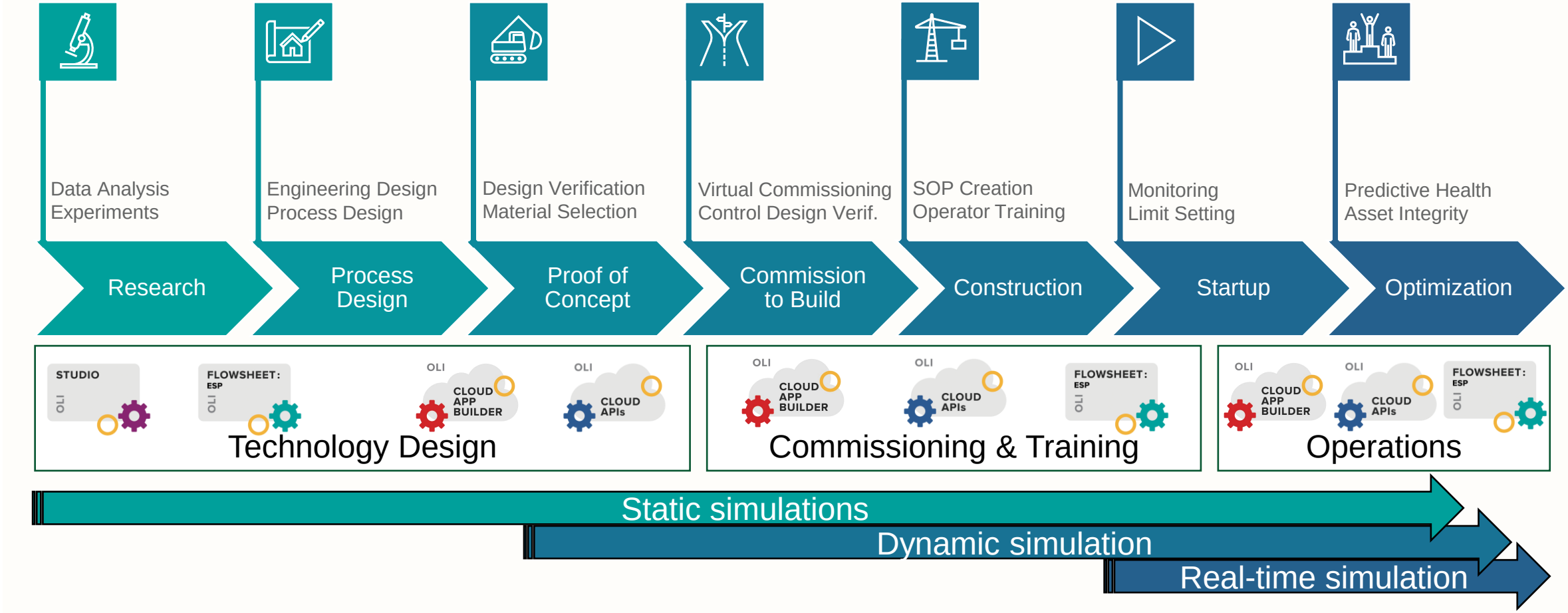
© 2023 OLI Systems – Confidential & Proprietary

Beyond design

© 2023 OLI Systems – Confidential & Proprietary

OLI Model Lifecycle

OLI simulations contribute across the value chain with the implementation of OLI Cloud APIs.
Robust simulations continue to add value to the organization.



© 2023 OLI Systems – Confidential & Proprietary

Cloud tools

OLI CLOUD APIs

- Desktop tools extended to the cloud
  - Stream Analyzer
  - ScaleChem
  - Corrosion Analyzer
  - Process (Flowsheet)
- RESTful API with no UI

OLI CLOUD APP BUILDER

- Cloud based simplified Flowsheet: ESP simulations
- Customized dashboard to extend usage
- Web UI

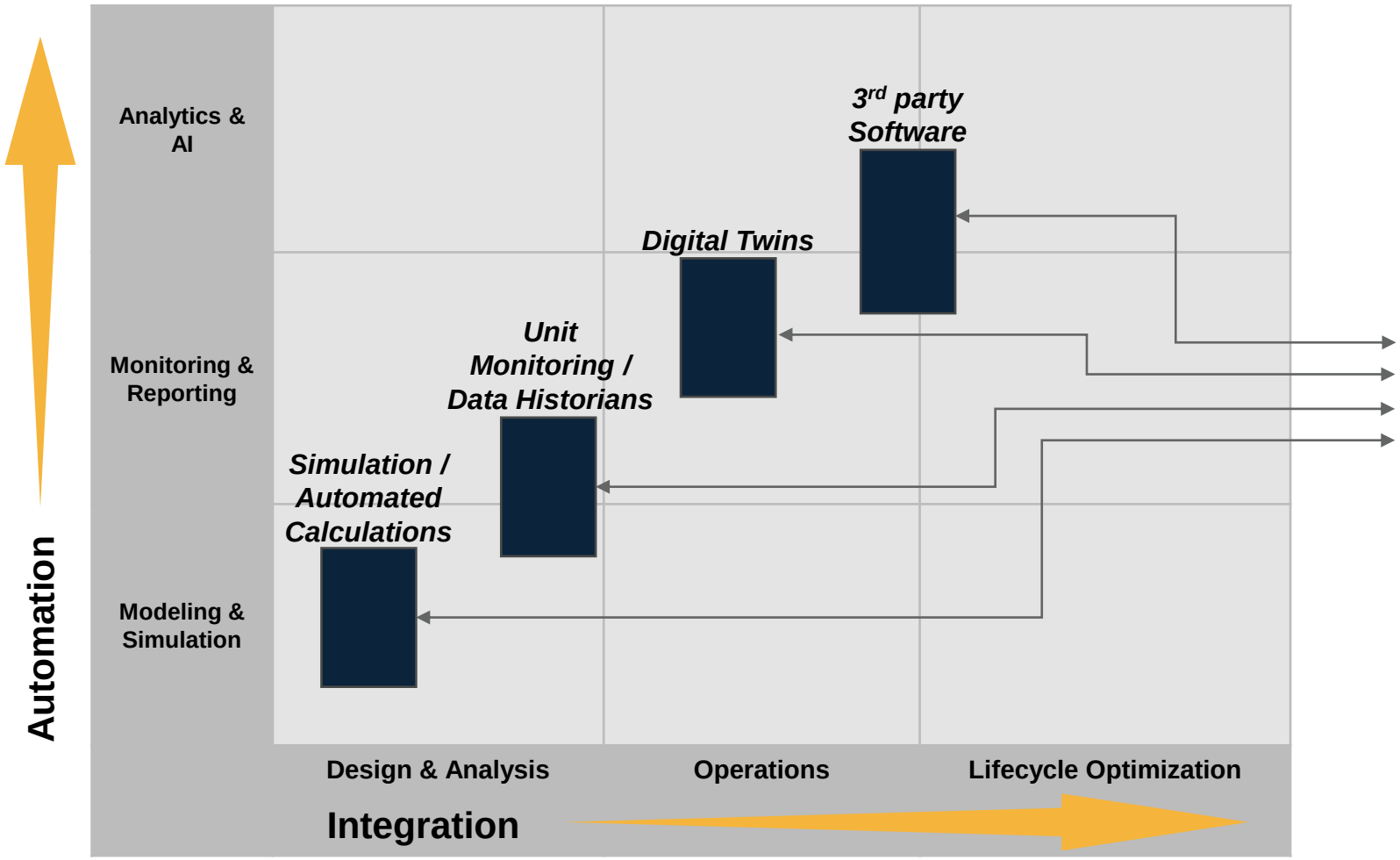
Digital Transformation

- SaaS automation that delivers value quickly
- First-principle analytics means
  - no model training
  - process historical data
- Scalable solutions
  - 30K+ of calcs per day with small setup

OLI systems, inc.

© 2023 OLI Systems – Confidential & Proprietary

Chemistry automated

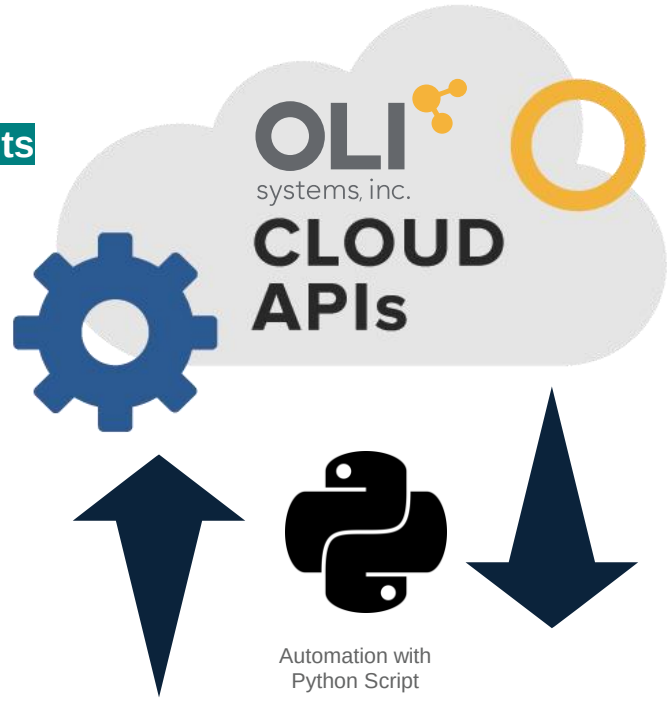


© 2023 OLI Systems – Confidential & Proprietary

Solution integration – Well Digital Twin

Input Data Requirements

- Steam Properties
- Pipe Thickness
- Water Analysis
- Real-time Values



OLI Output Results

- Scaling Speciation
- Scaling/Corrosion Potential
- Scaling/Corrosion Rate
- Metallurgy
- IOW for units
- Simulation Analytics

Data Historian | Relational Database | Lab Analysis

Data exchange and simulation results storage is completed via customer central repository.

Use what you have today!

© 2023 OLI Systems – Confidential & Proprietary

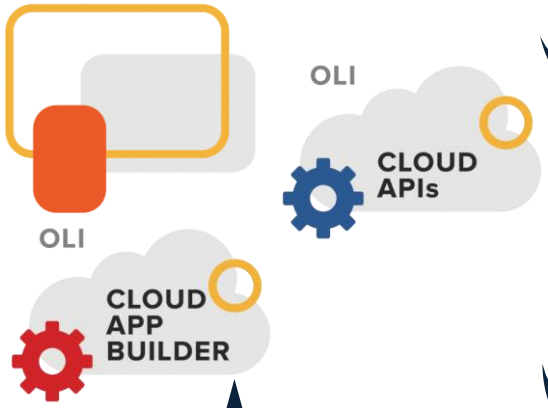
Chemistry automated

© 2023 OLI Systems – Confidential & Proprietary

OLI delivers digital transformations

How can I view simulations during walkdowns?

With OLI Application Builder
- View simulation models from any connected device, any time
- Run scenarios on the fly, from your device



What can I do to drive value from simulations without loads of new technology?

With OLI Application Builder
- No new installs needed to publish existing models as usable Apps in the cloud

With APIs
- Enrich OT/IT convergence using your existing tools

I want to share insightful, yet complex information with the whole plant?

With OLI Application Builder
- Complex models are turned into Apps usable by all
- Published Apps ensure the integrity of the models remain with the experts
- Web access opens this data silo to the plant

With APIs
- Integration with your storage and visualization tools enable actionable information to be shared

How do I quickly create usable information that requires little training?

With OLI Application Builder
- App Dashboards are setup to show results for target audiences
- Entry screens allow what-if scenarios

With APIs
- Enhancing existing tools with new simulation results adds predictive capabilities

Can I see electrolyte calcs with my real-time data to enhance further my Digital Twin?

With APIs
- Calculation results are directly able to integrate to your central data repository
- Enhance content in your visualization tools with simulation data
- Gather deep insights merging simulation data with real-time data in advanced analytics

OLI systems, inc.

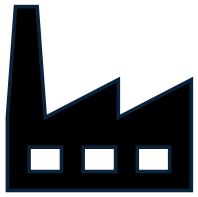
© 2023 OLI Systems – Confidential & Proprietary

An OLI solution path

Applying the OLI APIs to a customer problem

© 2023 OLI Systems – Confidential & Proprietary

Desired Outcomes



- Need to monitor crude overhead for corrosive conditions
- Ability to correct corrosive conditions promptly by operations
- Capability to make informed decisions on how to optimally operate the plant
- Flexibility to handle crude changes
- Tight operations without compromising safety or asset health
- Capability improve planning as well as product quality
- Asset health planning to allow incorporation of opportunity crudes with known unit impacts

© 2023 OLI Systems – Confidential & Proprietary

Assumptions\Functionality

CDU Real-time values

- Pressure
- Temperature
- Flow rates

Regular water analysis

- Minimum of once a day for accurate results.

Reprocessing required in event of system downtime

- Recovery can reprocess missed data or leave blank

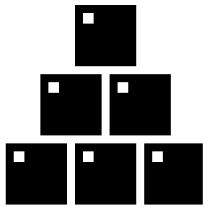
Run every 15 minutes

Assumes:

- Use of a central data repository
- Ability to store and schedule Python scripts
- Ability to make HTTPS calls from Business (level 4) network to OLI Cloud end points

© 2023 OLI Systems – Confidential & Proprietary

Components



Model in OLI Flowsheet:ESP provided by OLI Consulting

- OLI Services to create simulation to generate Ionic Dew Point and other corrosion indicator outputs

Access to:

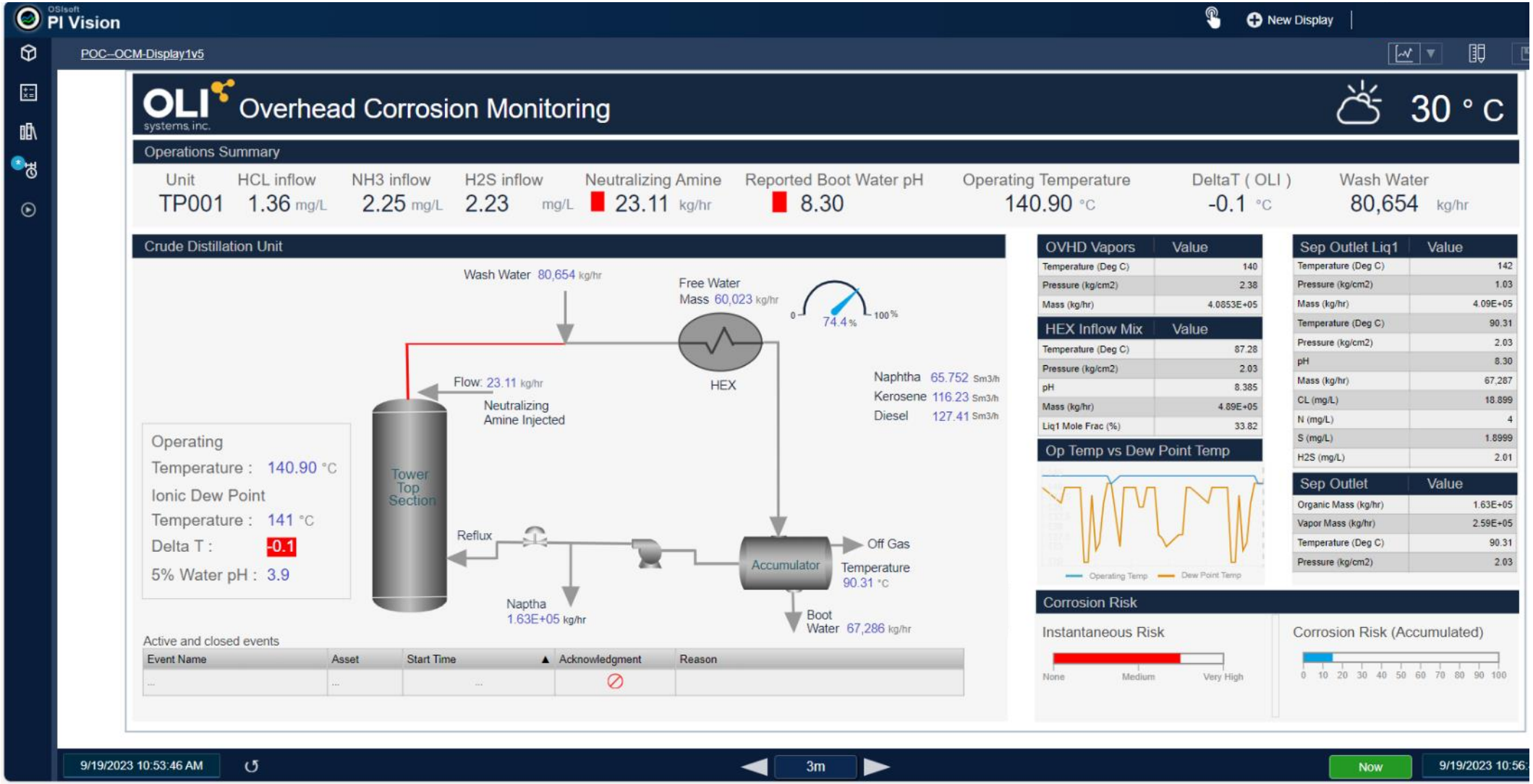
- OLI Cloud API: Process

Input values provided from central data source

- Current temp, levels, water chemistry,
- Connection to time series and/or relational database expected

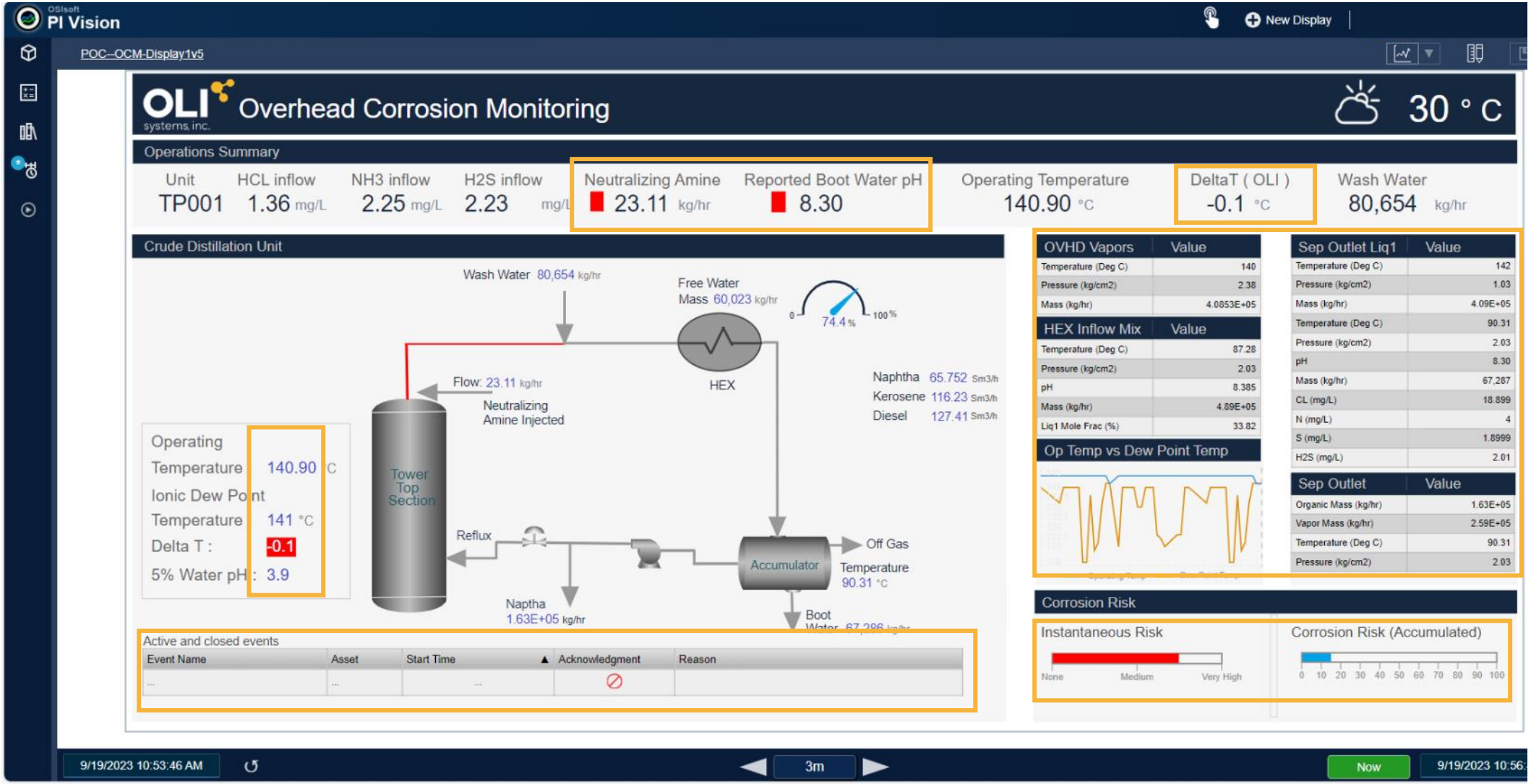
© 2023 OLI Systems – Confidential & Proprietary

Crude Overhead Monitoring – Dashboard in PI Vision



© 2023 OLI Systems – Confidential & Proprietary

With OLI outputs highlighted



© 2023 OLI Systems – Confidential & Proprietary

Outcomes

SUSTAINABILITY

- Visibility into systems to drive efficiency and reduce wastewater
- Reduce overdosing and chemical over-use

EQUIPMENT PERFORMANCE/ASSET INTEGRITY

- Using historical data, quickly assess equipment health for corrosion since previous inspection
- Alerts generated from integrity operating windows to protect system

SAFETY

- Healthy equipment reduces catastrophic equipment failures
- Avoid toxic releases harmful to staff as well as the health and safety of the public

COST

- Planned shutdown less costly than unplanned
- Active protection to preserve equipment and meet turnaround targets
- Significant cost in premature equipment failures
- Reduce lost capacity and achievement of Linear Plan

© 2023 OLI Systems – Confidential & Proprietary