

+ Connect everything to everyone

AVALON CORE AUTOMATION AND
DIGITALIZATION PLATFORM



avalon

sensia

INTELLIGENT ACTION

+ Welcome to Avalon

The platform powering a new era of Intelligent Action

It's recognized across the oil & gas industry that digitalization and automation have the potential to drive significant production and operating cost benefits. The platform on which your digitalization journey is based must be open, secure, future-proof, and flexible. Welcome to Avalon.

The evolution of ConnectedProduction™ – Avalon is the open core automation and digitalization platform underpinning a new breed of automated solutions that enable you to introduce Intelligent Action into every component of your oil & gas operations. An innovation that makes Sensia your one-stop shop for executing an oil & gas digital strategy.

In the field and in the office. On the pipeline. From the wellhead to the refinery. The producers of data connected to the consumers of data. No boundaries, no limits, no restrictions. Avalon is what you make it. Now make it your own.

TAKE DIGITALIZATION TO THE NEXT LEVEL

Moving your operations to a digitalized and automated environment isn't a single, major event. It can be broken down into steps, each of which adds value in its own right, but leads in a clear direction towards a more productive, efficient destination.

Avalon is an open platform that integrates easily with your existing IT/OT investment – unlocking the hidden potential of your existing IT/OT assets, it puts you on the path toward full digitization.

But, once in place, the Avalon platform will allow you to visualize and control all aspects of your oil & gas operation. By collecting the right data and contextualizing it into real-time diagnostics, production trends and KPIs, people and functions across the organization will be making more informed decisions.



**EXPLORE THE FUTURE-
PROOF AND FLEXIBLE
DIGITALIZATION PLATFORM
POWERING A NEW ERA OF
INTELLIGENT ACTION**

+ Accelerate your digitalization journey with Avalon

The evidence and arguments for digitally connected oil & gas operations are overwhelming. It drives production rates and resource recovery up, whilst enabling significant reductions in operating costs and well downtime.

OPTIMIZATION

80 billion additional oil barrels Big Data could help companies extract globally (source Upstream Intelligence)

80bn
EXTRA BARRELS

UP TO 8% higher production rates

Source: Chevron Technology Magazine

8%
HIGHER
PRODUCTION

UP TO 25% in operating cost savings

Source: Chevron Technology Magazine

25%
OPERATING
COST SAVINGS

Asset Performance
Remote monitoring
reduces well downtime by 4 hours after a shutdown Source: Orb Comm

**REDUCE
DOWNTIME**

But, of course, digitalizing such a distributed and complex industry will never be simple. The key is to build on a foundation that is flexible and open. That you can modify and make your own. That is Avalon.

UP TO 6% improved resource recovery
Source: Chevron Technology Magazine

6%
IMPROVED
RESOURCE
RECOVERY

Cost Reduction \$8 billion lost in non-productive time searching for data
Source: Teradata

\$8bn
COST REDUCTION

Skills Gap 90% of O&G companies felt industry is facing a talent shortage
Source: Ernst & Young

**FILLING THE
SKILLS GAP**

15% cost reduction through widespread adoption of technology
Source: Teradata

15%
COST REDUCTION

+ Make your digitalization journey work smarter – and harder

As an open platform offering – Avalon offers you all the flexibility you need to introduce Intelligent Action to your operation. Wherever you are on your unique digitalization journey.

+ Deploy anywhere, at speed

Avalon is a single, open platform. That ensures it can be deployed at speed, across oil & gas production, transportation, storage, and processing plants. As a cloud-native citizen it can live on-premise or on the cloud – any cloud, public or private.

+ Your existing investment is protected

If you've already started your digitalization and automation journey, not only can you leverage those assets, but also unlock their hidden potential.

+ Your data is always secure

Leave cybersecurity anxiety behind – Avalon is built from the ground-up with strict cybersecurity standards by design. With Avalon.

+ Every link is connected, always

Production, operations, domain, field – every link in the chain is intelligently connected.

+ Stay informed, ahead of time

Avalon's advanced alarming is an essential capability for managing hundreds or thousands of operational assets by exceptions. Use the existing ones or build your own alarm models to only get notified only when your attention is needed.

+ Your data is always available

From the user point of view, the system is seamless, and data is always available. With no interrupted workflows, data loss or missed events.

+ Always scalable, up and across

You'll never outgrow Avalon. Functions and data scale up independently and infinitely in, and across, environments.

+ Always reliably up to date

With Avalon you can always rely on fresh operational intelligence to make informed decisions, autonomously, or manually in real-time.

+ Personalize everything

Because it is built to be OEM-friendly, everything can be personalized and configured to suit your environment now, and as you move forward.

+ Bring your own anything

Use the Avalon productive development environment to develop native applications, or migrate your pre-existing apps to the platform.

+ Manage volume edge devices, remotely

Managing hundreds or thousands of edge devices in remote areas can be challenging. Take advantage of the Avalon Edge Device Management (EDM) to remotely deploy applications, update software or troubleshoot problems.



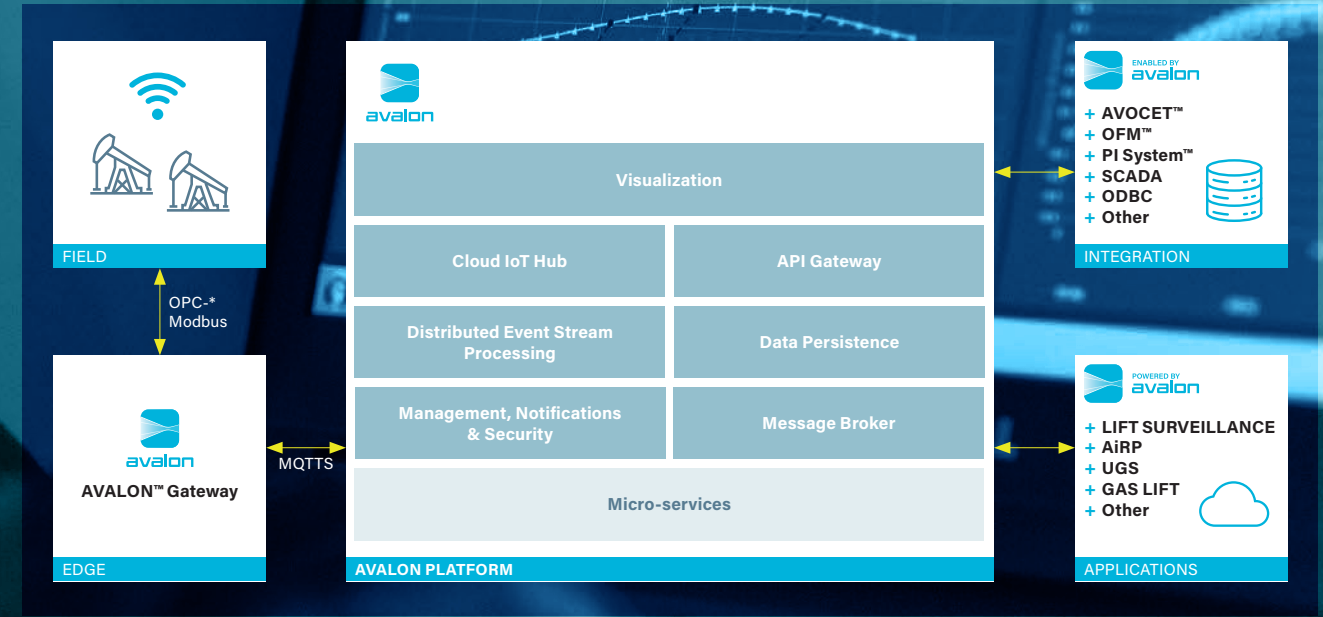
+ Connecting your assets from edge to enterprise

Make Avalon the driving force behind your digitalization journey - connecting your operation from end-to-end to deliver the real-time insight and you need, exactly when and where you need it most.

INTEGRATE AVALON INTO YOUR OPERATION, YOUR WAY

The Avalon platform offers multiple options for accessing the stored data:

- + Messaging (via MQTT, AMQP) publishes live data, events, alarms etc. to a message broker. Allowing any message-client to subscribe to the related queues to receive that data as soon as it's available in the Avalon platform. A client can also subscribe to the specific data points of interest in Avalon - only publishing those data points to the queue.
- + REST based web services utilize HTTPS based Application Programming Interface (RESTFUL API) for data communication from Avalon to external enterprise or cloud-based systems. This allows for external software to receive the data from Avalon quickly and easily through a standardized programming interface.
- + Avalon™ provides REST APIs that:
 - Access Live Data
 - Access Time Series (with optional data down-sampling, if needed)
 - Export to CSV



BUILT ON AVALON

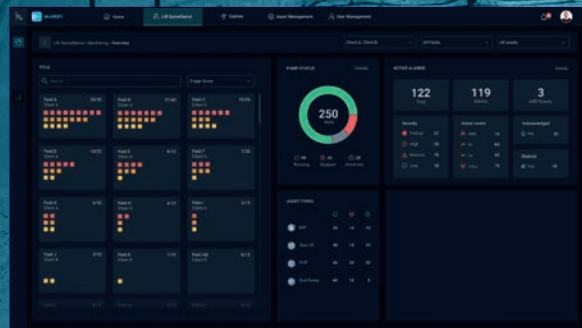
+ Avalon Lift Surveillance

Increase production uptime and take timely actions based on more insights. Avalon Lift Surveillance provides you with consumable surveillance on a single, open platform that grows with you on your oil & gas digitalization journey

ADAPT, REACT, EXPAND

Avalon Lift Surveillance for artificial lift is an enriched, scalable system encompassing a range of artificial lift applications that drive Intelligent Action across your production operations. It empowers users to drive efficiency in production optimization by building a full spectrum of surveillance systems on a single platform – from monitoring, alarms and visualization through to truly advanced analytics.

With total flexibility built in, you can start small – using existing datasets, for example – and easily adapt, react and expand.



BRING ALL YOUR LIFT ASSETS TOGETHER ON A SINGLE PLATFORM

Whether it's the field operator, back-office or head-office managers, with Avalon everyone is on the same platform. That means improved communication, efficiency and coherence of operations.

When you have all well data in one system, one view, you will have a big advantage when it comes to diagnosing precisely where and why a failure has occurred. When you can see the full picture, you can get to the right answer fast.

Avalon Lift Surveillance enables all lift types and manufacturers to function on the same platform:

- + ESP
- + SRP
- + PCP
- + Gas Lift

Choose your surveillance level

On the Avalon open platform your surveillance – whether it's a single well or multiple wells, a single lift type or a multi lift type – is fully extensible and easy to scale. It is equally effective for:

1. Simple on/off monitoring.
2. Basic surveillance and reporting of how each individual well is performing with visualization, remote control, automated reporting.
3. How the field is performing at a specific time.
4. Fully automated wellsite and advanced applications such as AiRP for identification, triage and prioritization.

BUILT ON AVALON

+ AiRP Ai Response Prioritization for ESPs

A big step towards autonomous lift starts with AiRP Ai Response Prioritization for ESPs. With the power of Avalon, events can now be addressed in minutes rather than hours as you can capture, save and analyze events in a single view, in real time.

WITHOUT INTELLIGENT ACTION, FAILURE PREDICTION IS IMPOSSIBLE

Out of thousands of alarms, which do you action as a priority? Disconnected systems and data sources make it very difficult to capture the full picture of events as they occur.

AiRP for ESPs, is an application within Avalon Lift Surveillance that brings the advantages of greater surveillance capabilities, digitalization and automation to capture, save and analyze events, in detail, in real time.

The single-view workflow brings together the latest advances in Ai and the most powerful data visualization to automate the prioritization process, uniting the time, date and context of the event in one consolidated system.

AiRP is much more than an app. It is an intelligent store for all of the accumulated knowledge that arises from each event, each response, and each outcome, empowering you to action operational efficiency and optimize lift, without the costly down-time



Close the gap between event and response with Avalon

- + In real-time: events captured, analyzed, classified and intelligently prioritized
- + Domain knowledge that resides in a fully integrated system
- + Field-management decisions empowered by real-time insights
- + Detection-to-correction times reduced
- + Advanced analytics and continuous machine-learning adapt to changing field conditions and build predictive capabilities

POWERED BY AVALON

+ Automated Gas Lift Optimization Solutions

Sensia offers both the expertise and the core components of gas lift surface automation. Wherever you are today Avalon can add value to your gas lift operation – from monitoring and surveillance to fully automated gas lift wells.



+ 15% GAS SAVING
+ 85% FEWER MANUAL INTERVENTIONS

RESPONSES IN MINUTES, NOT DAYS.

In a typical well, up to 5% of production shortfall can be attributed to gas lift operational inefficiencies. Automated Gas Lift Optimization solutions from Sensia – powered by our open digitalization platform Avalon – ensure responses in minutes not days, will reduce production shortfalls and quantity of gas use, and reduce overall levels of required manual intervention.

Well processes are continuous. But surveillance, interventions and optimization are still carried out manually in most cases, and therefore intermittently. Chokes are set, but not constantly controlled, and this inevitably means that operators are injecting suboptimal amounts of gas than is actually required to maximize the flow rate of reservoir liquids.

COMPLETE CONTROL. FASTER RESPONSE TIMES.

By automating gas lift optimization – rather than intervening manually – your response to events happens in minutes rather than days. As well as reducing production shortfalls, management time will be freed up to improving the business, rather than firefighting day-to-day issues. We've shown in recent field trials that manual interventions can be reduced by up to 85%.

ENABLED BY AVALON

+ Intelligent Throughput Optimization

Harness the power of Avalon to allow operators and control systems to 'see inside' the process, in real-time, to understand where a facility is operating with respect to critical physical constants.

The formation of hydrates in gas pipelines and processing facilities presents midstream operators with significant challenges to maintaining reliable operations.

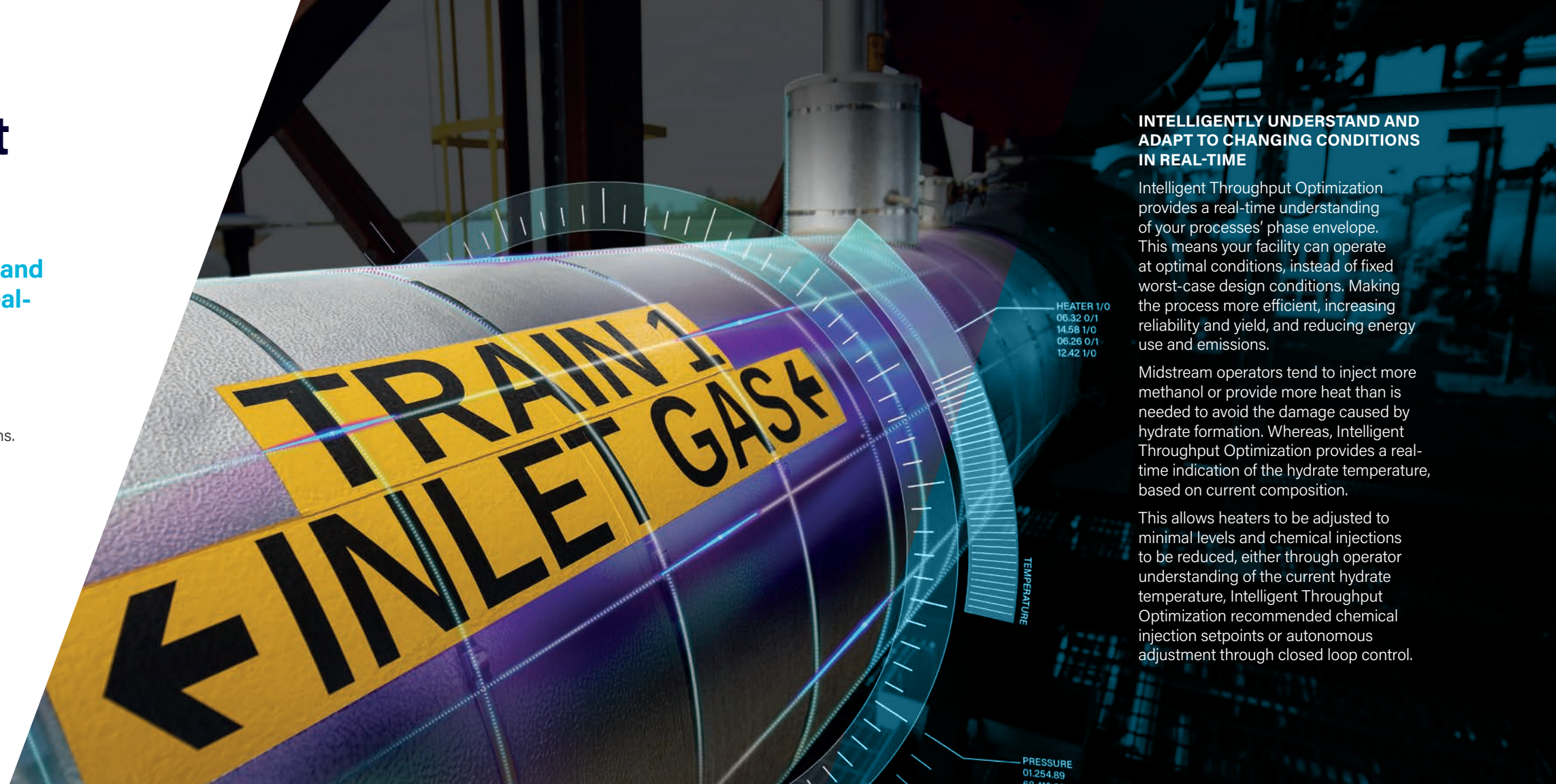
The injection of chemicals, or the use of process heaters, can prevent hydrates. However, they increase both cost and emissions. While applying heat or chemicals far in excess of the required amount to ensure operational stability as process conditions change can also result in sub-optimal performance.

INTELLIGENTLY UNDERSTAND AND ADAPT TO CHANGING CONDITIONS IN REAL-TIME

Intelligent Throughput Optimization provides a real-time understanding of your processes' phase envelope. This means your facility can operate at optimal conditions, instead of fixed worst-case design conditions. Making the process more efficient, increasing reliability and yield, and reducing energy use and emissions.

Midstream operators tend to inject more methanol or provide more heat than is needed to avoid the damage caused by hydrate formation. Whereas, Intelligent Throughput Optimization provides a real-time indication of the hydrate temperature, based on current composition.

This allows heaters to be adjusted to minimal levels and chemical injections to be reduced, either through operator understanding of the current hydrate temperature, Intelligent Throughput Optimization recommended chemical injection setpoints or autonomous adjustment through closed loop control.





Solving challenges from the reservoir to refinery.

**THE FUTURE-PROOF AND
FLEXIBLE DIGITALIZATION
PLATFORM POWERING A NEW
ERA OF INTELLIGENT ACTION**



**Solving challenges from
the reservoir to refinery.
One challenge at a time.**

We collaborate with all stakeholders to make the production, transportation, and processing of oil & gas simpler, safer, more secure, more productive, and better understood from end-to-end. Sensia is making the advantages of industrial-scale digitalization and seamless automation available to every oil & gas company. Now, every asset can operate more productively and more profitably.

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