



Moving Bioprocess Data to the Cloud: A Practical Guide for Pharma and Biotech Teams

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Abstract

Bioprocess teams generate valuable process data every day, including pH, dissolved oxygen, temperature, agitation, gas flow, feeds, alarms, user actions, and batch-context notes. Historically, much of this information has been stored on local workstations, plant-floor servers, exported spreadsheets, or isolated control systems. While these approaches remain common, they can make it difficult to compare runs, collaborate across teams, and maintain consistent access to process information.

Cloud-based historian and trend platforms offer an alternative approach by centralizing data collection, simplifying access, and reducing infrastructure management requirements. Modern cloud platforms can provide browser-based access, centralized backup and recovery, routine software maintenance, and scalable data availability while supporting collaboration across laboratories, facilities, and geographic locations.

This paper examines key considerations for evaluating cloud-based bioprocess data management platforms, including security, availability, compliance, and operational scalability. It also explores how cloud-native historians can help scientists and engineers transform process data into actionable insight.

Key Takeaway

Cloud software does not remove quality ownership from the regulated organization. It can simplify infrastructure management while providing scientists, engineers, and quality teams with faster access to the process data they already depend on.

BIOne Core at a Glance

BIOne Connect

Free gateway software securely connects compatible BIONe controllers through a networked Windows 11 Pro PC.

Browser-Based Access

Review dashboards, trends, and process data from a standard web browser without installing historian software.

Batch Analytics

Compare current and historical runs, including reference batches, to identify trends, process variability, and opportunities for optimization.

Store-and-Forward

Data is buffered locally during temporary network interruptions and automatically synchronized when connectivity is restored.



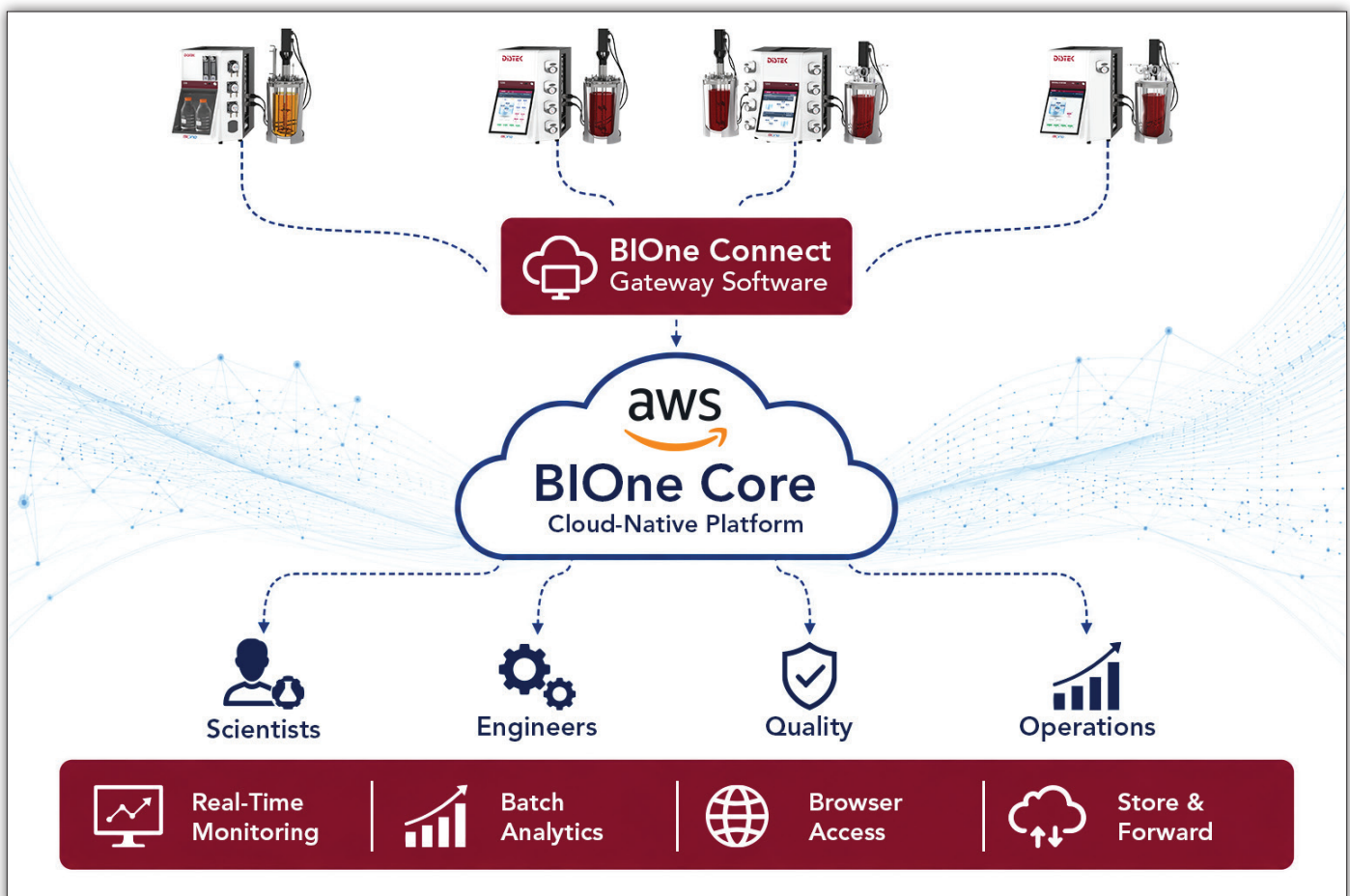
Introduction

The bioprocessing industry has traditionally been cautious with cloud software, and for good reason. Production and development data can be sensitive. GxP workflows may require documented controls. Teams need confidence that electronic records remain complete, accurate, secure, and available when needed. A local server can feel safer because it is physically nearby.

As organizations expand development activities across multiple laboratories, facilities, and geographic locations, access to process data becomes increasingly important.

At the same time, advances in cloud infrastructure and security have made cloud-based data management a practical option for many life science organizations. Large automation suppliers now offer cloud-enabled SCADA and historian platforms, while bioprocess-focused companies are developing cloud-based tools that help scientists monitor, visualize, and compare experiments more efficiently.

This paper examines key considerations for evaluating cloud-based bioprocess data management platforms and explores how cloud-based historians can support modern bioprocess workflows.





Why Bioprocess Data Management Is Changing

Bioprocess teams generate increasing amounts of data throughout development, scale-up, and manufacturing activities. Parameters such as pH, dissolved oxygen, temperature, agitation, gas flow, feeds, alarms, and operator notes provide valuable context for understanding process performance.

Historically, these data have often been stored on local workstations, isolated control systems, or exported spreadsheets. While familiar and effective in many

environments, these approaches can make it difficult to compare runs, collaborate across departments, or maintain consistent access to information as organizations grow.

As bioprocess operations expand across multiple laboratories, facilities, and geographic locations, many organizations are reevaluating how process data is collected, stored, reviewed, and shared. The goal is not simply to store more data, but to make process information easier to access, understand, and apply.

What Cloud Changes

A historian serves as the memory of the process. It captures values over time so teams can understand what happened, when it happened, and whether a run remained within the desired operating range. In a cloud-based model, the historian and trending layer are delivered through a managed software platform rather than relying exclusively on local infrastructure.



Centralized Access

Review process data from a single location rather than multiple workstations, spreadsheets, or isolated systems.



Collaboration Across Sites

Enable authorized users to review and compare process data regardless of where facilities or teams are located.



Simplified Deployment

Reduce the need for dedicated historian infrastructure and specialized administration through preconfigured dashboards and templates.



Flexible Reporting

Export trend data and visualizations for reports, investigations, presentations, process reviews, and technology transfer activities.



Cloud Versus On-Premises

	ON-PREMISES	CLOUD (BIOne CORE)
 Infrastructure	Customer maintains servers, storage, backup, updates and recovery plans.	Provider operates the platform with managed storage, updates, and redundancy.
 Access	Often dependent on plant networks, VPNs, or local workstations.	Authorized browser access from anywhere.
 Updates	Upgrade projects managed locally.	Software updates delivered routinely with documentation and change records.
 Scalability	Additional infrastructure may be required as systems grow.	Expansion can be achieved without additional local infrastructure.
 Visibility Focus	Infrastructure ownership and maintenance.	Data access, collaboration, and operational visibility.
 Different approaches. Same goal: reliable data for better decisions.		

Security, Availability, and Compliance

A well-managed cloud platform can provide security capabilities that many individual laboratories or development environments would find difficult to maintain continuously on their own. Examples may include centralized identity management, role-based access controls, encrypted communications, infrastructure monitoring, backup automation, and disaster recovery planning.

Organizations evaluating cloud platforms should understand how user access is managed, how backups are tested, how software changes are documented, and how incidents are communicated. These considerations are important regardless of where the software is deployed.

Availability is another common consideration. On-premises systems can be highly reliable when they are properly engineered, monitored, patched, backed up, and periodically tested. Cloud-based platforms are often designed around redundancy, managed storage, and documented recovery procedures.

Cloud software also does not eliminate validation, standard operating procedures, training, access review, data retention decisions, or change control. Those responsibilities remain part of regulated use. The level of control applied should be appropriate to the intended use of the system and the criticality of the data being generated.

Organizations should evaluate cloud-based platforms using the same risk-based principles applied to any software that supports bioprocess development or manufacturing activities.



Operational Scalability

As organizations add bioreactors, users, projects, and facilities, access to consistent process data becomes increasingly important. Cloud-based platforms can simplify expansion by providing centralized visibility across multiple systems without requiring dedicated historian infrastructure at each location.

For organizations supporting multiple development groups, manufacturing suites, CDMO operations, or geographically distributed teams, centralized access can help improve collaboration and reduce information silos.

The ability to compare process performance across systems, laboratories, and facilities becomes increasingly valuable as programs mature and move toward scale-up and technology transfer.

Evaluation Framework

Before implementing a cloud-based bioprocess platform, organizations should consider several practical questions.

Intended Use

What decisions will be made using the data?

Data Governance

What retention, backup, and recovery requirements exist?

User Access

How will permissions and responsibilities be managed?

Validation

What level of testing and documentation is appropriate for the intended use?

Vendor Support

How are updates, incidents, and support activities communicated?

A structured evaluation process helps ensure that technology decisions align with operational requirements, quality expectations, and long-term objectives.

BIOne Core in Practice

BIOne Core is Distek's cloud-native platform for bioprocess data acquisition, visualization, trending, and batch analytics. Designed specifically for the BIOne ecosystem, it combines real-time monitoring, historical data analysis, alarm management, and browser-based access within a single platform.

Through the free BIOne Connect gateway application, compatible BIOne controllers can securely transmit process data to BIOne Core, allowing scientists, engineers, and managers to review process performance from a standard web browser.

Hosted on AWS, BIOne Core centralizes data visibility while reducing the need for dedicated historian infrastructure, database administration, and local server maintenance.

Data Intelligence

Compare batches, identify process trends, benchmark performance against successful runs, and support data-driven optimization efforts.

Easy Deployment

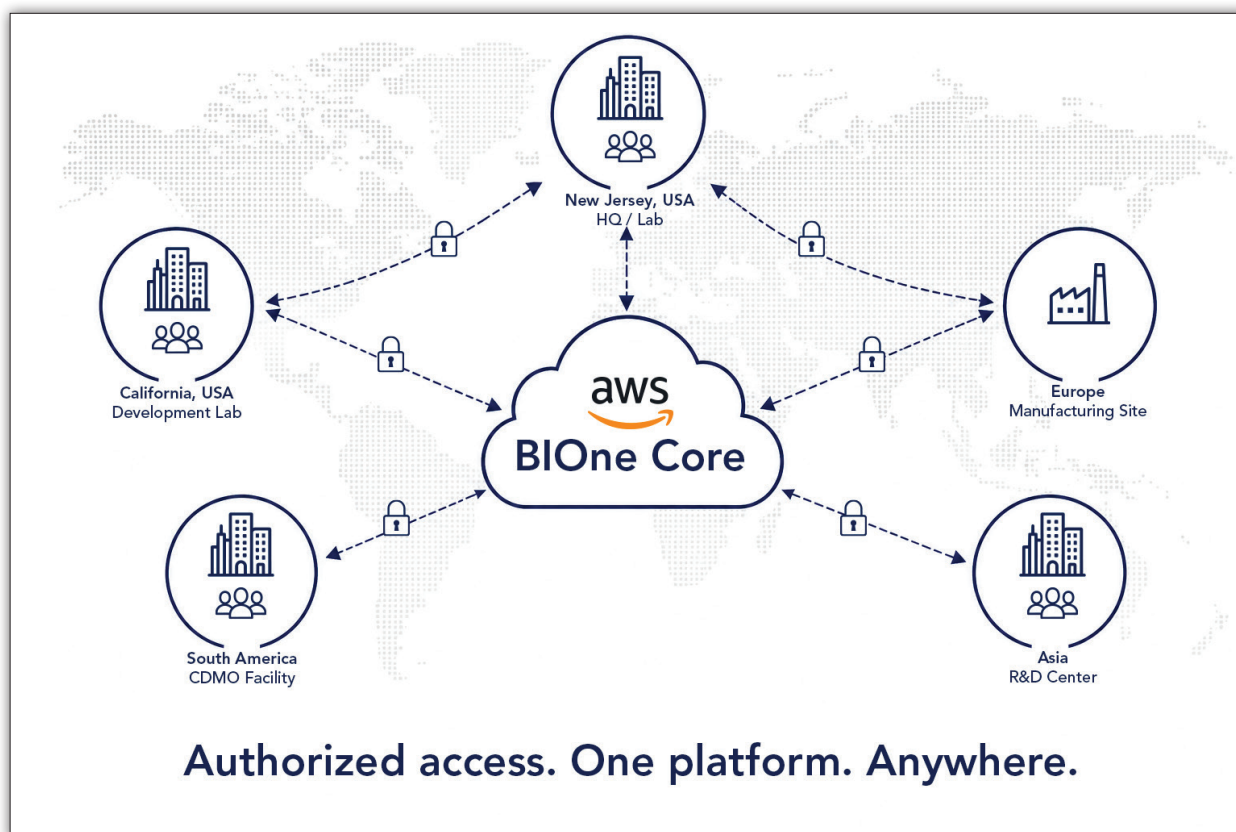
Connect through the BIOne Connect gateway application using preconfigured dashboards, templates, and workflow-oriented tools.

Access Anywhere

Secure browser-based access supports collaboration across laboratories, departments, and facilities while maintaining visibility into critical process data.

Store-and-Forward Protection

Data is buffered locally and automatically synchronized when connectivity is restored, helping maintain continuity of the process record.



Conclusion

Cloud-based bioprocess software is gaining traction because teams need more than local data capture. Scientists, engineers, and quality stakeholders need faster visibility into process performance, easier collaboration across authorized locations, resilient data storage, and a more efficient path from raw time-series data to process understanding.

Security, validation, availability, and control remain important considerations. These factors should be evaluated through documented procedures, risk-based assessment, vendor review, and clearly defined

data governance practices. When these elements are addressed appropriately, cloud-based historians can provide a practical way to improve data access while reducing the burden of maintaining local infrastructure.

Distek BIONe Core supports this transition by combining bioprocess data acquisition, historical trending, alarms, batch analytics, and cloud-based access in a platform designed specifically for the BIONe ecosystem. For laboratories and development teams seeking better access to process data without the added complexity of traditional historian infrastructure, BIONe Core offers a practical approach to improve visibility, streamline review, and support more informed bioprocess decisions.