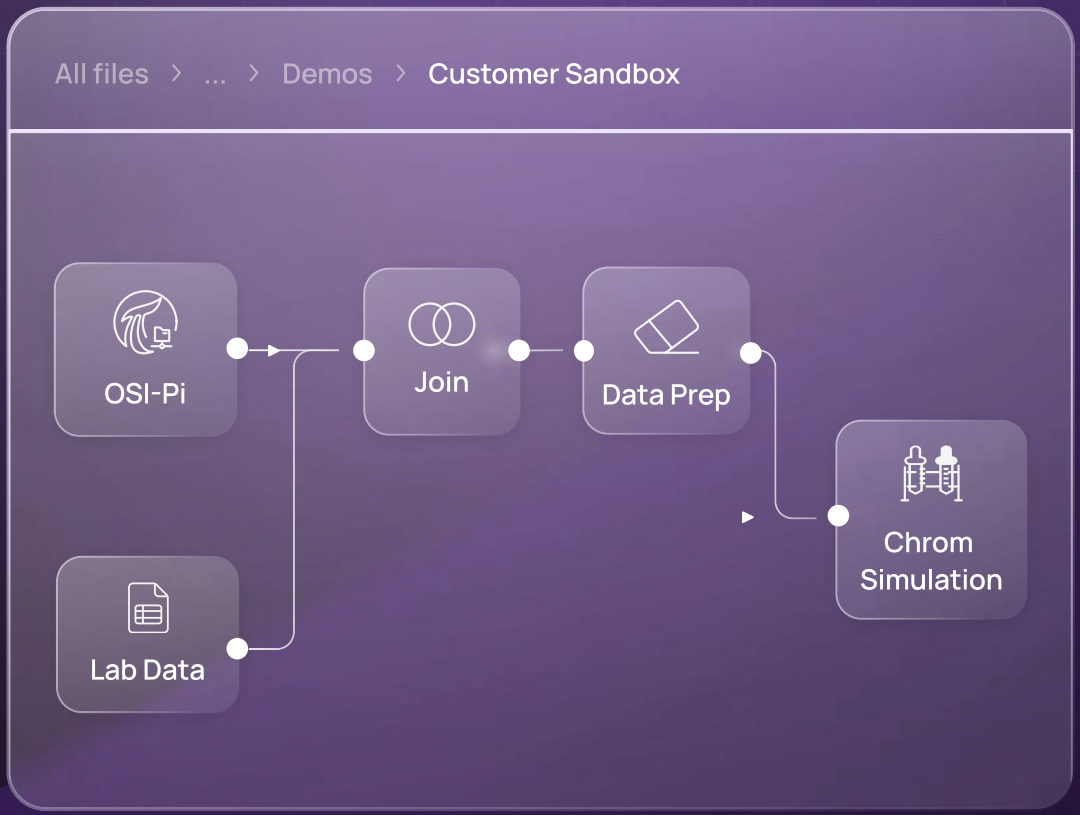
How Basetwo Automates Chromatography Workflows Using AI-Driven Analytics

A unified AI platform to accelerate chromatography development, improve reproducibility, and standardize analytics across molecules, modalities, and sites.



Basetwo

Problem

Chromatography is one of the most data-rich unit operations in biologics manufacturing, yet the workflows used to analyze it remain highly manual. Scientists routinely spend hours pulling AKTA/Unicorn exports, cleaning complex CSV structures, aligning UV and conductivity traces, building custom scripts, and assembling plots before they can interpret results.

As organizations scale chromatography operations, these challenges compound:

- Manual, spreadsheet-heavy workflows requiring hand-tuned edits for each dataset
- Highly variable analytics, with different groups building separate scripts and templates
- Limited reproducibility, since decisions about filtering, smoothing, or block selection aren't captured programmatically
- Slow iteration cycles, where analysts spend more time preparing data than understanding chromatography behavior
- Difficulty scaling across runs, campaigns, or molecules due to lack of standardization

As chromatography datasets grow in size and complexity, the bottleneck isn't the science — it's the manual data wrangling required to make sense of the science.

Objective

Rather than building one-off scripts per project, teams needed an enterprise-wide chromatography analytics environment that is reliable, scalable, and easily adaptable to new molecules or unit operations. The goal was to develop an automated chromatography analytics workflow that:

- Ingests and cleans raw instrument sources such as Unicorn/AKTA
- Parses run metadata to detect steps and annotate block boundaries
- Supports multiple analytical tasks (peak analysis, step comparisons, TA, etc.)

Basetwo Solution

Automated Data Integration & Transformation

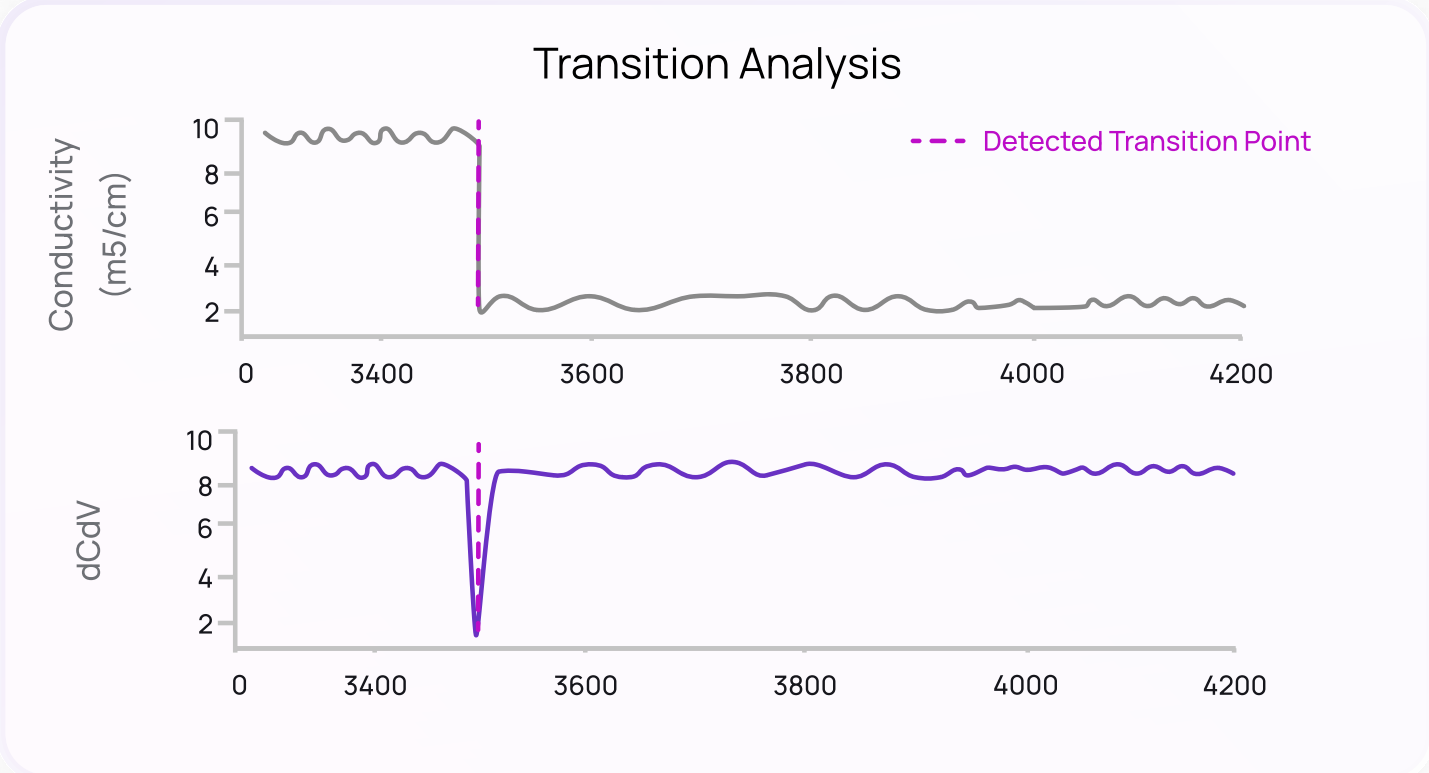
Basetwo's digital twin platform integrated chromatography run files and metadata from Unicorn/ AKTA exports, lab systems, and run logbooks into a unified, analysis-ready structure. Key datasets included:

Instrument signals:
UV absorbance, pressure, conductivity, volume

Run & Method Metadata:
Gradient profiles, buffer identities, flow rates

Performance metrics:
Purity, yield, HCP/DNA assays

Using Basetwo's automated data pipelines, teams can use rule based workflows to seamlessly clean and transform data to align UV, conductivity, pressure, and volume signals into a tidy, multi-signal time-series format. The result is a consistent, analysis-ready dataset that enables scalable comparison, diagnostics, and modeling across runs and campaigns.

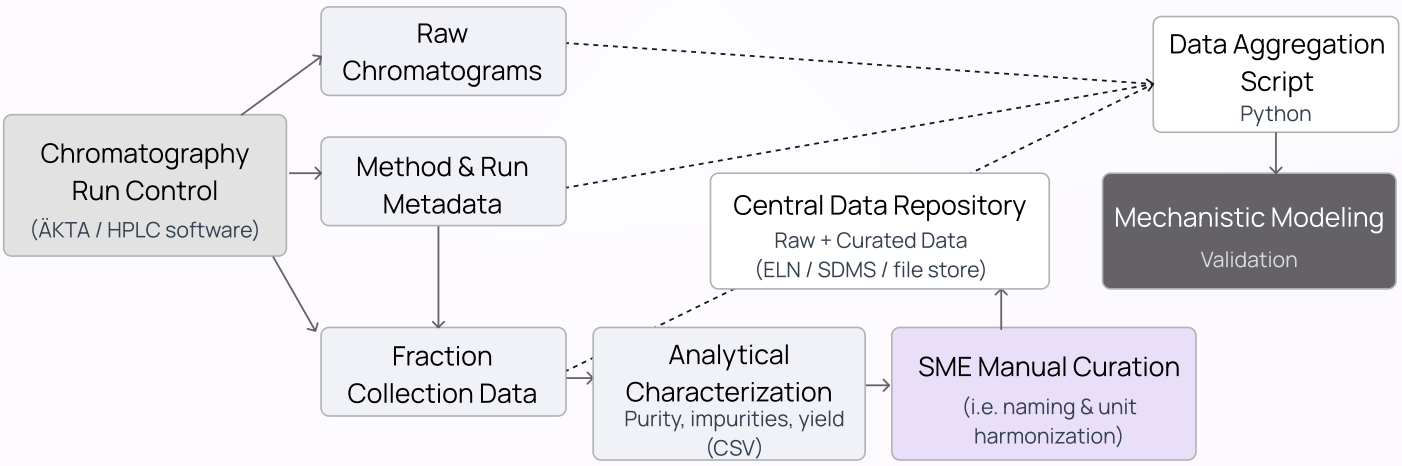


Basetwo Solution

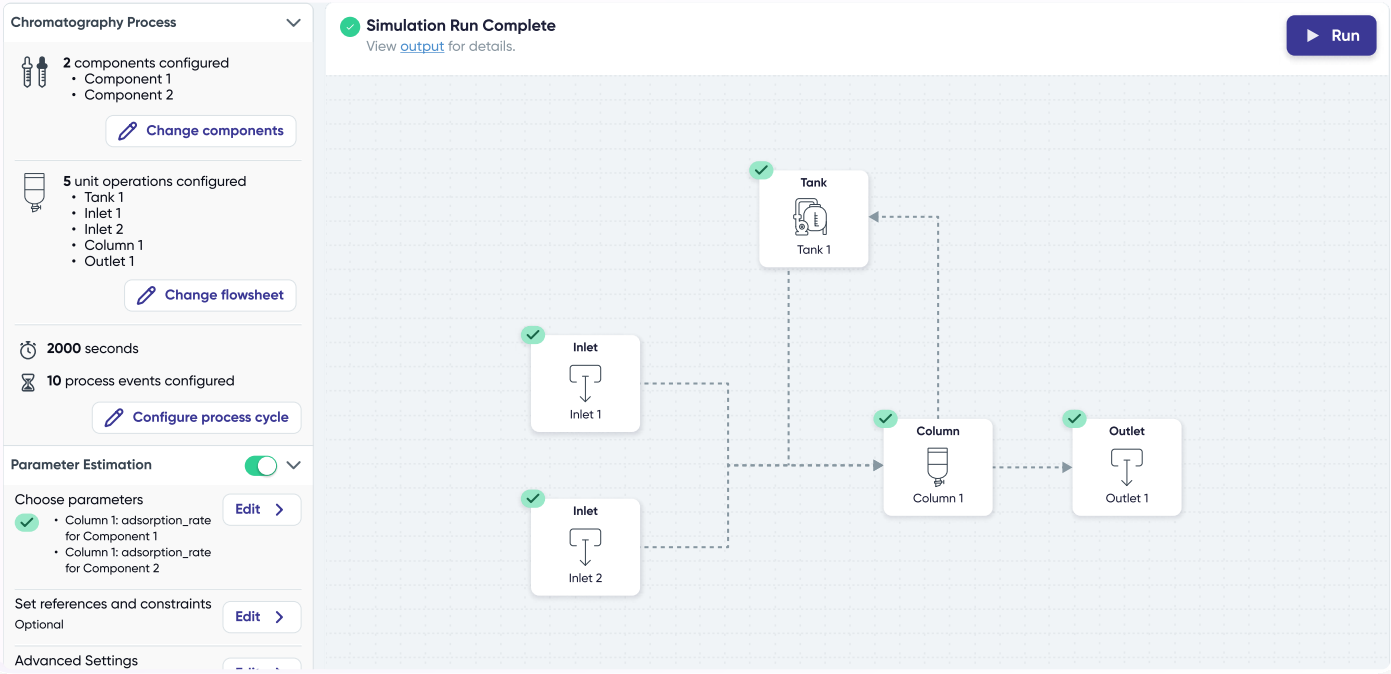
Model Development

Model development is accelerated on Basetwo by unifying data ingestion, preparation, and mechanistic modeling in a single platform. The result is faster model development, higher data fidelity, and reproducible, scalable chromatography modeling—from raw data to validated models in hours instead of months.

Example of a Standard Chromatography Workflow



Chromatography Workflow in Basetwo



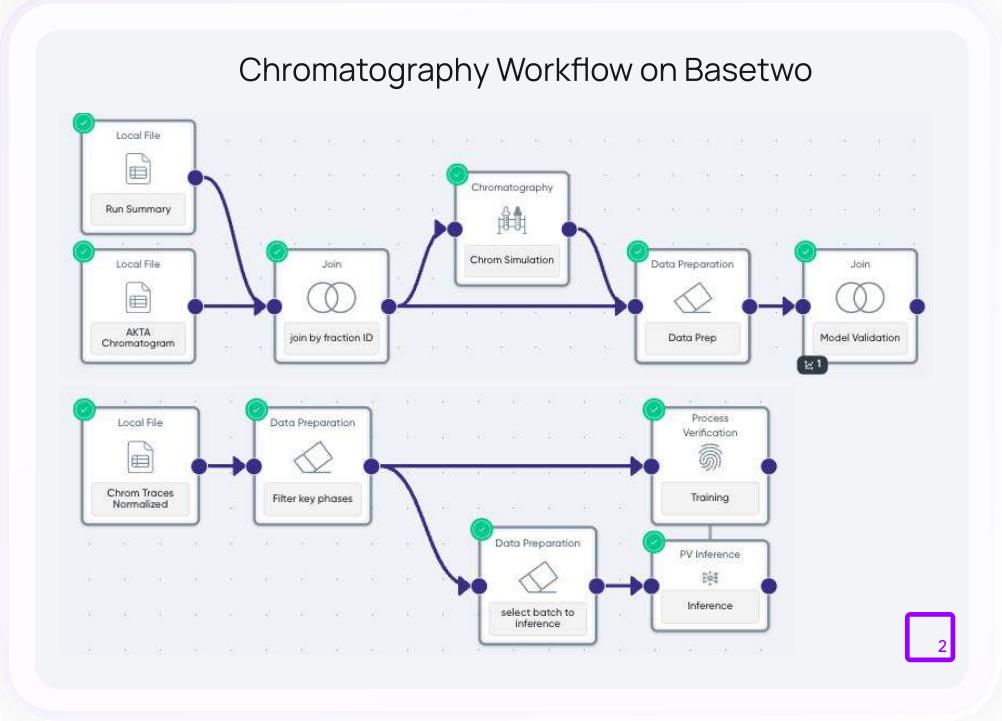
Basetwo Solution

Application View

To ensure the chromatography workflow could be used seamlessly across PD, MSAT, and manufacturing support teams, a complete chromatography workflow was deployed using Basetwo's Application View feature.

Application View bridges the gap between advanced workflow design and day-to-day execution, allowing non-technical users to run the chromatography workflow on new AKTA/Unicorn files without needing to understand or reproduce the underlying chromatography simulation pipeline.

1. Scientists and engineers simply select their entire workflow and turn it into an application in a single click. From there, they can select which visuals they want to include in their dashboard from their existing pipeline.



An example deployed workflow includes:

- Data ingestion and standardization of UV, conductivity, pressure, and volume signals
- Automated block/step boundary detection from run logbook markers
- Signal windowing, smoothing, and derivative calculations
- Chromatography analytics including peak characterization, step comparisons, and optional transition analysis
- Visualization outputs such as full-signal overlays, filtered windows, and metrics summaries
- Optional CPV-style run-over-run comparisons

2. The application automatically executes the full sequence of data preparation, step segmentation, signal processing, and analytics in a single click, delivering a decision-ready interface for the entire team.

The image above shows a chromatography analytics application built on Basetwo, where raw and derived signals—such as UV, conductivity, and pH—are analyzed together within a unified, interactive dashboard. The application computes key chromatographic features including peak position, peak width, elution windows, transition points, and normalized conductivity metrics, and enables direct block-to-block and historical comparisons across runs.

By consolidating chromatography signals, derived analytics, and run context into a single interface, teams can quickly assess run quality, verify process consistency, and detect emerging deviations without manual scripting or spreadsheet-based analysis.

The dashboard provides immediate visibility into chromatographic behavior and data integrity, significantly reducing the time required to analyze new runs and empowering teams with consistent, reproducible, and data-driven insight.

The result is an automated workflow that supports broader digitalization, CPV readiness, and scale-out objectives across the organization.

Basetwo Solution

A Fully Integrated Workflow

With Basetwo, chromatography workflows that were previously fragmented across scripts, spreadsheets, and tools are unified and productionized in a single platform. Automated data ingestion, analytics, and modeling pipelines ensure that insights generated during development can be reused consistently across runs, campaigns, and teams.

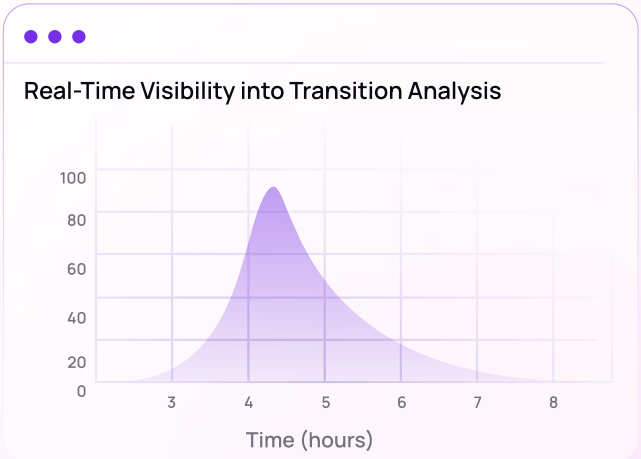
40-70%

Reduction in data integration time with automated workflows

- Reduced analysis and modeling timelines from weeks to hours
- Scalable digital foundation for CPV and manufacturing support
- Faster, more confident process decisions across teams

A Platform Built by Engineers for Engineers

- Rapid cloud-based deployment in weeks.
- Intuitive, drag-and-drop interface; for simplified simulation, monitoring, and optimization.
- Live process models deployed as reusable, scalable workflows



Explore automated workflows for improved efficiency in your biologics processes

Reach out today →

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