

Scaling up high-content imaging through engineered BioTek Gen5 data

A leading synthetic biology company relies on the Agilent BioTek Cytation system for high-content imaging, an automated microscopy technique for screening cellular phenotypes. This plate reader provides powerful quantitative and qualitative analysis. When paired with BioTek's Gen5 software, the system generates data visualizations that support critical steps in high-throughput screening.

The Challenge

As the volume of data from high-content imaging grew, the biotech company found it increasingly difficult to manage these large, complex datasets for analysis. Researchers spent excessive time on manual data tasks, diverting their focus from core experimental work. These manual processes were slow, prone to errors, and unsustainable, while DIY solutions like homegrown parsers proved ineffective and costly to maintain.

Making matters worse, researchers had to contend with a large body of data from diverse instruments in incompatible formats. Data was heavily siloed, hindering cross-analysis and limiting insights. Scientists struggled to make timely, data-driven decisions.

The Solution

The company urgently needed a scalable solution to automate data handling, reduce errors, and improve data accessibility. To address this, leadership decided to deploy the Tetra Scientific Data and AI Cloud™, integrating it with Gen5. A file-log agent automatically captures raw data from Gen5 and transfers it to the cloud, where it's transformed into a vendor-agnostic format optimized for analytics and AI. The resulting Tetra Data is large-scale, compliant, liquid, and purpose-engineered for science.

The Result

The streamlined workflow reduced scientists' hands-on time for plate reader runs by 75% and data processing time by over 50%, significantly accelerating discovery. As a result, screening throughput increased by up to 35% without requiring additional staff or equipment.

Automated data capture and analysis also minimized manual errors and standardized workflows, generating FAIR data enriched with consistent, relevant metadata. This approach dismantled data silos and made it easier to search, share, and reuse data. Researchers can now compile large, high-quality datasets for comprehensive cross-analysis, improving collaboration and uncovering deeper insights.

AI Readiness

The Tetra Scientific Data and AI Cloud engineers the high-content imaging results into AI-native datasets at scale. The biotech company is now equipped to leverage these datasets for predictive modeling, enhanced image segmentation, pattern recognition, multi-parametric analysis, and more. This will ultimately accelerate synthetic biology research, helping the company address global challenges across health, energy, food, and materials.

Challenge:

Bioengineers, relying on inefficient manual processes, struggled to manage high-content imaging data for analysis, which reduced screening throughput and further strained already limited resources.

Solution:

The Tetra Scientific Data and AI Cloud automatically collects and engineers plate reader data from BioTek Gen5 software, generating AI-native datasets at scale.

Result:

- Increased screening throughput by up to 35%
- Reduced scientists' hands-on time for plate reader runs by approximately 75%
- Decreased data processing time by over 50%
- Enhanced data completeness, consistency, and quality
- Enabled cross-analysis through significantly improved data accessibility and reliability