Alpenglow Biosciences enhances its 3D microscopy solution in collaboration with GenUI

At a glance

Alpenglow Biosciences is adding a third dimension to pathology, using its cloud-connected microscope to produce 3D images of tissue samples and utilize AI-powered algorithms to provide accompanying analysis. While the applications of its novel technology are many, the company is a particularly strong fit for drug development and clinical trials.

When a high-profile client in the pharmaceutical industry approached Algenglow about a partnership, they were looking forward to innovating together. However, the client required the team to use Microsoft Azure rather than their usual cloud services provider, AWS. They relied on GenUI to meet their clients' specific data storage and transfer needs within a tight timeframe.

Looking beyond a 2D slice

Think back to your high school biology class. You probably remember placing a thin specimen on a slide and viewing it through a microscope. In fact, this isn't too far off from how it's done at many large biology labs today. Where Alpenglow changes things, however, is by digitizing these tissue samples, whether they're from a human biopsy, an animal study, or a lab-grown specimen, and digitizing them in 3D space. This provides dramatic new opportunities for advancing basic science and disease research in ways that have the potential to transform lives.

However, Alpenglow doesn't stop there. "We not only digitize the tissue, but we also automate the entire process by uploading the tissue to the cloud, running sophisticated data processing and analytics on it, and then delivering powerful insights at the end of the day," says Alex Springer, Chief of Staff at Alpenglow. "We provide an integrated solution, including the technology, the hardware, the processing, and the analysis."

Getting from data to insights

As a true end-to-end solution, Alpenglow stands out from other biosciences companies working in the 3D microscopy space. They're also especially well-suited to a critical and lucrative aspect of the biopharma industry: drug trials. "We're tailor-made for clinical trials and drug development settings where you need to image 100 biopsies in rapid procession and find out which patients are going to be best suited, or which animal models are working best for your drug," Springer says. "Our company's mission is to accelerate drug development and deliver better drugs into the hands of patients faster."

In addition, Alpenglow has both access to and the ability to transfer and analyze staggering amounts of 3D sample data—up to 50 terabytes in a single day. "No one has had access to these large-scale, 3D tissue datasets before," Springer says. "It's critical that we help clients not only capture the data, but also empower them with tools to extract and make use of the resulting insights." All of these distinctive capabilities piqued the interest of a major player in the biosciences world: a top-five pharmaceutical company.

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> *Alex Springer, Chief of Staff, Alpenglow Biosciences*

A game-changing client

Innovative 3D technologies were already top-of-mind for this global pharma enterprise. Company leadership had prioritized the use of new and unique data in its therapeutic discovery process, especially spatial data. The company wanted the ability to analyze biopsied tissue, as well as organoids, which are three-dimensional, self-organizing tissue cultures that simulate the functions of organs.

The pharma company chose Alpenglow for its ability to deliver a full spectrum of services, from the specialized microscope itself to the transfer and analysis of the resulting data. With its capabilities around both the hardware and software sides of microscopy and pathology, the relationship made perfect sense.

From the start, however, Alpenglow knew that this client was going to be a little different. For one thing, the company would need to migrate its data pipeline. The Alpenglow microscope doesn't just capture images—it interfaces with the company's cloud platform and data processing pipeline. Previously, Alpenglow's data pipeline was built and managed using Amazon Web Services (AWS). However, the client mandated the use of Microsoft Azure. Essentially, the team would be replicating their cloud pipeline code using any entirely different platform.

In addition, they would be providing the client with the hardware onsite. "The closer the platform is to the tissue, the more quickly you can generate results," says Springer. Enabling the client to use the system directly required upgrading the interface to be more automated and user-friendly.

Meeting the challenge

The team needed a software engineering partner that could tackle the migration and user experience elements while navigating a system featuring complex integrations of software and hardware.

They chose GenUI because of our experience with hardware and software, our Azure expertise, and our reputation in the startup community for being able to tackle tough projects quickly without compromising on quality. "GenUI was one of the only firms that we reached out to who could deliver on the timeline that we needed and had the diversity of skills we needed in one team," says Springer. "Since day one, we have experienced seamless integration with the GenUI team."

Alpenglow's Director of Engineering, Cody Cooper, notes GenUI's enthusiasm for engineering excellence. "We started off meeting a few days a week, and pretty soon it was a fifteen-minute standup each day," he says. "The GenUI team engaged at a deep level. They were always interested in learning about microscopy and our technology specifically so they could help us deliver the best solution for the client."

GenUI quickly got to work implementing Azure data processing pipeline, making it as modular as possible for easy switch-outs to AWS parallels. The team was also able to address a major issue that came up regarding data upload speed.

"We get to the final integration testing and the data is just not uploading as quickly as we thought it would–by a factor of 100," says Cooper. Unsure what was causing the bottleneck, they started digging through the code. One of the GenUI engineers suggested that Azure's default function might throttle at certain speeds. Sure enough, that was the answer, and the team found a workaround. "That was quite a breakthrough," Cooper says.
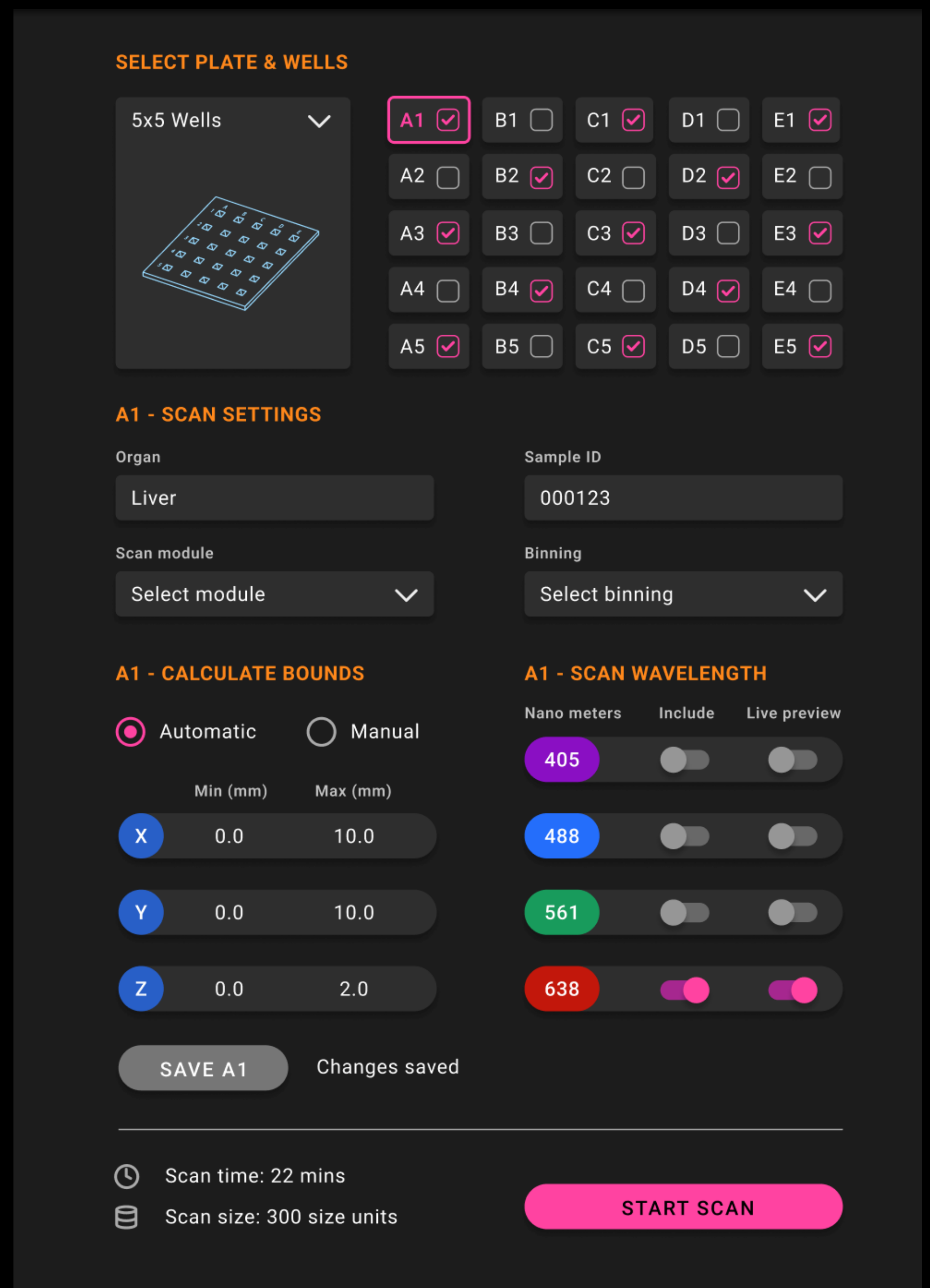
Getting from data to insights

At the end of the day, the pharma client was very pleased with the work Alpenglow and GenUI did. Particularly impressive was the speed at which they completed the project–only three months from start to finish.

"In addition to successfully migrating the data pipeline, GenUI contributed to multiple improvements both on the back end and the front end of our solution," adds Springer. For example, GenUI first built Alpenglow an MVP command line interface for the microscope and then proceeded to develop a modern graphical user interface (GUI).

Alpenglow already sees a number of potential applications for this new setup. "The GUI that GenUI eveloped for us is now coming standard on all of our microscope installations, including with our academic customers," notes Springer. "Our own team is using it in-house for client work and demos. It's much easier to get started with and helps users get to results that much faster."

In addition, GenUI debugged some of the microscope's drivers and helped automate data transfer from the device to the cloud and back to the customer's cloud storage account.

After the project was finished, GenUI provided Alpenglow with code walkthroughs, live demos, and written documentation to ensure a successful transition. "GenUI was a fantastic partner throughout," concludes Springer. "They were essential to helping us capture a major opportunity for our business and helped take our solution to the next level with their creative thinking, collaborative approach, and deep engineering and UX expertise. I would work with them again anytime the opportunity arises."

SELECT PLATE & WELLS

5x5 Wells

A1 ☑	B1 ☐	C1 ☑	D1 ☐	E1 ☑
A2 ☐	B2 ☑	C2 ☐	D2 ☑	E2 ☐
A3 ☑	B3 ☐	C3 ☑	D3 ☑	E3 ☑
A4 ☐	B4 ☑	C4 ☐	D4 ☑	E4 ☐
A5 ☑	B5 ☑	C5 ☑	D5 ☑	E5 ☑

A1 - SCAN SETTINGS

Organ
Liver

Sample ID
000123

Scan module
Select module

Binning
Select binning

A1 - CALCULATE BOUNDS

◉ Automatic   ○ Manual

	Min (mm)	Max (mm)
X	0.0	10.0
Y	0.0	10.0
Z	0.0	2.0

SAVE A1   Changes saved

A1 - SCAN WAVELENGTH

Nano meters	Include	Live preview
405		
488		
561		
638		

🕐 Scan time: 22 mins
🗄 Scan size: 300 size units

START SCAN

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genui

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