

Enabling scalable, precise, and fast spatial biology studies with Orion and OMERO Plus



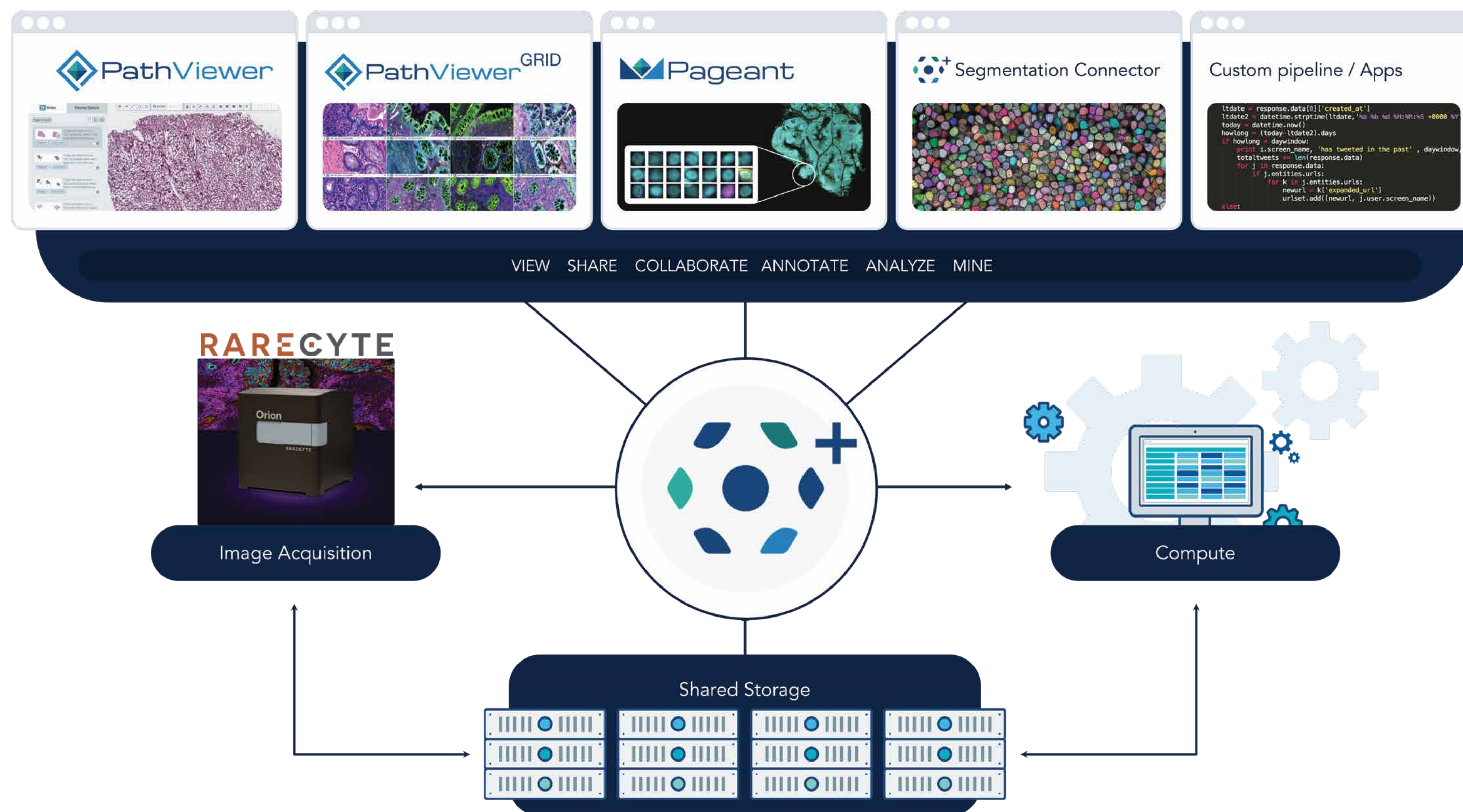
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The Challenge: Analyzing multiple spatial biomarkers across entire tissue sections is a bottleneck in many research areas, including cancer biology and immunology. Traditional methods are time-consuming and limit the scale of investigation.

Our Solution: A streamlined workflow combining **RareCyte's Orion** high-throughput imaging system with **Glencoe Software's OMERO Plus** data management, analysis and visualization software. This integrated system dramatically accelerates the identification and analysis of cell populations within complex tissues.



The seamless integration of Orion and OMERO Plus enables efficient workflows connecting data acquisition to analysis and visualization.

RareCyte's Orion:

Orion is a next generation spatial biology platform that uniquely enables 20-channel immunofluorescence in a single staining and imaging round. The platform consists of IHC-validated antibodies directly conjugated to bright and photostable ArgoFluor™ dyes along with a benchtop laser-powered scanner for sensitive and specific detection of biomarkers in the context of high-plex panels. The combined power of the Orion instrument and workflow enables ultra-fast imaging at a low run cost that preserves the integrity of the tissue sample, providing scale to translational and clinical studies.

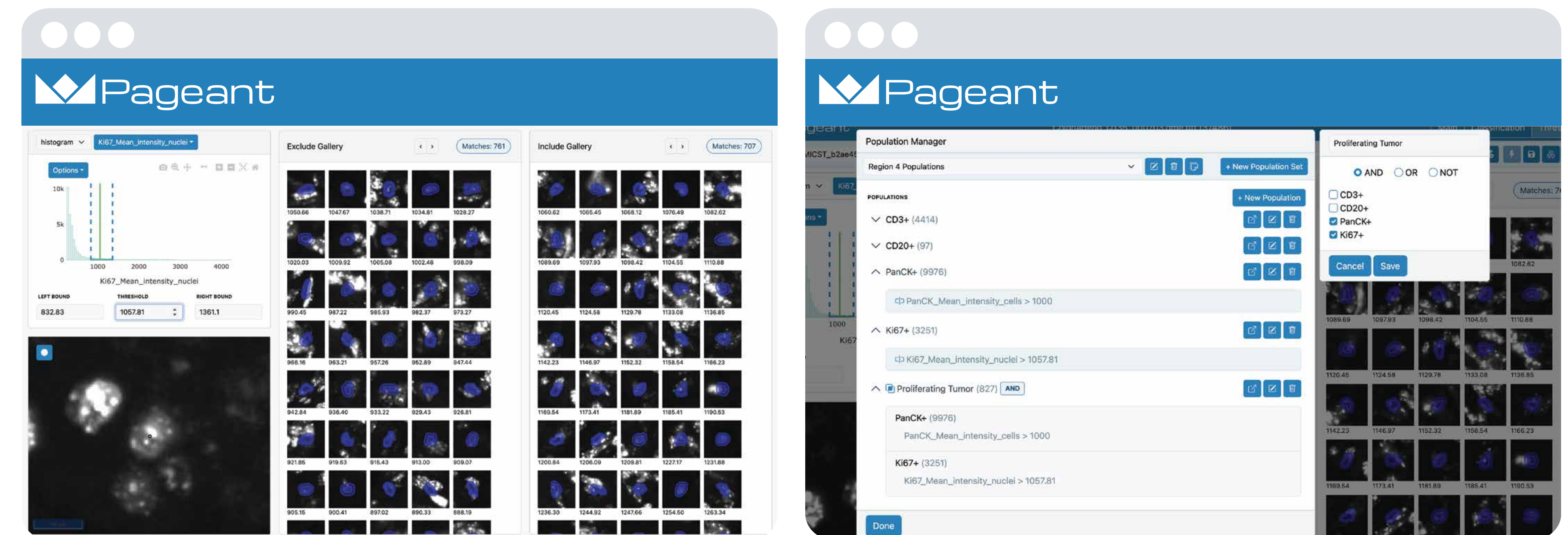
Glencoe Software's OMERO Plus

Glencoe Software's OMERO Plus is a powerful enterprise image data management platform which enables remote viewing, sharing and analysis of large-scale biological image datasets, including metadata ranging from simple annotations to complex, quantitative descriptions of cells within images. Furthermore, OMERO Plus' open API allows for flexible customization and integration with other tools and pipelines. Additionally, OMERO Plus ensures data integrity and reproducibility by tracking experimental conditions and data provenance.



A new visual data mining interface called Pageant supports the exploration and classification of millions of cells based on hundreds of features.

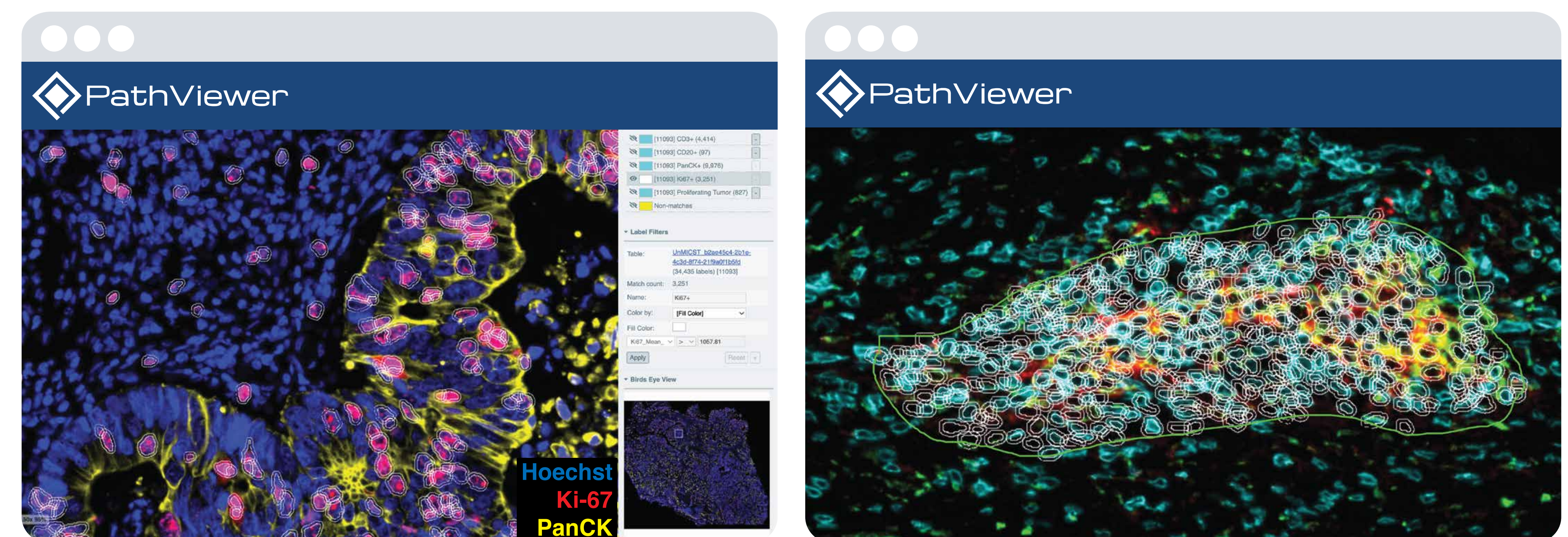
Cell classification is time consuming and requires expert review. To improve the speed of per-marker threshold calling, the Threshold Window in Pageant displays objects just above and just below a dynamic, user-specified threshold.



We performed an iterative classification workflow, first by finding marker-positive cell populations (example: Ki-67+), then by creating boolean combinations of these markers into biologically-meaningful cell types (example: proliferating tumor), all within a web browser.



Maintaining spatial context is enabled by seamless integration of Pageant with the Digital Pathology viewer, PathViewer. Cell populations can now be defined by regions of interest drawn in PathViewer.



In PathViewer, Ki-67+ cells (red), first identified in Pageant, are viewed within a Leukocyte cluster and nearby proliferating tumor cells. Populations can also be defined spatially by drawing regions of interest in PathViewer, such as this cluster of PD-L1+ (red) macrophages.

Conclusion: Orion generates multiplexed spatial biology data at unparalleled speeds. Now, rich analytical data can be evaluated with similar rapidity with new interfaces in OMERO Plus like Pageant and PathViewer. OMERO Plus, Pageant and PathViewer transform the scientist's ability to make conclusions from analytical data without code at scale.