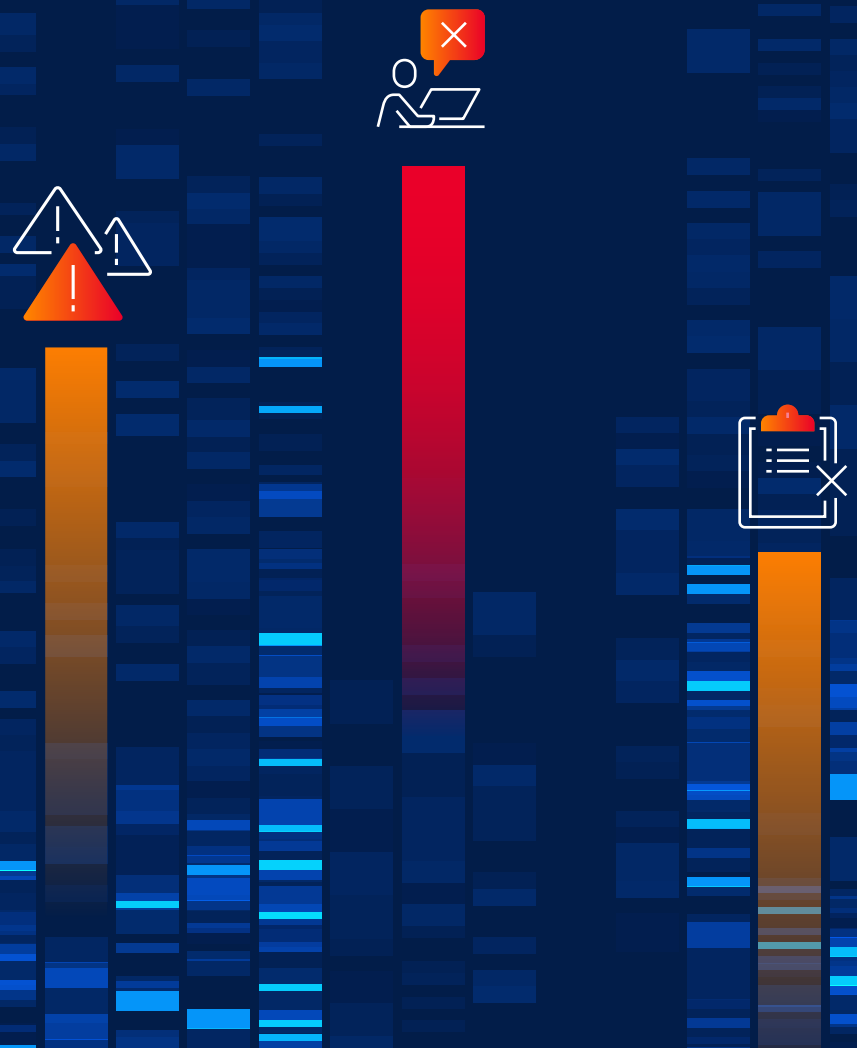
sapio sciences

Why NGS ELN Deployments Fail:

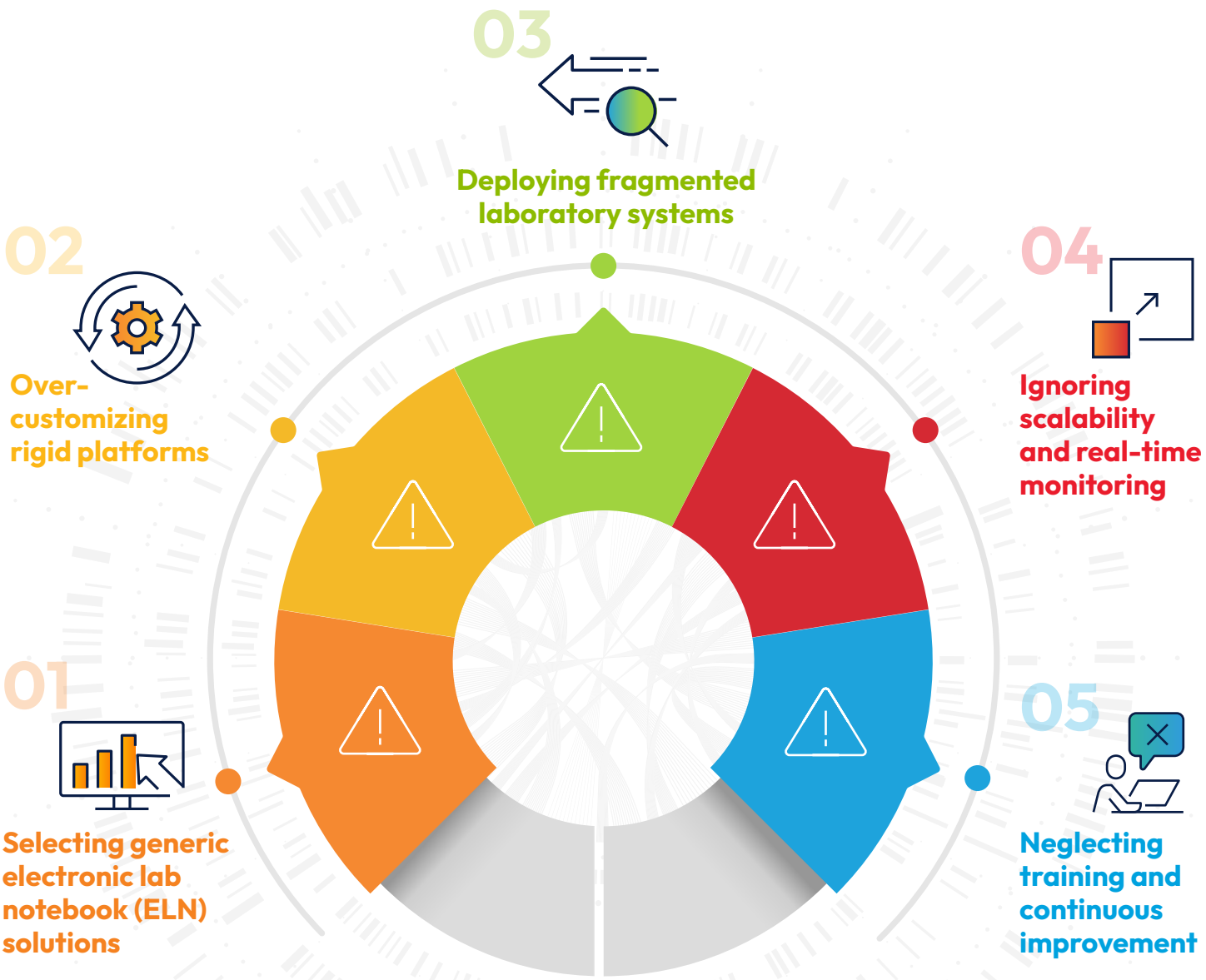
Don’t Make These Mistakes



Introduction

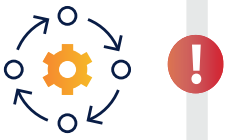
Next-generation sequencing (NGS) has become indispensable in biopharmaceutical research, enabling breakthroughs in personalized medicine, gene therapy, and genomics.

However, labs often struggle with failed ELN (electronic laboratory notebook) deployments that derail NGS workflows. Based on insights from our NGS informatics experts who regularly hear these complaints, here are the critical mistakes to avoid:



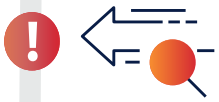
01 Selecting generic electronic lab notebook (ELN) solutions

NGS workflows are inherently complex, involving massive data volumes, intricate sample lineages, and evolving protocols. Generic ELNs designed for standard lab operations often fail to meet these unique demands. Key shortcomings include:



Inadequate handling of complex and variable workflows

Generic platforms lack pre-built templates for NGS processes like library preparation or variant annotation, forcing scientists to spend valuable time implementing cumbersome adaptations or workarounds. Selecting an ELN with configurable, no-code workflows enables laboratories to adjust processes quickly in response to their evolving scientific needs.



Insufficient management of data volume and velocity

The substantial volume of data generated by NGS experiments can overwhelm ELN systems not designed for such high-throughput genomics. An ELN must offer scalable data management capabilities to handle the terabytes of data per experiment, including efficient data storage, retrieval, and analysis, to prevent bottlenecks and ensure seamless operations.

Limited integration with specialized instrumentation

NGS processes rely on various specialized instruments and systems. An ELN that cannot seamlessly integrate with these tools may lead to data fragmentation and manual transfer errors. Effective NGS ELN solutions must easily connect with sequencing instruments and bioinformatics tools to ensure end-to-end traceability. Prioritizing ELN systems with robust integration capabilities ensures cohesive data flow and operational efficiency.

Deficient sample and material management

Effective tracking of samples and materials, including reagents and consumables, is critical in NGS workflows. ELNs that lack comprehensive sample and inventory management features can lead to traceability issues and compromised experiment integrity. Implementing an ELN with built-in sample and materials management enhances accuracy and compliance.

Weak reporting and data visualization capabilities

Generic ELNs often fail to provide actionable insights due to inadequate reporting tools and fragmented data visualization. Labs often struggle with:

- Absence of real-time dashboards for tracking quality control (QC) metrics like contamination rates, coverage depth, or sequencing errors.
- Lack of lineage maps to trace samples from extraction to analysis, complicating troubleshooting and audit processes.
- Static reports that obscure trends in large datasets, forcing researchers to manually aggregate data across platforms.

Choosing a purpose-built solution ensures compatibility with complex workflows and reduces the need for costly customizations.

02

Over-customizing rigid platforms

Customization may seem like a solution for adapting generic ELNs to NGS workflows. However, excessive modifications often lead to:

Fragile architectures

Updates or changes can break heavily customized systems, causing downtime and inefficiencies.

High maintenance costs

Custom solutions require ongoing developer support, diverting resources from research priorities.

Scalability issues

When workflows evolve, such as transitioning to single-cell sequencing, rigid platforms struggle to adapt.

Instead of customization, opt for configurable platforms that allow no/low-code adjustments aligned with scientific needs. Sapio Sciences emphasizes configurability over customization to ensure robust and scalable deployments.

03

Deploying fragmented laboratory systems

Many labs rely on separate systems for LIMS (laboratory information management systems), ELN, and bioinformatics tools. This fragmented approach creates challenges such as:

Manual data transfers

Scientists waste time reconciling metadata between systems.

Data silos

Disconnected systems hinder collaboration and reduce traceability across workflows.

Error amplification

Workflow errors propagate downstream when systems lack integration.

An ELN that is part of a unified lab informatics platform promotes streamlined workflows, better data visibility, and improved collaboration between teams. Sapio's science-aware informatics solution combines LIMS, ELN, and analytics into a single ecosystem. This integration enhances data traceability and reduces operational inefficiencies.

04

Ignoring scalability and real-time monitoring

NGS workflows demand scalable solutions capable of handling growing volumes of data and evolving protocols. Common pitfalls include:

Slow performance

Systems not designed for big data analytics struggle with the terabytes of sequencing information generated.

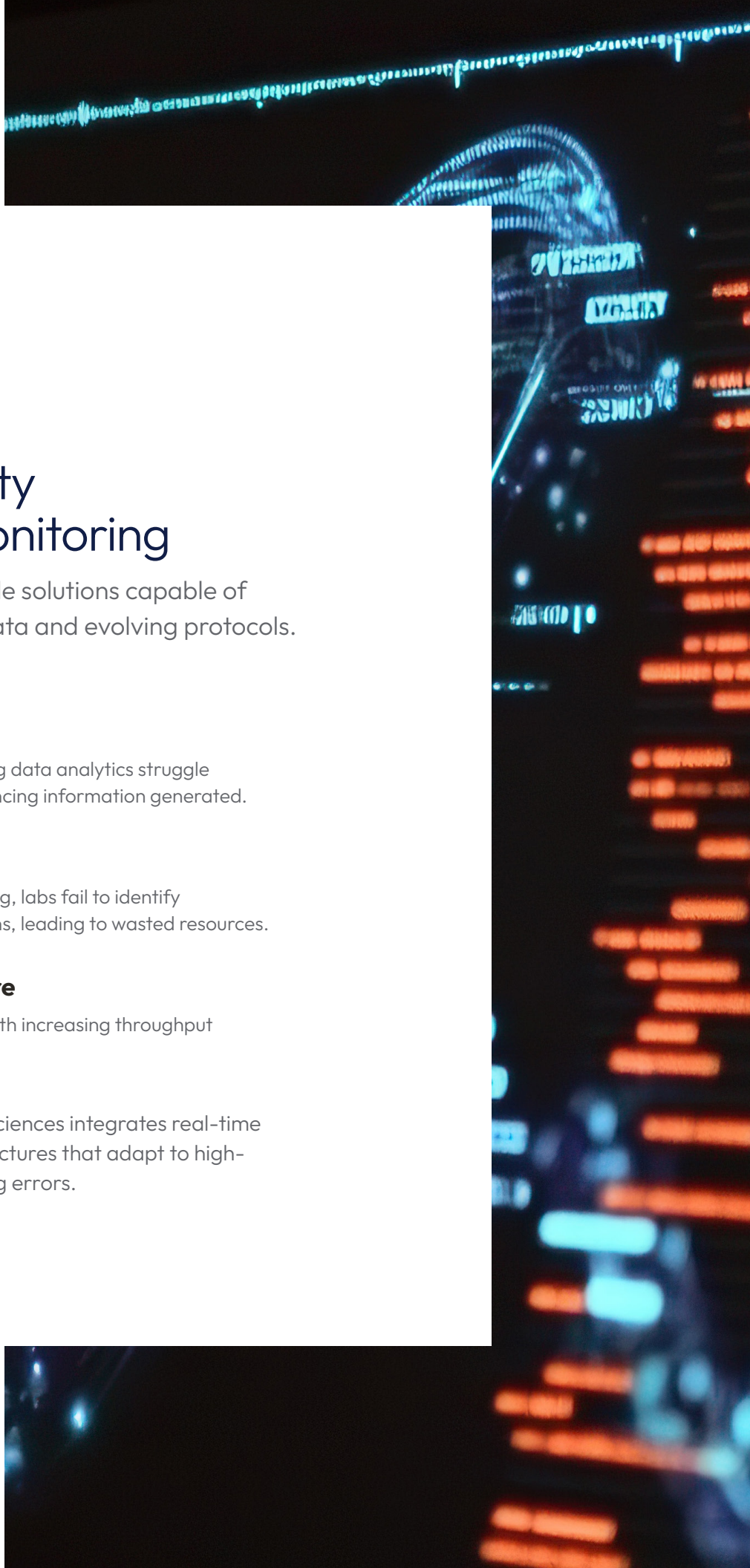
Missed errors

Without real-time monitoring, labs fail to identify issues during sequencing runs, leading to wasted resources.

Inflexible architecture

Platforms unable to scale with increasing throughput limit lab productivity.

To address these challenges, Sapio Sciences integrates real-time monitoring tools and scalable architectures that adapt to high-throughput demands while minimizing errors.



05

Neglecting training and continuous improvement

Inadequate user adoption is a common complaint when ELN deployments fail, particularly due to poor user experience and concerns about steep learning curves or overly technical configuration requirements. Successful ELN deployment doesn't end at installation—it requires ongoing user training and system optimization. Labs often fail by:

Underestimating training needs

Scientists must learn best practices for navigating the system and entering metadata consistently.

Skipping audits

Regular audits identify bottlenecks and ensure compliance with regulatory standards like Clinical Laboratory Improvement Amendments (CLIA), College of American Pathologists (CAP), HIPAA (Health Insurance Portability and Accountability Act) and ISO certifications.

Ignoring updates

Outdated templates or workflows reduce efficiency over time.

Sapio Sciences advocates phased implementations paired with comprehensive training programs to ensure smooth adoption. Continuous monitoring further enhances system performance by identifying areas for improvement.

How to ensure the successful deployment of ELN software for NGS

Avoiding these mistakes requires careful planning and selecting the right platform. Here are key strategies for success:

Best practices	Benefits
Choose purpose-built NGS solutions	Streamlines workflows, ensures adequate data management infrastructure, and enables process automation and data visualization without costly customizations
Prioritize unified platforms that embrace connectivity	Enhances traceability across end-to-end processes, helping to ensure compliance
Emphasize configurability	Adapts workflow easily to evolving protocols with no or little developer support
Implement real-time monitoring	Reduces sequencing errors and resource waste, helping to maintain a high standard of data quality
Provide ongoing training	Ensures user confidence and compliance readiness

Deploying an ELN for NGS requires careful consideration of workflow complexity, data management needs, instrument integration, sample tracking, and system unification. By addressing the factors proactively, labs can avoid common pitfalls and enhance the success of NGS initiatives.

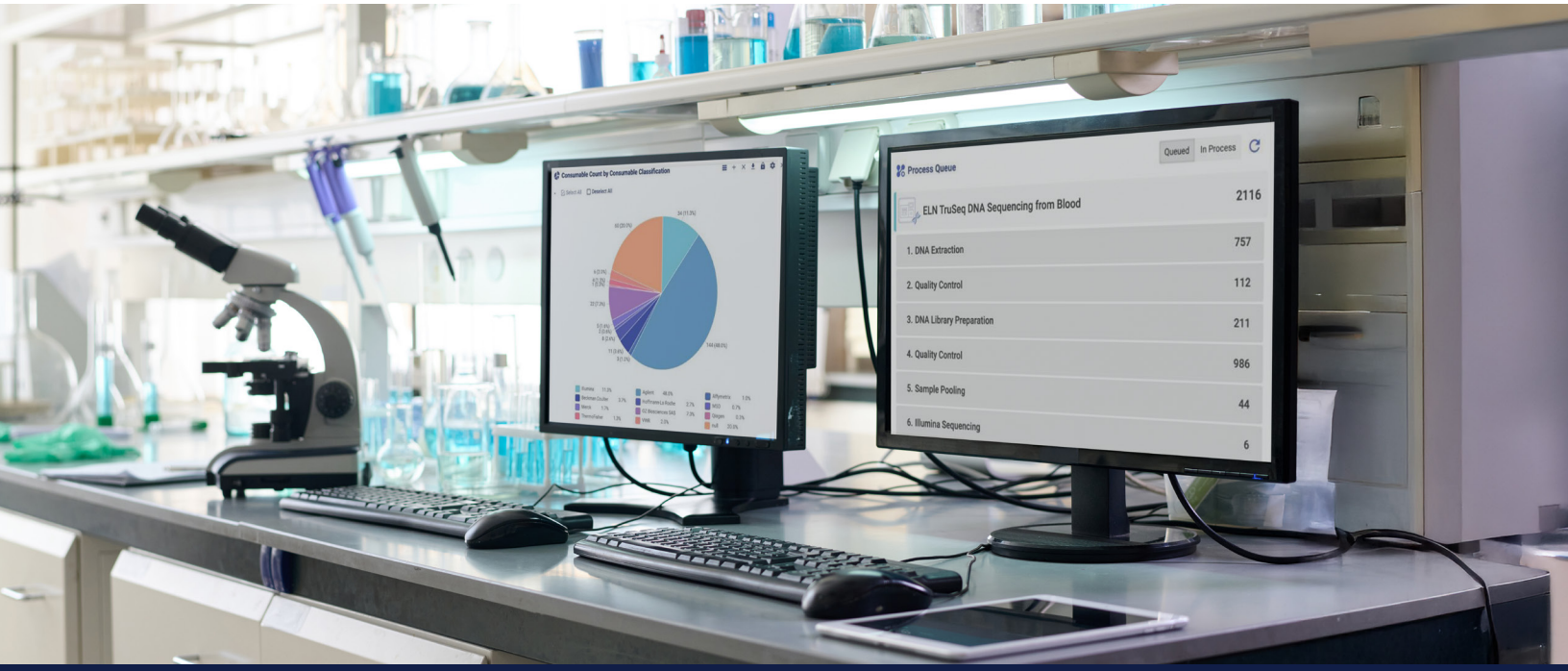
The NGS Toolkit from Sapio Sciences

Sapio Sciences' NGS Toolkit is a purpose-built, out-of-the box solution designed specifically for the demands of next-generation sequencing.

The toolkit, developed by a team with deep domain knowledge, offers pre-built NGS workflows such as library construction, pooling, and sequencing, that can be instantly configured and activated without the need for coding. This no-code configurability empowers scientists to rapidly adapt workflows as protocols evolve, ensuring the platform remains aligned with actual laboratory practices.

The NGS Toolkit is a powerful, scalable solution for managing the high data volumes and complexity inherent to NGS. It features built-in search functionality, advanced data visualization tools, and seamless integration with specialized instruments. Additionally, the toolkit provides comprehensive built-in molecular biology tools from genome editing to plasmid design. It also includes sample and material management to ensure full traceability throughout the sample lifecycle—from request and quality control to reprocessing and storage.

Platforms like Sapio Sciences NGS Toolkit demonstrate how a tailored solution can unlock the full potential of NGS research while maintaining scalability and compliance.



For more information about the NGS Toolkit, visit
www.sapiosciences.com/solutions/next-generation-sequencing/

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