

NEW YORK GENOME CENTER TAKING AN INGENUOUS APPROACH TO SEQUENCING AND THEIR LIMS

Located in a busy segment of lower Manhattan, the New York Genome Center (NYGC) is home to 30,000 square feet of modern lab space. A fleet of high-capacity sequencers, such as the Illumina® HiSeq series, and a number of scientists and bioinformaticians make for a bustling environment. As a consortium of leading scientists, researchers, and clinicians, NYGC processes tens of thousands of samples a year and works to translate genomic research into viable clinical solutions. Renowned for precision and quick turnaround, NYGC recently implemented Clarity LIMS to support their sequencing operations. This case study describes their selection and implementation process.

LABORATORY INFORMATION MANAGEMENT SYSTEM (LIMS) SELECTION

Under the direction of Harold Swerdlow, Ph.D., Vice President of Sequencing, NYGC develops cutting edge techniques and advances a variety of next-generation molecular biology techniques as well as the tools needed to support them. For NYGC, one of these tools includes a comprehensive laboratory informatics platform. To support the multitude of next generation workflows and large sample volume, NYGC decided to invest in a laboratory information management system (LIMS) designed specifically for genomics and next generation sequencing. They evaluated LIMS options and chose Clarity LIMS because it had numerous out-of-the box workflows and instrument integrations, configurability, and toolkits to extend system functionality.

It was a selling point for NYGC that Clarity LIMS was straightforward to configure. Easy configuration would mean that their highly engaged team of scientists and bioinformaticians from all groups within the organization could pool their knowledge and contribute to creating the workflows necessary to support their innovation.

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IMPLEMENTATION

From start to finish, the first phase of their implementation took only three months, and involved integrating with various instruments and systems in the lab. Some of these included:

- » Sample accessioning and sample ordering system
- » A fleet of instruments, which included Illumina MiSeq, HiSeq, and HiSeq X instruments as well as instruments from other manufacturers
- » Liquid handling robots
- » QC instruments
- » Library prep and sequencing processes

Implementation of any major software system can be fraught with challenges, and LIMS is no exception. Due to the complexity of lab procedures and the need to integrate with so many different instruments and other systems, LIMS implementations are known for being problematic. So how were they able to pull off such a smooth implementation?

For starters, the design of Clarity LIMS lends itself to a speedy implementation. It comes with out-of-the box workflows for numerous instruments. In some cases, NYGC needed to make modifications to these workflows but could do so easily by starting with existing workflow templates and adjusting individual steps and protocols. Further, if NYGC needed a workflow outside of the many preconfigured in Clarity LIMS, they were able to build it with no development resources required.

PREPARATION AND OPEN MINDEDNESS TRUMP COMPLEXITY

Clarity LIMS can only take a small portion of the credit for NYGC's expedient implementation. From the beginning, NYGC brought the same sense of passion and urgency to the implementation as they do their science. According to GenoLogics Field Application Scientist, Jill Hesse, they were extremely prepared for every facet of the implementation.

They prepared by taking stock of all of the workflows in their lab. They thought about their short-term and long-term goals. They also had a good sense of their challenges and resulting pain points and worked across different areas to consider the big picture.

With each Clarity LIMS implementation, GenoLogics deploys a team of specialists to manage the process. This team works to quickly implement the system but often has to rely on people or resources at the customer site to move forward. To keep the process moving, the team at NYGC dedicated a group of individuals to shepherd the new LIMS into the organization.



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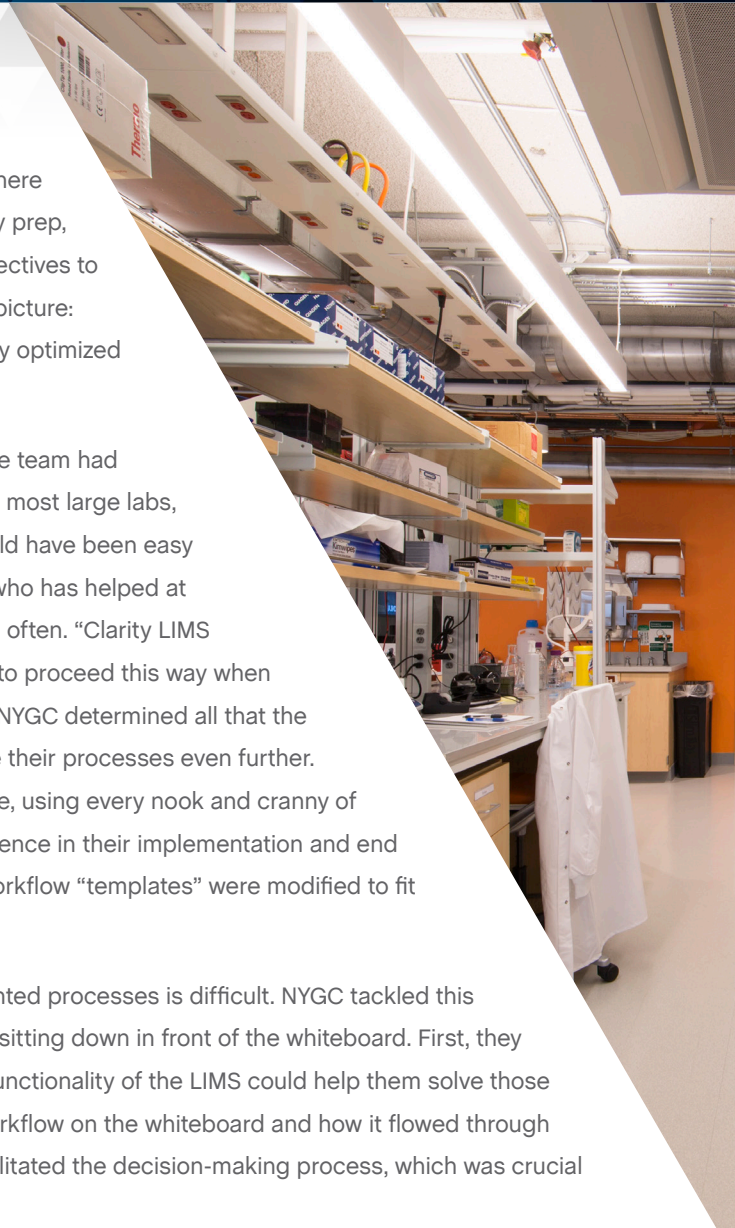
For NYGC, this was a group of lab scientists and one software developer. There were representatives from each major area--sample submission, QC, library prep, sequencing, and data analysis--and they each brought their respective objectives to the table. What they did so well, according to Hesse, was consider the big picture: "Their ability to work across groups and collaborate was evident in how they optimized their workflows with the LIMS."

Undeniably, collaboration and ingenuity were crucial to what came next. The team had to capture all of their workflows the way they wanted them in the LIMS. Like most large labs, NYGC had a number of complicated processes. According to Hesse, it would have been easy for NYGC to set up the workflows in the LIMS exactly as they were. Hesse, who has helped at least 50 organizations with implementations, sees labs fall into this trap too often. "Clarity LIMS can capture workflows as labs have them, but it often doesn't make sense to proceed this way when the LIMS can help you optimize your processes instead." With this in mind, NYGC determined all that the LIMS could do and used its implementation as an opportunity to streamline their processes even further. Hesse states, "They saw the possibilities and quickly went into exploit mode, using every nook and cranny of the LIMS." She adds, "They were open to change, and it made all the difference in their implementation and end result." Many of Clarity LIMS workflows were used as-is, and many of the workflow "templates" were modified to fit their specific workflows and protocols.

Implementing change in any organization where there are already documented processes is difficult. NYGC tackled this challenge by joining forces with the GenoLogics implementation team and sitting down in front of the whiteboard. First, they considered the lab's current pain points. Then, they talked about how the functionality of the LIMS could help them solve those problems as well as optimize their current workflows. The visual of each workflow on the whiteboard and how it flowed through each group made it easy for the team to see all of the steps and it also facilitated the decision-making process, which was crucial for moving the process forward.

As savvy project managers, the NYGC team put another key project management tactic to work: prioritization. Their implementation was broken into two phases. The first phase involved putting all prioritized workflows into production. Then, the second phase would focus on the remaining workflows and optimizing the system for the anticipated throughput. Here again, NYGC excelled because they weren't afraid to put the new workflows into production. According to Hesse, many labs hesitate at this point out of worry that the new workflows aren't absolutely perfect. This, of course, impedes the process and prevents labs from perfecting and optimizing the workflows. This wasn't the case with NYGC. NYGC used the workflows in production to get immediate team feedback to plan future improvements.

What also helped the implementation proceed smoothly was being realistic about dates. When NYGC began their implementation, they knew that the end of year holiday season would likely affect their rollout. Over virtually any 2-3 month period, it's common for labs to have to manage holidays or staff absences. NYGC mitigated the lapse by working it into the overall schedule. Additionally, the GenoLogics team provided continuity by filling in any gaps.



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LIMS BENEFITS

NYGC is now using Clarity LIMS throughout their organization, including:

- » The toolkits, specifically the LabLogic Toolkit and the Lab Instrument Toolkit. The LogLogic Toolkit enables them to perform custom calculations on user-defined fields. Right now, they use it on QC steps to either pass or fail samples but have identified other areas in which they want to apply it. Additionally, the Lab Instrument Toolkit has allowed them to parse data from multiple instruments and import it back into Clarity LIMS. NYGC estimates that these two toolkits prevented them from having to write 5-6 scripts, which took pressure off of the developer member of their implementation team.
- » Centralization. Team remarks that having all of their sample data in one location — rather than a system of spreadsheets — has saved them time and frustration. It's given them the luxury to think about and work on other important initiatives for their lab.
- » Standardization. The team is also enjoying the standardization that comes with a LIMS. Like any lab, there are multiple ways to carry out protocols and workflows, but their work to decide on what the workflows would capture and the ability of the LIMS to “lock them down” has helped them develop consistency and even higher levels of quality.

A LOOK AHEAD

NYGC's work with the GenoLogics implementation team is indicative of all the work done at NYGC. Their innovation and “being open to possibilities” spirit is rivalled only by their sense of urgency. In the future, they may extend the use of Clarity LIMS to their clinical operations. It will enable them to effortlessly manage samples and implement new methods in their lab so that they can focus on what they do best: translating biomedical discoveries to improve people's lives.

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