Clarity LIMS™ software accelerates NGS research

The Illumina FastTrack Sequencing Services Lab experienced significant operations improvements using Clarity LIMS software

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Introduction

Managing the pace of technological change can be challenge for labs using next-generation sequencing (NGS). This includes vendor sequencing services labs that provide on-demand service to their instrumentation customers and clients that outsource their sequencing projects. To help address this challenge, Illumina offers Clarity LIMS software, a laboratory information management system (LIMS). The software enables sample tracking and workflow management, optimizing lab efficiency.

This technical note presents a use case for adoption of Clarity LIMS software by the Illumina FastTrack Sequencing Services lab. The FastTrack lab, which was working with different products, methods, and protocols on a weekly basis, saw a dramatic increase in its demand and workload such that tracking and assessing its own performance was deprioritized as staff focused on delivering high-quality data back to clients in a timely manner. The in-house sample tracking database was unable to keep pace with the demand, and they needed a better solution to evaluate lab processes and improve efficiency.

Personnel at the FastTrack Sequencing Services lab replaced their system with Clarity LIMS software. Within a week of implementation, the FastTrack Sequencing Services lab was tracking samples in Clarity LIMS software. Even during the initial evaluation phase, lab staff experienced significant time savings by using Clarity LIMS software automation capabilities in the NGS workflow.

Outgrowing homegrown data management

The standard NGS workflow (sample receipt, library preparation, sequencing, data analysis, and reporting) can be complicated for vendor services labs such as the FastTrack Sequencing Services lab, as customers often have different requirements. While some customers need FASTQ files or full analysis and return of results, others request raw data files so they can run their own analysis pipelines.

While the FastTrack Sequencing Services lab had been using an in-house developed system to track samples, the system wasn't flexible enough to support the needs of a growing lab:

- Using Excel spreadsheets, not a full-fledged LIMS, made data retrieval a manual, time-consuming process
- Maintaining and updating a homegrown system was difficult for personnel focused on lab operations and not building software

Preconfigured for implementation

Many elements of Clarity LIMS software are available as preconfigured capabilities to support workflows specific for Illumina library preparation and sequencing, making the software easy to implement (Figure 1). Within a week of implementing Clarity LIMS software the FastTrack Sequencing Services lab was tracking samples, runs, and data more efficiently.

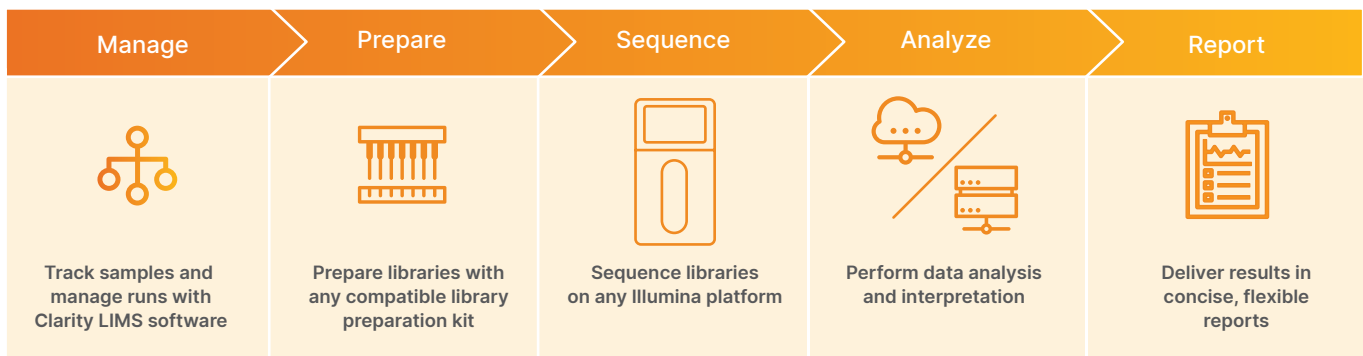| Manage	Prepare	Sequence	Analyze	Report
Track samples and manage runs with Clarity LIMS software	Prepare libraries with any compatible library preparation kit	Sequence libraries on any Illumina platform	Perform data analysis and interpretation	Deliver results in concise, flexible reports

Figure 1: Clarity LIMS software is preconfigured for the Illumina NGS workflow.

Clarity LIMS software removed unnecessary manual tracking steps during library preparation, automatically transferring sample information throughout the LIMS after an initial scan. Automated tracking resulted in significant time savings, as the in-house system required lab personnel to repeatedly scan barcodes for every tube used for each step throughout the library preparation workflow.

Clarity LIMS software enables direct interfacing with Illumina instruments to monitor sequencing. After scanning a flow cell barcode and loading it onto a sequencing system, Clarity LIMS software automatically generates a sample sheet and begins collecting data associated with the run from the sequencing system. This required little to no action from scientists while sequencing runs were in progress.

While preconfigured, automatic workflows in Clarity LIMS software offered numerous benefits, scientists in the FastTrack Sequencing Services lab still needed flexible functionality and customizable features. Importantly, preconfigured Illumina workflows in Clarity LIMS software did not restrict what the lab could do with the LIMS. By preconfiguring library prep workflows and automating sequencing data collection, Clarity LIMS software streamlined lab operations. However, the system remained flexible enough to adapt to a range of different instruments and changing protocols. While the previous in-house database could only accommodate 12 sequencing indexes, Clarity LIMS software enabled the FastTrack Sequencing Services lab to adopt a new library prep protocol that used 48 indexes.

Saving time and effort

Almost immediately, scientists in the FastTrack Sequencing Services lab saw significant time savings after adopting Clarity LIMS software. Using their in-house management database, lab personnel spent ~ 20 hours a week collectively on flow cell data entry. Automation with the LIMS cut that time in half and eliminated manual work, freeing them for other activities.

Beyond providing time savings with data entry and sample tracking, Clarity LIMS software aided lab personnel with quality control (QC). Previously, lab staff manually reviewed sequencing metrics to determine pass or failure for each sample. Clarity LIMS software automatically recorded that information and matched it to previously scanned samples, enabling staff to quickly review and make decisions. Furthermore, data stored in Clarity LIMS software are searchable and capable of providing predictive control over lab operations. Lab personnel can use this data to better estimate how long future projects may take. Clarity LIMS software provided better insight into all aspects of lab processes—what portions of a project are finished, what has passed QC, which samples need to be rerun, etc. With data easy to find in the system, Clarity LIMS software enabled staff to identify bottlenecks, ultimately resulting in faster turnaround times and the ability to better serve their customers.

Summary

Clarity LIMS software enables genomics labs to track samples and manage workflows to optimize operations and increase efficiency. In this use case, the Illumina FastTrack Sequencing Services lab replaced an in-house database with Clarity LIMS software, resulting in immediate operations improvements. Preconfigured workflows and sample tracking enabled the lab to eliminate manual touchpoints and streamline operations easily, resulting in significant savings in time and resources.

Learn more

[Clarity LIMS software](#)

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