QLIMS | Oxford Nanopore Compatible Product

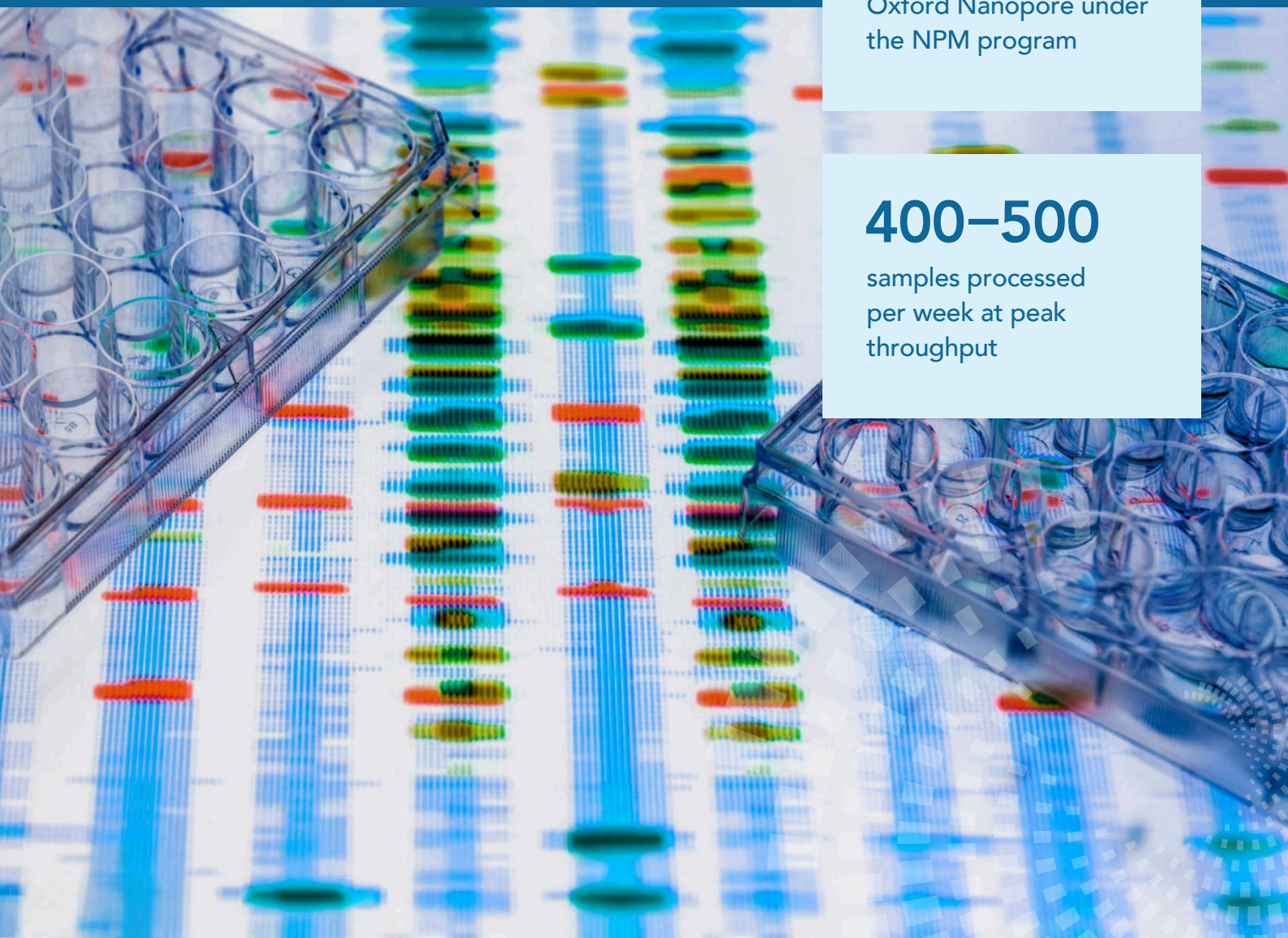
ONQ SOFTWARE
CASE STUDY /
QLIMS INTEGRATION

From pilot to national scale in twelve months

How OnQ and Oxford Nanopore Technologies worked together to integrate OnQ's QLIMS with long-read sequencing, developing a scalable capability that connected laboratory operations, sequencing instrumentation and downstream analysis workflows.

10,000
genomes sequenced by Oxford Nanopore under the NPM program

400–500
samples processed per week at peak throughput



THE CHALLENGE

National-scale sequencing demands robust sample tracking

As part of Singapore's National Precision Medicine programme, Oxford Nanopore sequenced 10,000 long-read genomes from the PRECISE-SG100K cohort over 12 months from mid-2024. Processing 200 samples a week meant end-to-end sample tracking and metadata integrity had to be tightly managed throughout.

While Oxford Nanopore's sequencing technology provided the foundation for high-throughput long- read sequencing, implementation at scale demanded a robust LIMS platform for sample tracking. Each batch of 96 samples required automatic library preparation, flow cell loading, and data analysis – and complete sample traceability was essential.

Without a direct integration between the LIMS and the sequencer, essential metadata could not flow seamlessly between systems. Tracking runs meant manual cross-referencing across spreadsheets containing sample manifest, QC, sequencing and data analysis logs.

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Together, Oxford Nanopore and OnQ identified the need for an integrated workflow that could coordinate end-to-end sample management, including sample manifest, QC, sequencing operations, resequencing (for failed samples) and data traceability within a single connected ecosystem to maintain a complete auditable chain of custody.

WHY QLIMS

Built for every lab environment

OnQ's QLIMS brought a flexible laboratory information management platform designed for high- throughput laboratories, with configurable workflows and an intuitive user interface. Working closely together, Oxford Nanopore and OnQ teams integrated QLIMS with Oxford Nanopore's NanoXint middleware, creating a seamless connection between laboratory operations, sequencing instrumentation and downstream analysis workflows.

> "The result was a jointly developed, configurable workflow capable of supporting large-scale genomics programs while remaining flexible enough for deployment across different laboratories and applications."

Rather than a simple software deployment, the solution evolved through continuous collaboration between both teams.
An initial implementation in June 2024 was progressively enhanced over the following six months with new genomics-specific capabilities, informed by operational experience from live production sequencing.
The result was a jointly developed, configurable workflow capable of supporting large-scale genomics programs while remaining flexible enough for deployment across different laboratories and applications.

HOW IT WORKS

End-to-end sequencing, managed from a single platform

01 Plan and load.

Laboratory users plan sequencing runs and upload sample batches directly within QLIMS. NanoXint validates sample metadata, performs pre-run checks and routes sequencing runs to the appropriate PromethION device.

02 Sequence and monitor.

One-click run start replaces manual instrument configuration while real-time dashboards provide visibility across samples, sequencing devices and run status. NanoXint coordinates communication between QLIMS, Oxford Nanopore sequencing devices and downstream bioinformatics, ensuring analytical results remain linked to the correct sample metadata throughout the workflow.

03 Review and re-sequence.

The QLIMS performs automated data QC checks to identify samples or runs that fall below user defined performance criteria, then generates simple reports and queues up relevant samples. Leveraging integrated Oxford Nanopore workflows, the QLIMS can create new, automated work orders that do not require manual instrument reconfiguration.

THE RESULTS

What changed on the ground

- One-click run sequencing workflows replaced manual instrument configuration.
- Real-time sample-to-sequencer traceability enabled rapid identification of issues.
- Integrated sample tracking and sequencing management improved operational efficiency while strengthening traceability and audit readiness.

The success of Singapore's National Precision Medicine long-read program demonstrates how close collaboration between Oxford Nanopore and OnQ delivered an integrated sequencing and laboratory informatics workflow that is scalable, fully auditable, and designed to support the evolving needs of large-scale genomics programs. The workflow built for the NPM program is a template for similar programs worldwide as genetic testing becomes a routine part of clinical care.

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OnQ Software

Web: www.onqsoft.com

Email: info@onqsoft.com

Ph: +61 3 8582 6999

Address: Suite 6 – 405 High Street
Northcote VIC 3070

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