

# Oregon State Public Health Lab: Streamlining the Laboratory's Approach to Surveillance Reporting

## Innovations in Informatics: Laboratory Success Stories

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### The situation

Public health laboratories are required to report laboratory results to myriad agencies and programs at the state and federal level, each with distinct reporting requirements, data standards and validation. The Oregon State Public Health Laboratory (OSPHL) managed these dataflows through a hodgepodge of different solutions that involved manual intervention and oversight. The surveillance reporting logic was stored in three separate applications: 1) in the laboratory information management system (LIMS), 2) on desktop proprietary scripts (maintained by vendor) and 3) in the Rhapsody integration engine. Changes to existing interfaces or the creation of a new interface typically required vendor support with additional costs. OSPHL's reliance upon LIMS vendors to build and maintain interoperability resulted in complicated workarounds and routine manual intervention for OSPHL staff. The multiple, decade-old LIMS required multiple point-to-point connections and did not innately support critical capabilities, such as version control, the ability to monitor logs or automated alerting for intermittent failures.

This cumbersome model carried with it significant administrative overhead and complicated documentation. A single update in the implementation guide or in the LIMS could require many cascading changes across applications. Further, dependence on vendors limited OSPHL's ability to quickly respond to changing reporting mandates and emerging health threats.

### The solution

OSPHL designed a new Surveillance Reporting Solution that combines a SQL database with Rhapsody's enterprise architecture and web service capabilities to enable a unified pathway for multiple electronic data exchanges.

The LIMS vendor built an interface to send all unsolicited results to Rhapsody. This single interface replaces all legacy data feeds.

### Impact

More than 100,000 tests are conducted each year in the OSPHL communicable disease laboratory. All of these tests are subject to discrete reporting requirements at the state and federal level. The Surveillance Reporting Solution has streamlined these requirements, allowing OSPHL to utilize a single mechanism to manage all outgoing public health reporting. The solution is now live for PHLIP, ARLN, LRN and ELR data, with thousands of messages transmitted through the solution to date.

Not only does the new system ensure that accurate, timely data is delivered to public health program staff, it has also eased the burden of OSPHL Informatics staff, who previously monitored and performed troubleshooting of legacy data flows manually. OSPHL can identify and address issues more quickly, ensuring critical data continues to flow. In most cases, OSPHL can configure and update the system without LIMS vendor support, which is a crucial functionality in emerging public health threat scenarios.

This LIMS-agnostic, configurable, flexible and low maintenance solution strengthens OSPHL's ability to respond to emerging public health threats, evolving reporting requirements and the ever-changing landscape of available resources and funding.

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Through this automated process, laboratory reports are evaluated for reporting eligibility, then prepared and sent to the appropriate recipient. For example, flu results are flagged for electronic laboratory reporting (ELR) to the state and for PHLIP to CDC Influenza Division (via AIMS). Rhapsody parses, validates, standardizes and transforms results into the appropriate format for each program based on configurable logic; it also performs error handling. Staff receive email notifications for application and network-level errors during message processing. The new solution can monitor data exchange trends in real-time and capture and report data quality issues. If needed, OSPHL can search and send historical surveillance data.

The Surveillance Reporting Solution is configurable, extensible, scalable and system-agnostic, allowing OSPHL to agilely add new data elements and new data flows in the event of changing mandates, new reporting requirements or emerging public health threats.

- **Robust:** It can accommodate multiple HL7 formats and can quickly change to accommodate new tests or workflows or requirements for sharing data.
- **LIMS-agnostic:** It can seamlessly adapt a new LIMS application should OSPHL implement a new LIMS in the future.
- **Scalable:** The Rhapsody solution allows OSPHL to nimbly respond to new outbreaks, changing reporting mandates and new testing needs.
- **Consolidation of Logic:** OSPHL can troubleshoot a single point of failure in Rhapsody, as opposed to multiple places in the legacy infrastructure.
- **Monitoring and Error Alerting Capabilities:** OSPHL can leverage the data stored in the SQL database to monitor and troubleshoot all messaging activity

## Reflections

### Collaboration

This project required sponsorship by OSPHL leadership; active participation by the OSPHL Informatics team, including the interoperability coordinator and the LIMS administrator; LIMS vendor support to create the new interface for unsolicited results; and the work of J Michael Consulting (JMC) as an independent contractor to build and validate the solution. Once the solution was built, OSPHL worked with program staff within the Oregon Health Authority and CDC to validate the many data flows that transitioned to the new solution. The investment of time and resources and the management of a complicated validation schedule were worth the eventual outcomes of higher quality, more consistent data with more automated monitoring and faster troubleshooting.

### Challenges

The collaborative nature of this project was perhaps its biggest challenge. OSPHL's implementation and go-live schedule was dependent on the availability of the LIMS vendor, JMC and the program teams that would receive the data.

To add another layer of complexity, as this solution was being built, OSPHL leadership intended to launch a LIMS replacement project within the next one to two years. OSPHL did not want to operationalize a solution that would become obsolete as soon as the new LIMS was deployed, yet the details of this LIMS replacement were very much unknown at

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this stage. The team therefore had the added challenge of designing a solution that would be LIMS-agnostic to work seamlessly with both the legacy system and its eventual replacement.

Data Modernization and associated initiatives like TECCA were (and still are) causing paradigmatic changes across the public health landscape. OSPHL originally intended the solution to manage electronic test orders and results (ETOR). With the initiation of the AIMS ETOR Trusted Intermediary, OSPHL pivoted to designing a solution for surveillance reporting. While this reorientation caused delays, the project was ultimately successful.

## Suggestions for Others

It is possible to build for now, and for the future. OSPHL was committed to creating a robust solution that would deliver an immediate return on investment, yet still position OSPHL for the future—knowing that OSPHL still has a long way to go on its modernization journey. The solution had to take into account the uncertainty of staffing and funding levels and the imminent possibility of a new LIMS implementation.

## Up next

OSPHL is working now to expand the Surveillance Reporting interface to other reportable conditions and data feeds. OSPHL is well-positioned to be able to add new data elements and reporting requirements to these data feeds quickly and without vendor support. OSPHL would also like to build a dashboard to present the Rhapsody validation and monitoring data in a visual format. OSPHL is investigating the possibility of managing provider and facility information in the SQL database across multiple LIMS and extending the interface to support FHIR-based functionality.

**Built for now, and for the future.**

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