



Rapid implementation of high-volume community-based SARS-CoV-2 PCR testing in Washington State

Lessons Learned the Hard Way from COVID-19: What Gaps in Laboratory Informatics do we need to Close Before the Next Pandemic?

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Disclosure

The speaker and spouse/partner has no relevant relationships with commercial interests to disclose.



Learning Objectives

After participating in this session the learner should be better able to:

- Provide examples of IT infrastructure dependencies for development of solutions for rapidly changing ordering, resulting, and operational needs.
- Identify common limitations in IT infrastructure for delivery of services outside of traditional healthcare settings.
- Contrast uses, capabilities, and tradeoffs between commercial systems and custom-built applications.

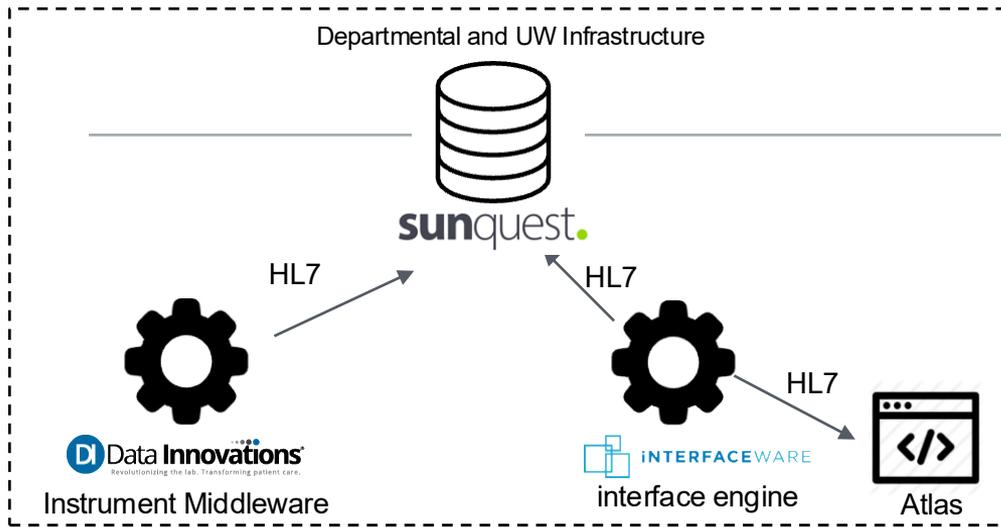


UW Department of Laboratory Medicine and Pathology



- Support UW Medicine's mission to improve the health of the public by providing laboratory services, educating laboratorians, and fostering research and development
- > 1500 staff & 150 faculty
- > 6 million laboratory orders & 30 million reportable results per year (pre-COVID)
- Outreach testing encompassing local primary care, regional and national specialized reference testing

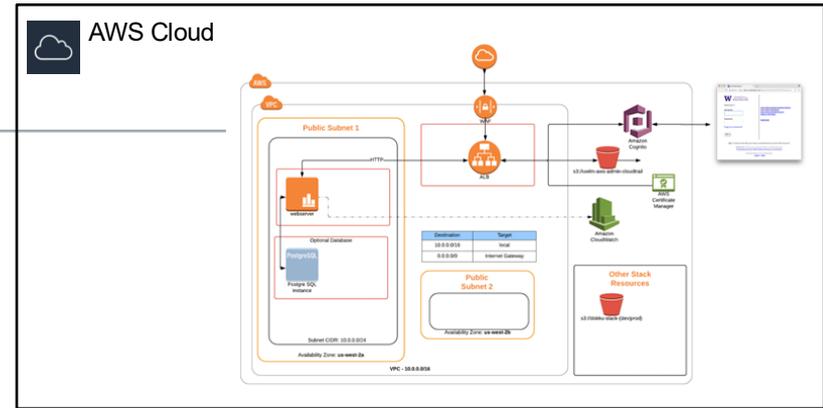
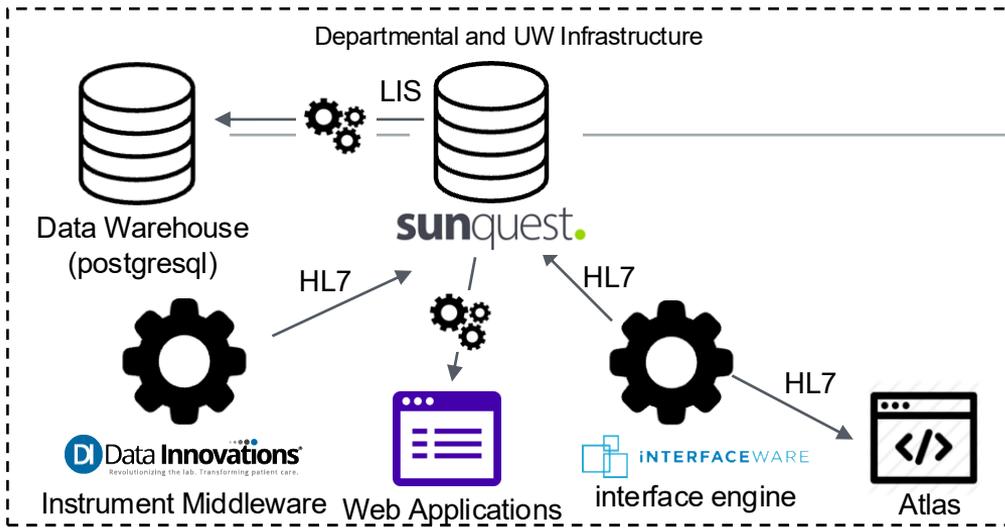




Core lab informatics infrastructure

- Laboratory Information System (Sunquest)
- Instrument middleware (eg, Data Innovations = DI)
- HL7 interface engine (Interfaceware Iguana)
- Orders/results web portal (Sunquest Atlas)
- Billing software and services (Xifin)





“Extra” departmental infrastructure and capabilities

- Low-level access to LIS database (file-based, custom APIs)
- Departmental networking and system administration resources
- Secure, HIPAA-compatible internally and externally-facing web application hosting platforms (both local and on AWS)
- Laboratory data warehouse (Postgresql)
- User authentication: Internal (SAML SSO) or external access (AWS Cognito)
- Self-hosted VCS (Gitlab)

Responding to a pandemic



UW Medicine now testing for coronavirus at Seattle laboratory

UW Medicine and the Washington State Public Health Laboratory in Shoreline are currently the only two locations in the state that can test for COVID-19.



Author: Sebastian Robertson (KING5)
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March 3, 2020

- Order generation
- Specimen labeling
- Pre-analytical specimen processing
- In-lab data management, labeling, and specimen flows
- Inventory management
- Instrument interfaces
- Result distribution
- Reporting to healthcare authorities
- Analytics



Expanding SARS-CoV2 PCR testing to non-healthcare settings

- First use case: first responders
- No electronic system for collecting contact information outside of the EHR
- No electronic mechanism to distribute results to out of system patients
- Phone calls for reporting results are prohibitively labor intensive
- Collection sites are challenging environments for patient engagement and data collection

Limitations of the patient portal for community testing (Epic MyChart)

- Cumbersome registration workflow for new users
- Original portal sign-up process included delays (has since been streamlined)
- Challenging UI for many users



Specimen labeling and identification

Problems:

- Require reliable link between specimen and result
- On demand label printing typically not possible
- Pre-printed order-specific labels not an option
 - No pre-existing orders for walk in testing
 - Difficult to manage pre-printed labels

Solution: Pre-defined retrieval code on pre-printed labels, assign to specimen on collection

Name: _____
DOB (MM/DD/YYYY): _____



6QAH-RVWV-9A53 (1-1)

<https://securelink.labmed.uw.edu>



Visit URL or scan QR code
Your retrieval code:
6QAH-RVWV-9A53
Testing by Univ. of Washington (1-1)

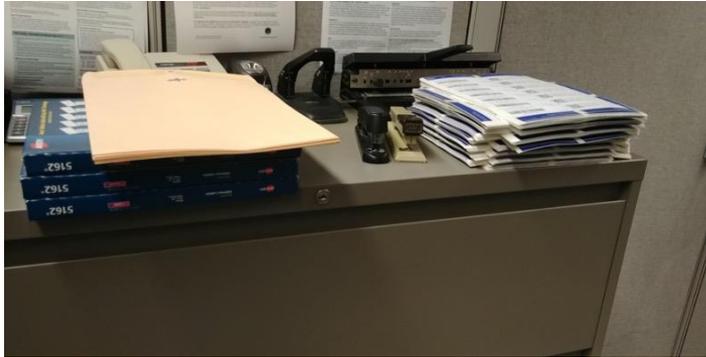


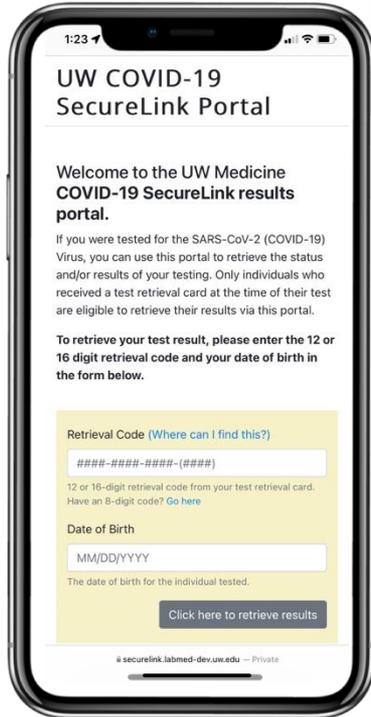
Python command line utility
using *reportlab*, *python-barcode*,
qrcode packages

Place on lab req or specimen

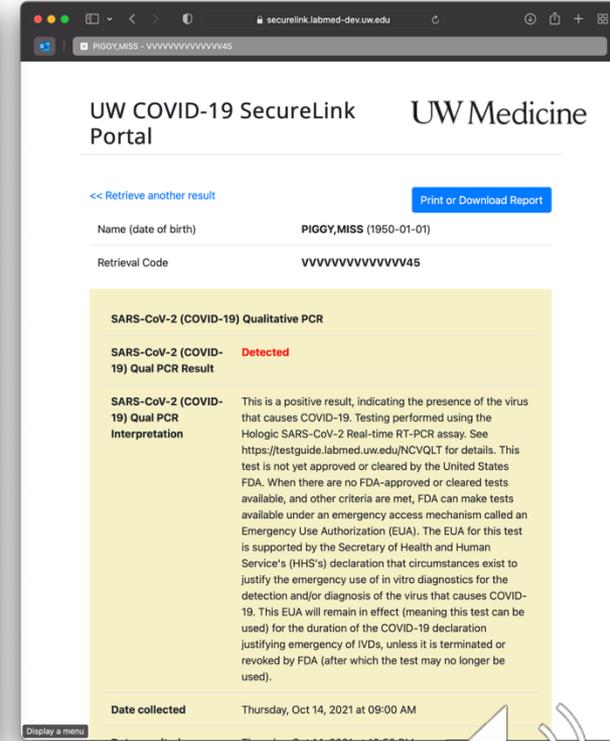
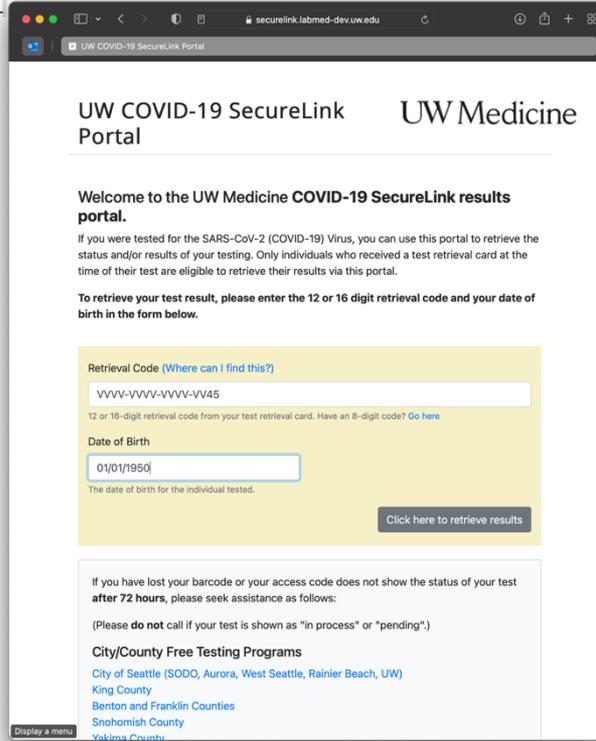
Provide to patient

Label production





Nik Krumm,
MD, PhD



Initial UW Securelink data flow

Name: _____
DOB (MM/DD/YYYY): _____



6QAH-RVWV-9A53 (1-1)

< 2 weeks from inception to go-live (mid-March, 2020)

<https://securelink.labmed.uw.edu>



Visit URL or scan QR code
Your retrieval code:
6QAH-RVWV-9A53
Testing by Univ. of Washington (1-1)

↓ Create manual order from paper requisition

Scan code-128 retrieval code into battery component

Specimen processing



File containing results and retrieval codes

Caché MUMPS routine



AWS

Create database record for each result

Python task (EC2), PostgreSQL (RDS)



Retrieve result



Display result given retrieval code and DOB

Securelink web application (Python/Flask)



June 2020: City of Seattle free COVID testing

Emergency order from Seattle Mayor Jenny Durkan to lease two former emissions testing sites for drive-through COVID PCR testing

Project launched June 4 with about two weeks to implement

- PCR testing by UW Medicine Virology
- Staffing by Seattle FD and City employees
- US Digital Response worked with mayor's office to select Solv health for booking and data collection

Seattle Testing made possible in partnership with:



UW Medicine
LABORATORY MEDICINE

Solv.

US DIGITAL
RESPONSE.org

Public Health
Seattle & King County

COVID-19: How to Register for Free Testing

English 한국어 繁體中文 한국어 Soomaali Español

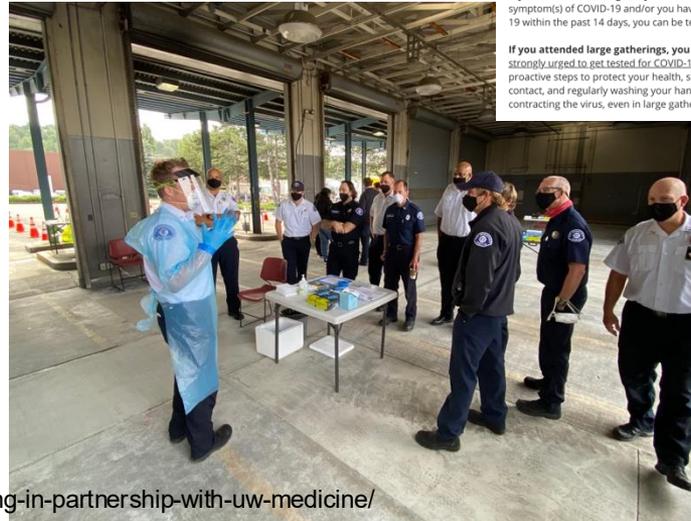
Tiếng Việt

The City of Seattle is now offering free COVID-19 testing, for all ages, across Seattle through a partnership with King County and UW Medicine. Drive-through and walk-up testing is available, but you must first register online.

Who Can Get Tested for Free?

If you live, work, or regularly visit Seattle, and you are experiencing a symptom(s) of COVID-19 and/or you have been exposed to someone with COVID-19 within the past 14 days, you can be tested for free.

If you attended large gatherings, you MAY have been exposed. You are strongly urged to get tested for COVID-19 if you develop ANY symptoms. Taking proactive steps to protect your health, such as wearing a mask, avoiding physical contact, and regularly washing your hands, can cut down on your risks of contracting the virus, even in large gatherings.



<https://durkan.seattle.gov/2020/06/mayor-jenny-durkan-announces-free-citywide-testing-in-partnership-with-uw-medicine/>



Solv Health: scheduling and data collection

- Consumer-facing practice management software
- Schedule visits to community testing sites (also walk-ins)
- Used for collection of demographics and other data needed for testing, public health reporting, reimbursement (including specimen identifier)
- **Orders generated in LIS using exported data in CSV format (via custom application for validation and location mapping and interface engine)**

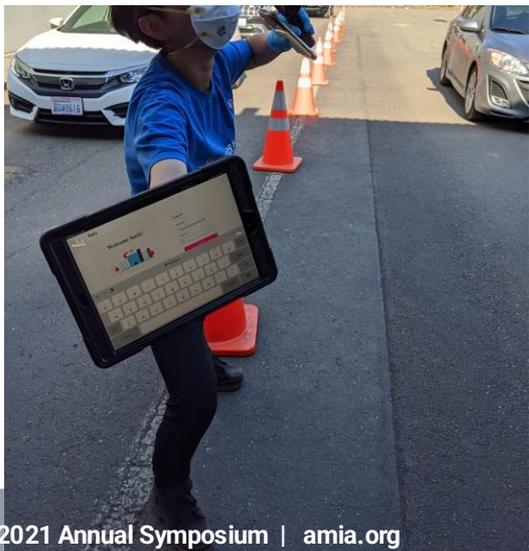
The screenshot shows a web browser window with the URL `solvhealth.com/book-online/0xvwjip`. The page is for a COVID-19 testing site at UW Medicine Laboratory Medicine, City of Seattle SODO Site. The site is open now, from 9:00am to 5:30pm PST, located at 3820 6th Ave S, Seattle, WA 98108, with phone number (206) 684-2489. A map shows the location near the W Seattle Bridge. The page includes a 'REASON FOR VISIT' field, a 'CHOOSE A DATE AND TIME' section for Today, November 5th (PST) with a warning that no visit times are left, and a 'HAVE YOU BEEN TO CITY OF SEATTLE BEFORE?' section with a 'No' button selected. The 'PATIENT INFO' section includes fields for Patient first name, Patient last name, Birth date (Month, Day, Year), Patient Sex, Mobile number, and Email address (optional). A speaker icon is visible in the bottom right corner of the form area.



Name: _____
 DOB (MM/DD/YYYY): _____

 2BUH-YRXY-WC2U-GM8D (1-1) specimen

<https://securelink.labmed.uw.edu>
 Visit URL or scan QR code
 Your retrieval code:
2BUH-YRXY-WC2U-GM8D
 Testing by Univ. of Washington (1-1)



IT Ima Testpateint

Profile Insurance Paperwork Consent Forms

Basic Details Save

First Name <input type="text"/>	Last Name <input type="text"/>	Date Of Birth <input type="text"/>
Ima	Testpateint	01/01/2000
Phone Number <input type="text"/>	Email Address <input type="text"/>	Patient Sex <input type="text"/>
(999) 999-9999	ima@testpatient.com	Male <input type="text"/>

Visit Details

Reserved **Here** Ready In Exam Done Cancelled No Show Transfer

Reason for Visit

symptoms

Notes

VGTHHTGA77H57GHY

Walk-in New Existing

15

Photos:
 Leah
 Tivoli

☑ COVID testing sites

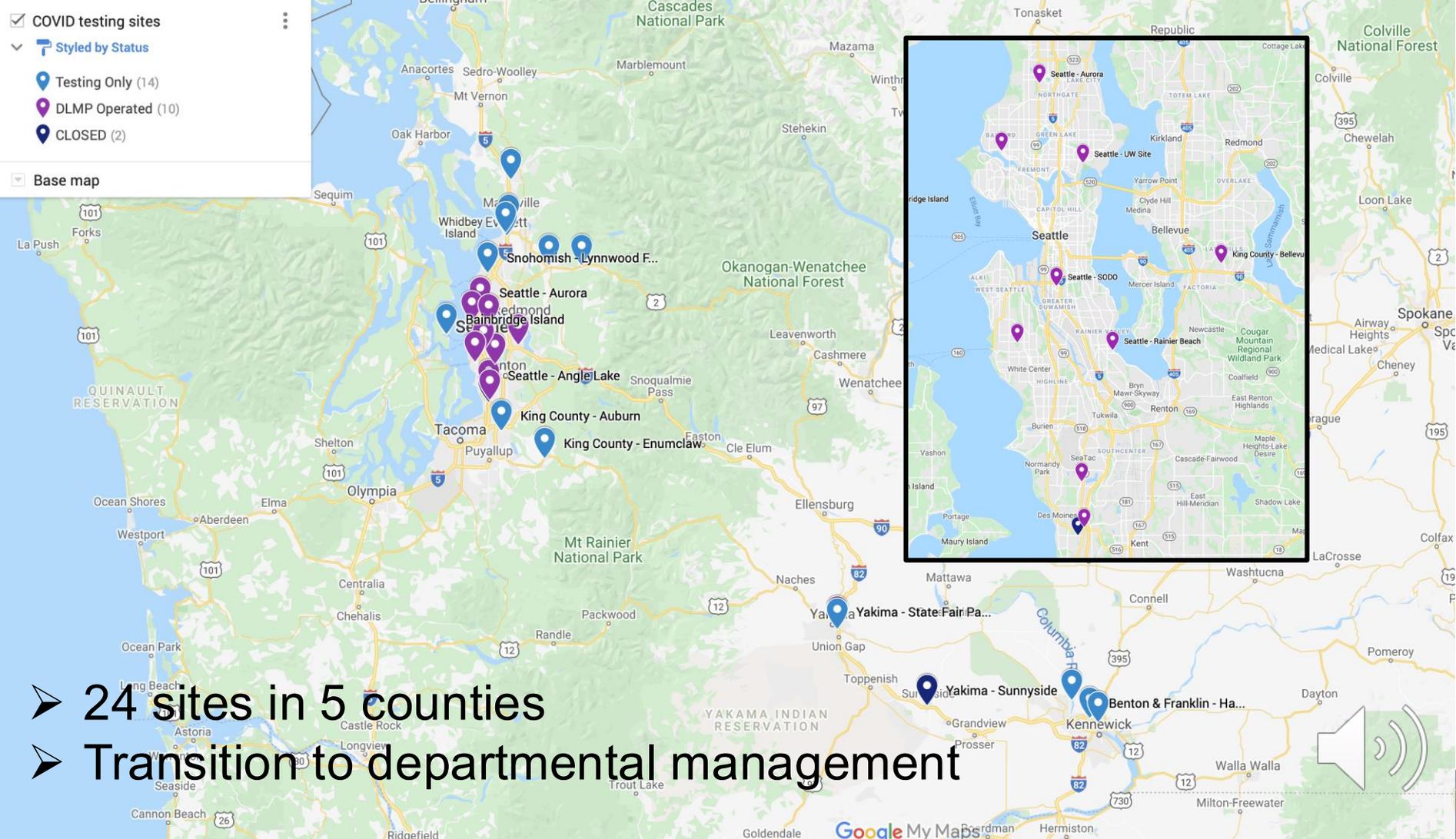
▼  Styled by Status

 Testing Only (14)

 DLMP Operated (10)

 CLOSED (2)

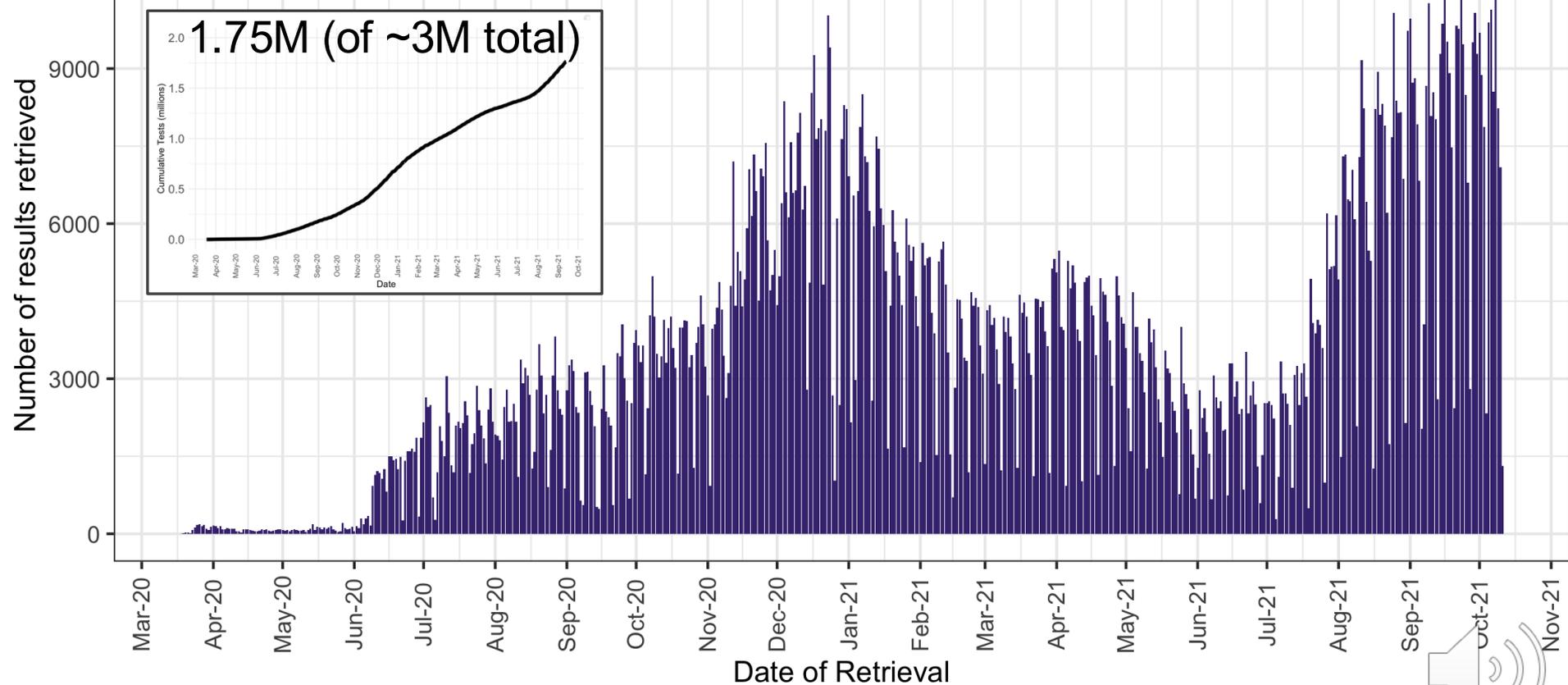
▾ Base map



➤ 24 sites in 5 counties
➤ Transition to departmental management

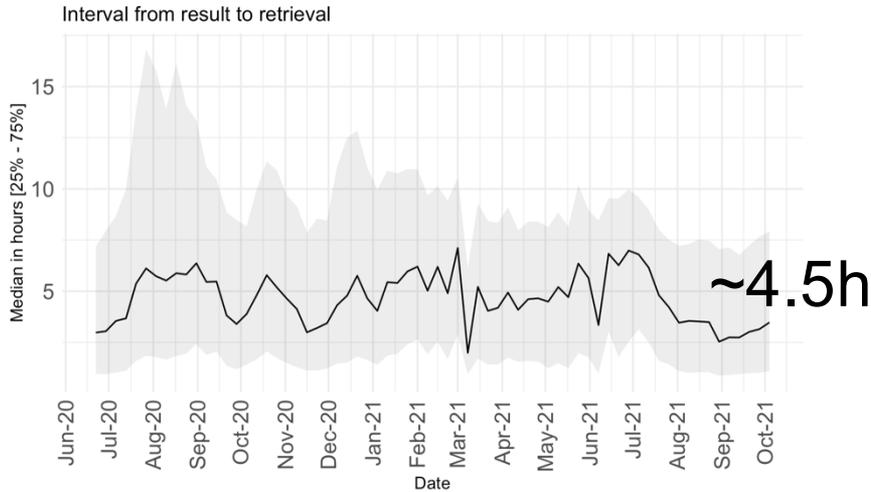


Results delivered via Securelink portal

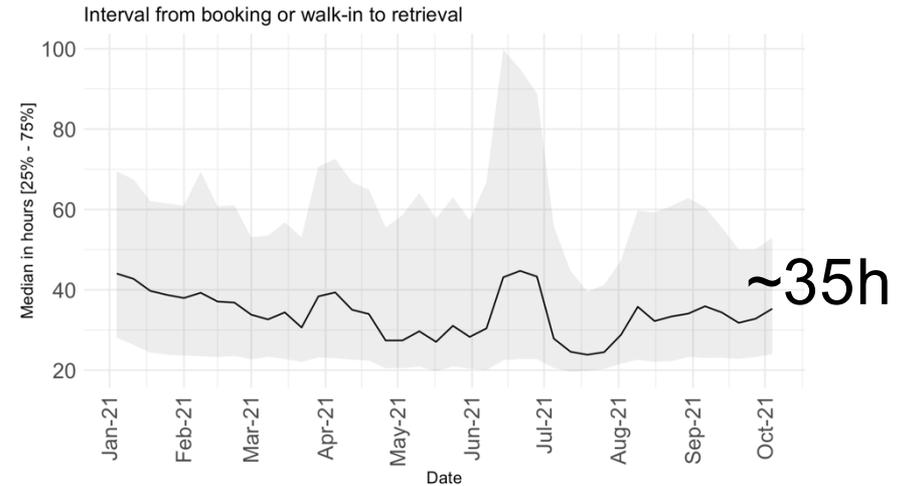


Effectiveness of result delivery

Interval from availability of result to retrieval



Interval from desire to test to retrieval of result



Lessons learned

(Relatively) simple custom solutions can fill in gaps in functionality not provided by core systems

- Streamlined scheduling and data collection outside of pre-existing healthcare settings
- Standardized approaches to interoperability
- Result delivery and notification

Ownership and technical mastery of core information systems are fundamental requirements for a rapid response to changing needs

Big payoff for investment in expertise and tools for development of custom applications

Achieve scale through iterative improvements



Acknowledgements

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Thank you!

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