



# 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?

S96

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#AMIA2021



# Disclosure



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

# Learning Objectives



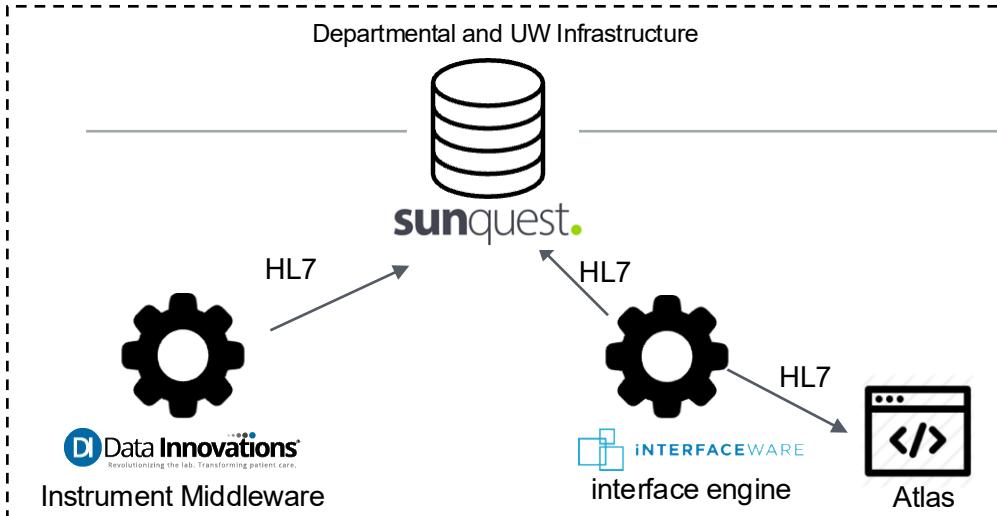
After participating in this session the learner should be better able to:

- 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

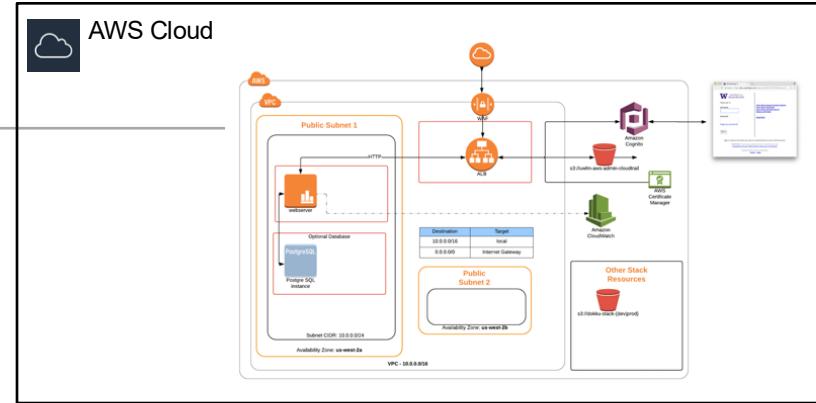
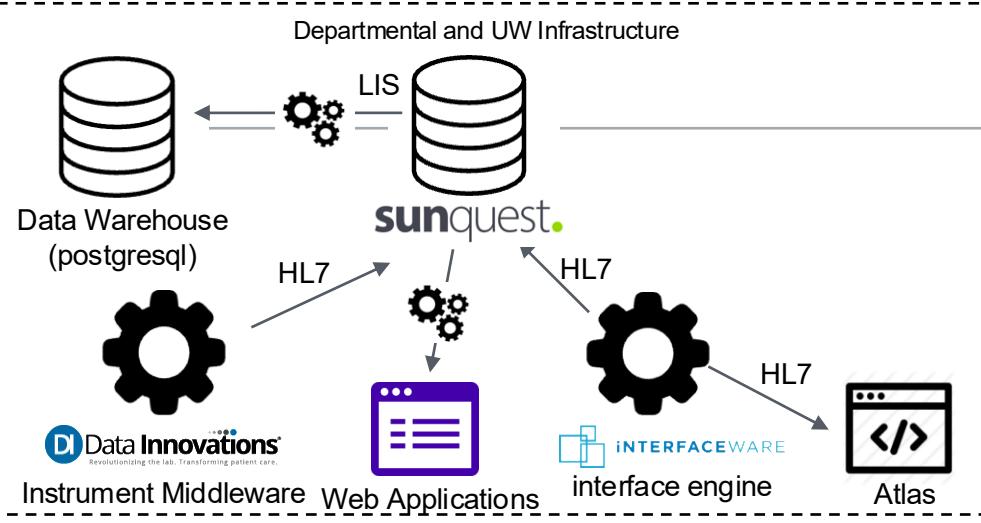


- Support UW Medicine's mission to improve the health of the public by providing laboratory services, educating laboratorians, and fostering research and development
- > 1500 staff & 150 faculty
- > 6 million laboratory orders & 30 million reportable results per year (pre-COVID)
- Outreach testing encompassing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



A screenshot of a KING5 news website article. The header includes the KING5 logo, navigation links for News, Weather, Sports, Connect, Watch Live, ELECTION 2020 COVERAGE, CORONAVIRUS, FACING RACE, STAND FOR TRUTH, and YO. A sub-header says "COPROVIRUS". The main title is "UW Medicine now testing for coronavirus at Seattle laboratory". Below the title is a short text snippet: "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." To the right is a video thumbnail showing a laboratory setting with a play button over it. At the bottom left is author information: "Author: Sebastian Robertson (KING5)", "Published: 6:28 PM PST March 4, 2020", and "Updated: 6:28 PM PST March 4, 2020". Below the video thumbnail are social media sharing icons for Facebook and Twitter.

- **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

March 3, 2020

# Orders and results beyond the EHR



## 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): \_\_\_\_\_



(1-1)

6QAH-RVWV-9A53

<https://securelink.labmed.uw.edu>  
Visit URL or scan QR code  
Your retrieval code:  
**6QAH-RVWV-9A53**  
Testing by Univ. of Washington (1-1)

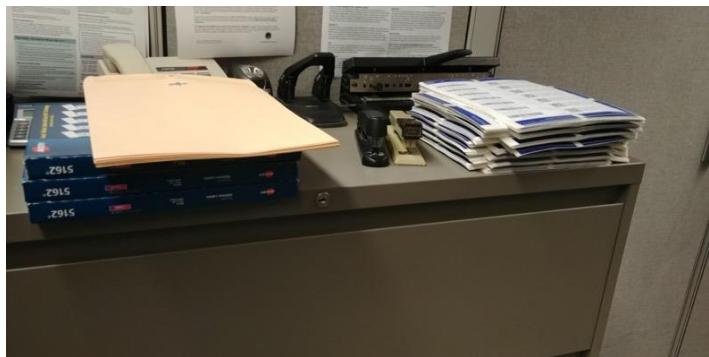
Place on lab req or specimen

Provide to patient

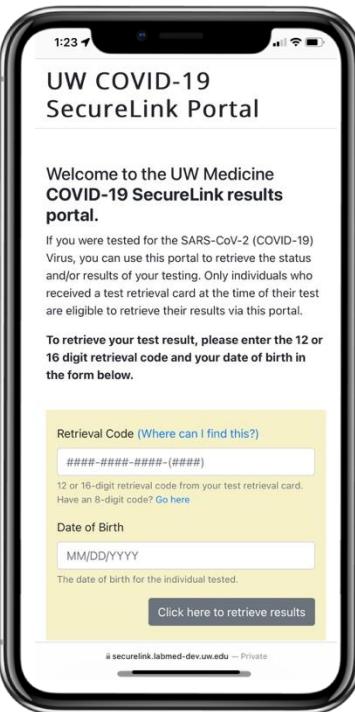


Python command line utility  
using *reportlab*, *python-barcode*,  
*qrcode* packages

# Label production



<https://securelink.labmed.uw.edu>  
Visit address above or scan QR code (1-1)  
Your retrieval code:  
**ZT8F-RMWT-6E4E-7ZJF**  
Testing performed by the University of Washington



Nik Krumm,  
MD, PhD

UW COVID-19 SecureLink Portal

Welcome to the UW Medicine COVID-19 SecureLink results portal.

If you were tested for the SARS-CoV-2 (COVID-19) Virus, you can use this portal to retrieve the status and/or results of your testing. Only individuals who received a test retrieval card at the time of their test are eligible to retrieve their results via this portal.

To retrieve your test result, please enter the 12 or 16 digit retrieval code and your date of birth in the form below.

Retrieval Code ([Where can I find this?](#))  
  
12 or 16-digit retrieval code from your test retrieval card. Have an 8-digit code? [Go here](#)

Date of Birth  
  
The date of birth for the individual tested.

[Click here to retrieve results](#)

Display a menu

UW COVID-19 SecureLink Portal

UW Medicine

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12 or 16-digit retrieval code from your test retrieval card. Have an 8-digit code? [Go here](#)

Date of Birth  
  
The date of birth for the individual tested.

[Click here to retrieve results](#)

If you have lost your barcode or your access code does not show the status of your test after 72 hours, please seek assistance as follows:

(Please do not call if your test is shown as "in process" or "pending".)

City/County Free Testing Programs  
City of Seattle (SODO, Aurora, West Seattle, Rainier Beach, UW)  
King County  
Benton and Franklin Counties  
 Snohomish County  
Yakima County

SARS-CoV-2 (COVID-19) Qualitative PCR  
**Detected**

SARS-CoV-2 (COVID-19) Qual PCR Result  
Interpretation

This is a positive result, indicating the presence of the virus that causes COVID-19. Testing performed using the Hologic SARS-CoV-2 Real-time RT-PCR assay. See <https://testguide.labmed.uw.edu/NCVQLT> for details. This test is not yet approved or cleared by the United States FDA. When there are no FDA-approved or cleared tests available, and other criteria are met, FDA can make tests available under an emergency access mechanism called an Emergency Use Authorization (EUA). The EUA for this test is supported by the Secretary of Health and Human Services' (HHS's) declaration that circumstances exist to justify the emergency use of in vitro diagnostics for the detection and/or diagnosis of the virus that causes COVID-19. This EUA will remain in effect (meaning this test can be used) for the duration of the COVID-19 declaration justifying emergency of IVDs, unless it is terminated or revoked by FDA (after which the test may no longer be used).

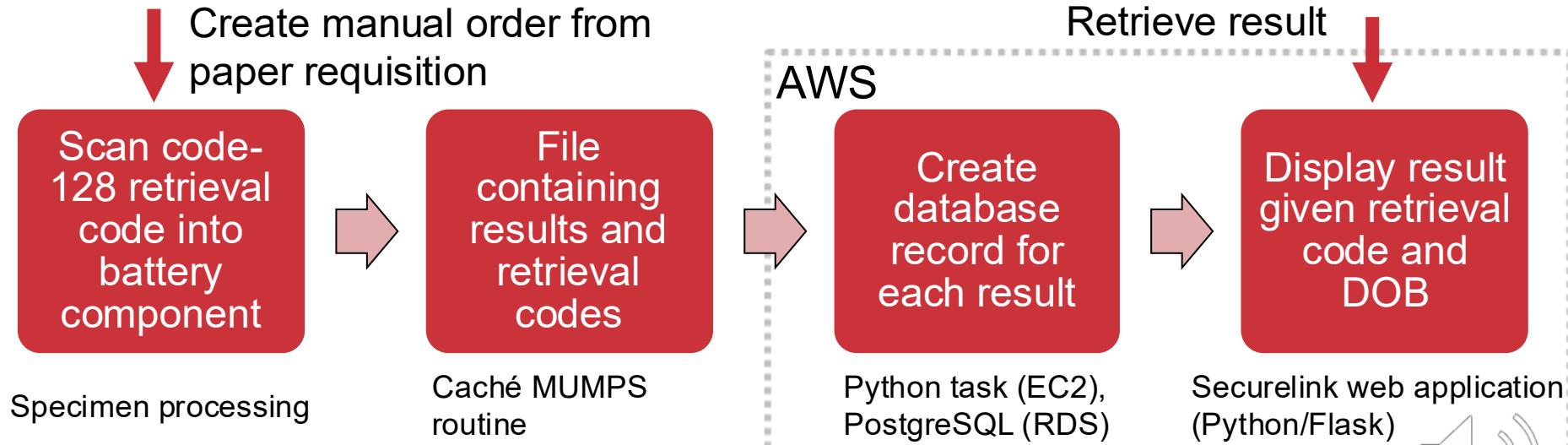
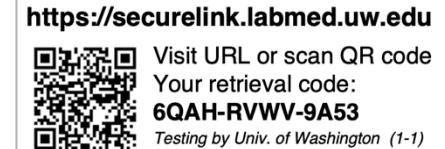
Date collected Thursday, Oct 14, 2021 at 09:00 AM

Display a menu

# Initial UW Securelink data flow



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



# 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](#) | [Soomali](#) | [Español](#)

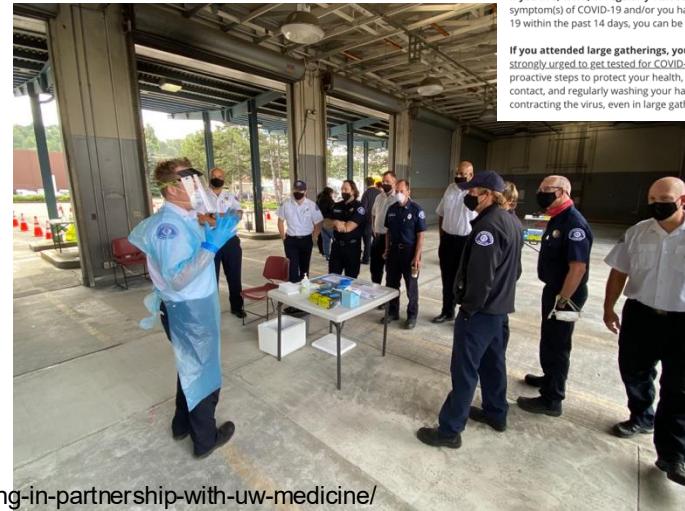
Tiếng Việt

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 any 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.

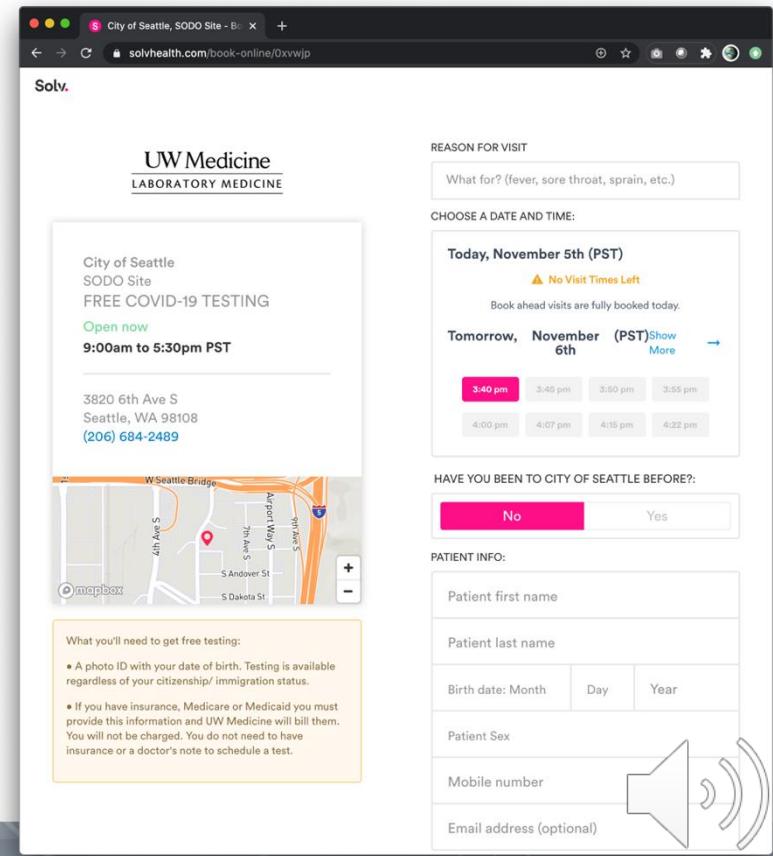


<https://durkan.seattle.gov/2020/06/mayor-jenny-durkan-announces-free-citywide-testing-in-partnership-with-uw-medicine/>

# Solv Health: scheduling and data collection

AMIA  
INFORMATICS PROFESSIONALS. LEADING THE WAY.

- 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)**





Name: \_\_\_\_\_

DOB (MM/DD/YYYY): \_\_\_\_\_



(1-1)

specimen

2BUH-YRXY-WC2U-GM8D

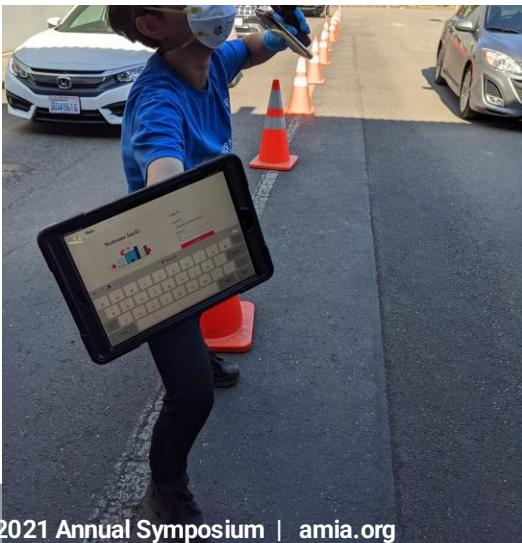
<https://securelink.labmed.uw.edu>



Visit URL or scan QR code  
Your retrieval code:

**2BUH-YRXY-WC2U-GM8D**

Testing by Univ. of Washington (1-1)



Ima Testpateint

Profile Insurance Paperwork Consent Forms

Save

Basic Details

First Name: Ima	Last Name: Testpateint	Date Of Birth: 01/01/2000
Phone Number: (999) 999-9999	Email Address: imat@testpatient.com	Patient Sex: Male

Visit Details

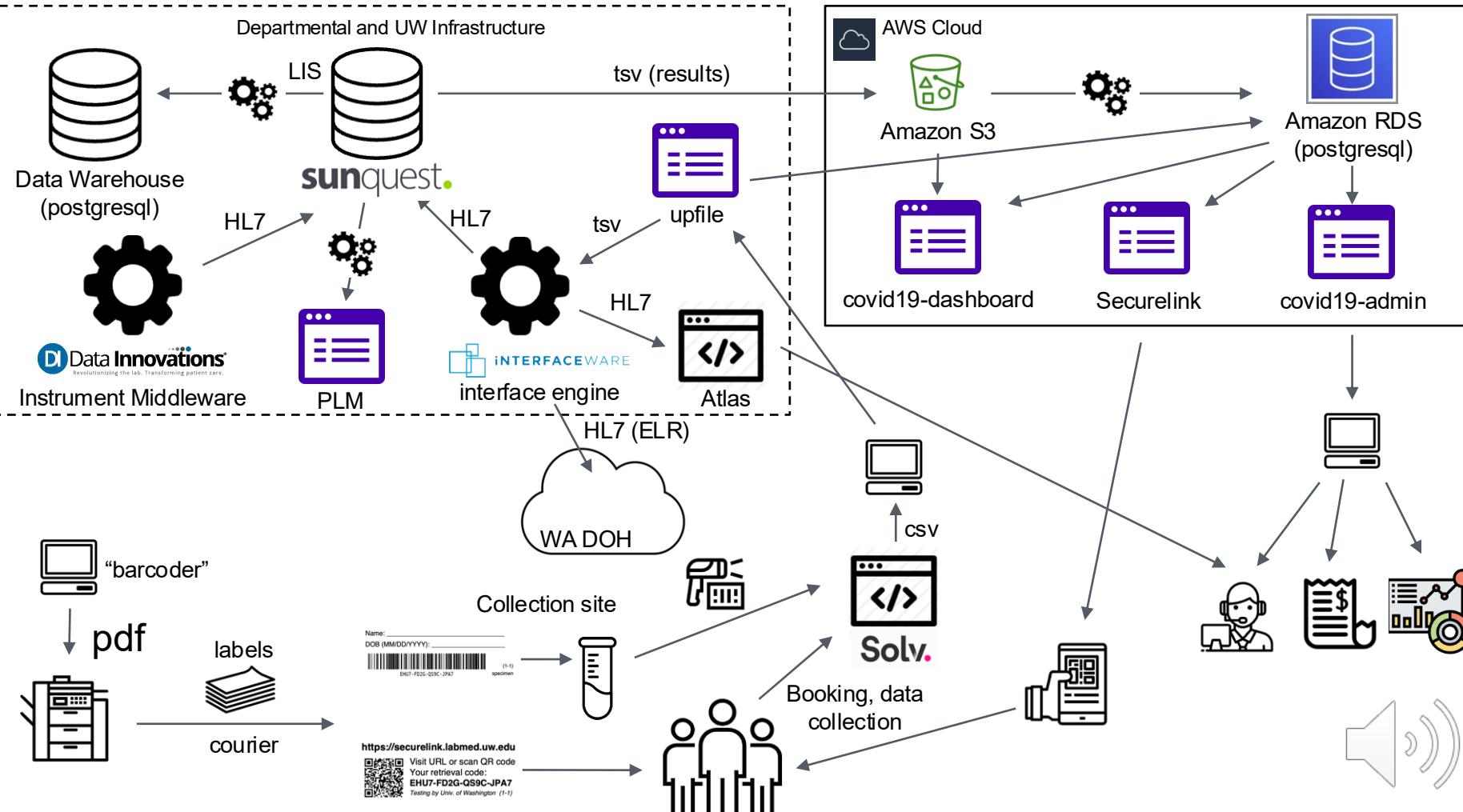
Reason for Visit: symptoms

Notes: VGTHHTGA77HS7GHY

Walk-in  
New  
Established

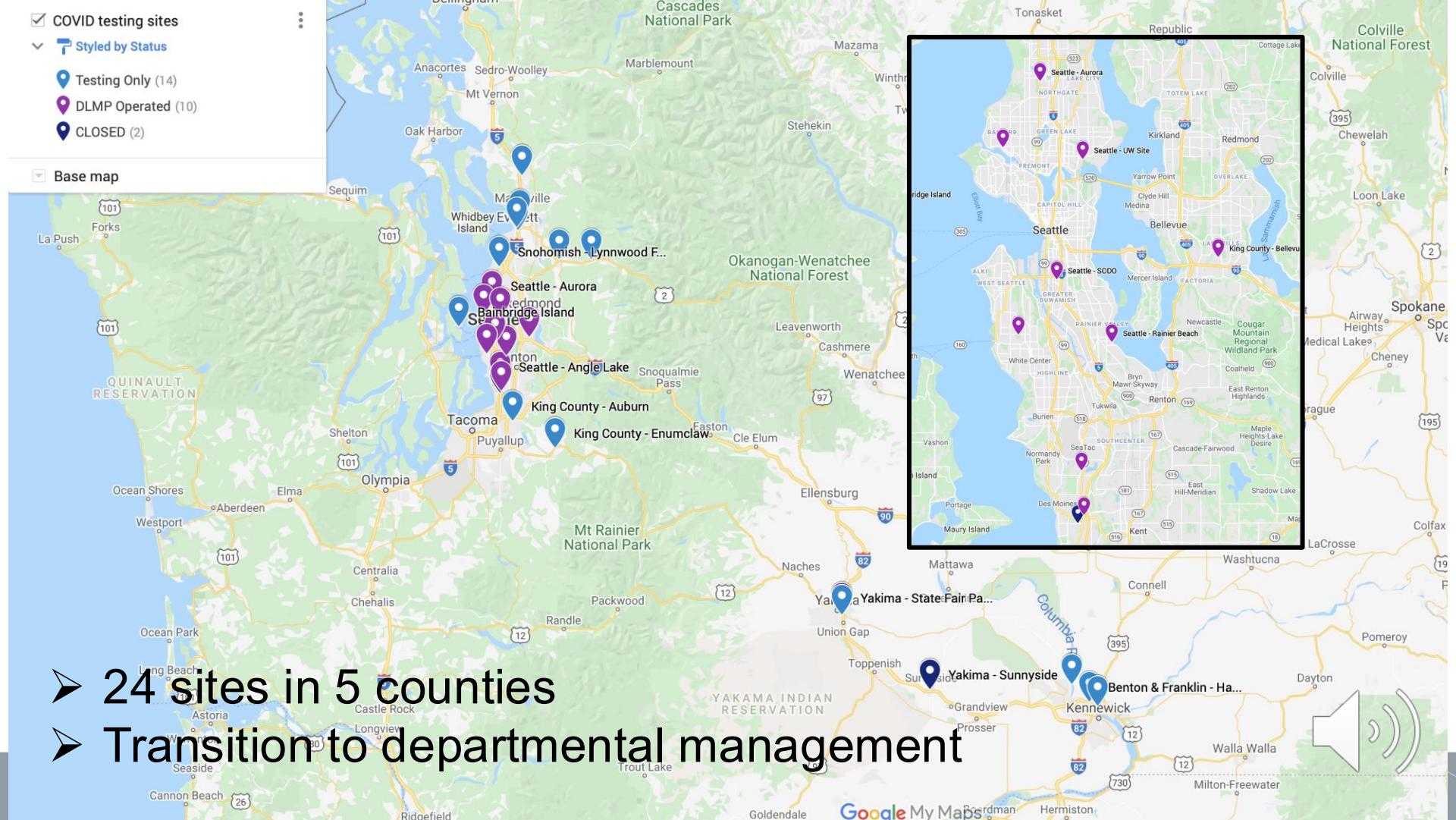
15

Photos:  
Leah  
Tivo!

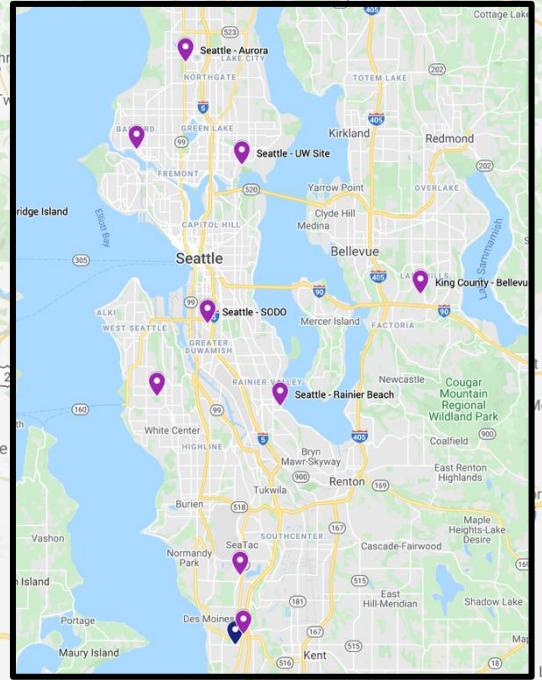


- COVID testing sites
    - ▼  [Styled by Status](#)
    -  [Testing Only \(14\)](#)
    -  [DLMP Operated \(10\)](#)
    -  [CLOSED \(2\)](#)

## Base map

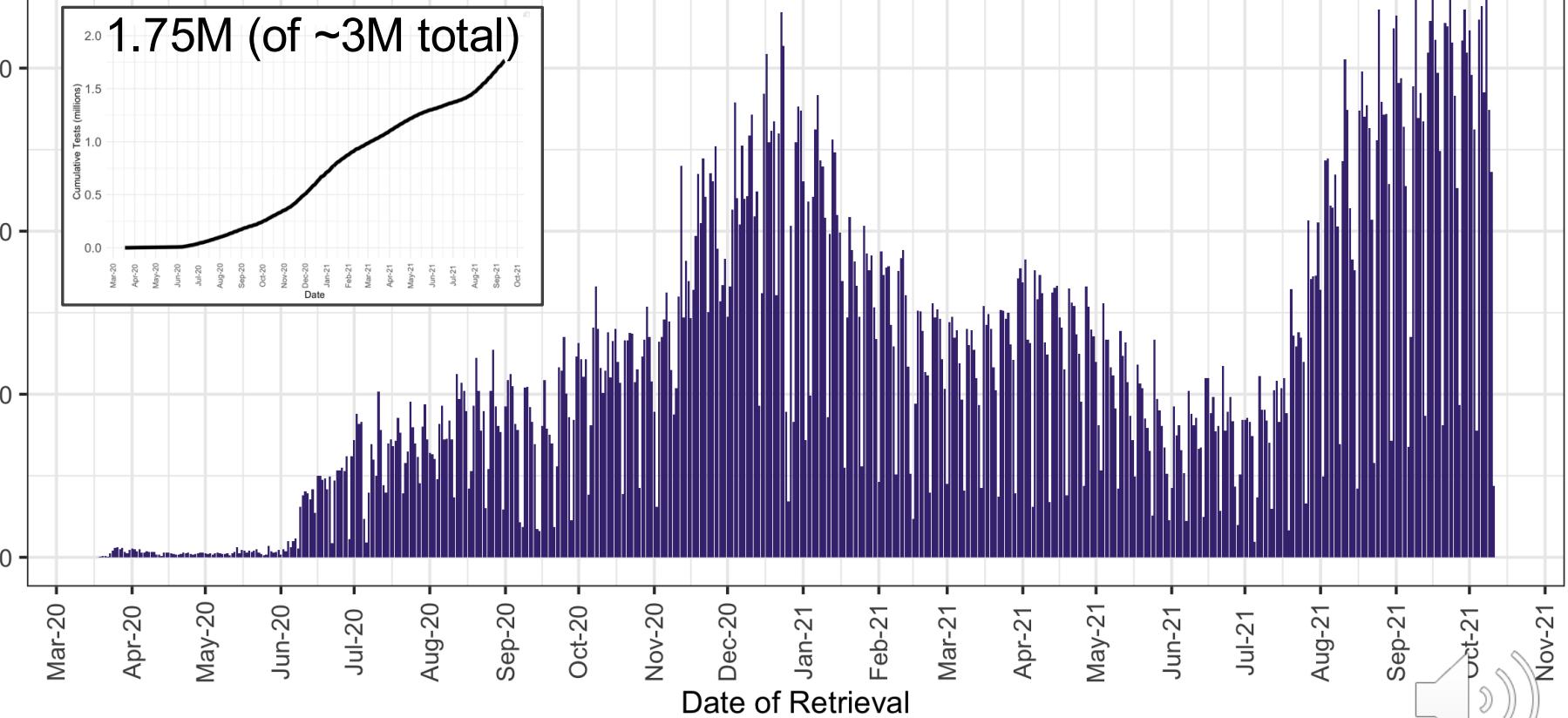


- 24 sites in 5 counties
  - Transition to departmental management



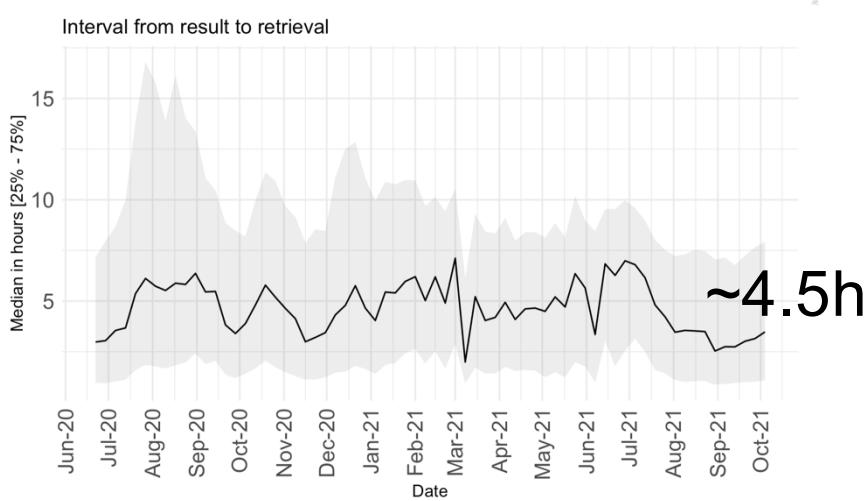
# Results delivered via Securelink portal

Number of results retrieved

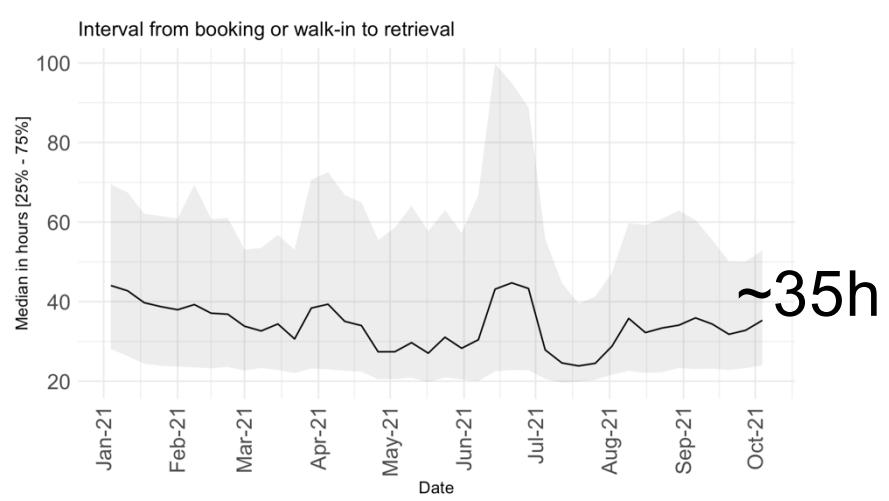


# Effectiveness of result delivery

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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Beth Dimond

UW Virology

Jared Castor

Ka Wing Sullivan

Greg Pepper

UW testing sites

Scott Mah

Carolyn Grant

Jenny Brackett

City of Seattle

Michael Sayre

Brian Wallace

Sarah Smith

Leah Tivoli

Solv Health

Lauren Tien

Adam Zook



# Thank you!

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