Evolution of PHL Data Exchange

A brief history…
How Has Data Exchange Evolved

Where Were You in 2002?

• Top Song from 2002
  – #1 Nickelback
    • “How You Remind Me”
  – #3 Nelly
    • “Hot in Herre”
CONCLUSION

from “Alabama Department Of Public Health Bureau of Computer Services NEDSS Assessment Results”

• Obtain Lab Information System
• Implement Necessary Security Enhancements
• Apply For Base System
Currently Lacking “PHINness” in Alabama

- Most Public Health Systems Not Integrated
  - Exceptions
    - PHALCON – LIS – NEDSS (in progress)
    - PHALCON – ImmPrint
  - Not Uniform
  - No standard vocabulary
  - Non-uniform data exchange (HL7, XML)
  - No standard architecture
Overview of Communicable Disease Data Flow
Specimen from a mandatory reportable condition

Specimen from a mandatory reportable condition is sent to the Physicians/Clinics.

- **State Lab (LIS)**
- **Private Lab(s)**
- **Hospital Labs**

Positive Results Paper is sent to the State Health Department.

State Health Department sends the Positive Results Paper to the Morbidity Card/Lab Report.

Mailed, Faxed or Telephoned to County Health Department.

Mailed, Faxed or Telephoned to the CDC.

Mailed, Faxed or Telephoned to NETSS.

Case Report sent for Investigation.

Returned to be data entered.

Case Data added in field.

Circa 2004
- Where did we start?
- NETSS

(Circa 2004)
Why ALNBS (Benefits)?

- Electronic real-time reporting of information for public health action
- Earlier Detection of Outbreaks
- Allow Public Health to make better decisions
- Reduce duplicate data entry
- Eliminate paper reporting
- Electronic Laboratory Reporting (ELR)
A Nurse orders a Hepatitis Panel for a patient through PHALCON.

The patient demographics and Ordered Test electronically create an accession in the LIS.

The specimen is bar-coded at the clinic, packaged and mailed to the Lab.

The Lab receives the specimen, scans it with a barcode reader, conducts the test and posts the final results.

A positive Hepatitis A result is electronically sent back to PHALCON and it is also sent to the NBS.

The caseworker reviews the lab result and creates a Hepatitis Investigation. If the investigation meets Case Definition, a National Notifiable Disease Message is created and sent electronically to the CDC.

Complete Electronic Data Flow!!!
Alabama’s Evolution

• 2003-2008 - 50% LIMS implementation
• 1\textsuperscript{st} Qtr 2009 Implementation of Horizon LIMS
• 1\textsuperscript{st} Qtr 2009 Integration of LIMS and Billing System
  – CPT, ICD9, Insurance details
  – *ICD10, NPI\textsuperscript{2nd}
• Qtr 2009 Web Portal for Test Ordering/Reporting
  – Decrease in paper result reporting
  – More accurate, complete order info
  – Distributed data entry to ordering facility
  – Integration with CHD Encounter system
• 3\textsuperscript{rd} Qtr 2009 HL7 2.3.1 ELR to NEDSS
  – LOINC/SNOMED encoding
  – Orion Rhapsody Integration Engine
Alabama’s Evolution

• 2010  PHLIP ELSM (HL7 2.3.1)
  – Leverage NEDSS ELR work
  – Orion Rhapsody
  – PHINMS/AIMS (FL RNR Hub)
  – APHL PHLIP TA

• 2011  ETOR (HL7 2.6)
  – Bi-directional Interface
  – SuccessEHS – 2 counties, 20 clinics
  – Maintenance / Vendor Customizations
  – TCP/IP Message Transport

• 2012  LRN-B (HL7 2.5.1)
  – CDC LRNB TA
  – PHINMS/AIMS Hub
Alabama’s Evolution

- 2013  SDWIS to ADEM
  - XML
  - Manually uploaded to EPA web site
- 2013  Laboratory-base Enteric Disease Surveillance (LEDS)
  - CSV file
  - CDC LRNB TA
  - PHINMS/AIMS Hub
- 2015  PHLIP ELSM upgrade to HL7 2.5.1
- 2016  Addition of Respiratory Panel Results to PHLIP
- 2017  Rabies results to CDC
- 2017  ETOR with Athena Health (1 county, 10 clinics)
- 2018  Quest ELR to ALNBS
- 2018  ETOR with CureMD (65 counties, 80+ clinics)
Keys to Success

• Start small – “low hanging fruit”, “jump in with both feet”
• Early experience with consuming ELR leveraged for ELR development in LIMS
• Utilize integration tools
• Cross pollinate staff
• Staff retention
• Utilize TA if possible
• Stick to the standards
• AIMS for transport (and more...)
Barriers/Challenges

- Lack of messaging and vocabulary knowledge
- Resources for ongoing maintenance
- Regression testing upgrades to LIMS
- Staff retention
- Working with 3rd parties (ETOR)
- Competing priorities
ELR from LIMS to ALNBS/CDC

LIMS ELR Message Counts

Year | Message Counts
--- | ---
2009 | 10000
2010 | 50000
2011 | 80000
2012 | 90000
2013 | 100000
2014 | 80000
2015 | 70000
2016 | 60000
2017 | 70000
2018 | 30000
ETOR Orders and Results

![ETOR Orders and Results Chart](chart.png)
LRN Results
ELR Consumed by NEDSS

ELR Messages Received by ALNBS

- X-axis: Years from 2004 to 2020
- Y-axis: Number of messages received from 0 to 400,000
Requirements for Public Health Laboratory Information Management Systems:

A Collaboration of State Public Health Laboratories, the Association of Public Health Laboratories and the Public Health Informatics Institute

1a. Test requisition
1b. Test receipt
1c. Sample management
1d. Testing and validation
1e. Report distribution
1f. Report receipt
2. Test scheduling
3. Sample collection
4. Sample chain of custody
5. Reagent manufacturing
6. Inventory control
7. General lab reporting
8. Stats and surveillance
9. Lab billing
10. Contract management
11. HR including training
12. Oversight/licensing
13. Customer service
14. Quality control
15. Lab safety
16. Lab mutual assistance
Executive Summary:
One of APHL’s key functions is to advocate for constructive collaborations to strengthen the public health laboratory community. A critical strengthening element for our public health community and the nation is the ability for the public health partners to communicate electronic disease information reliably and effectively.

The following proposal outlines a 13-month project to foster two key objectives: To foster collaboration between federal, state, and local health laboratories with the purpose of reengineering the way these entities communicate electronically and collaborate; and to create a Community of Practice (CoP) to enable virtual collaborations between partners with unique areas of competence and needs within the Informatics arena including both the public and private sector.

The Need:
1. Harmonization of Vocabulary and Messaging Guides
2. Implementation of Production Level Messages
3. Building Collaboration and Cross Project Fertilization
2008 - Building the technical foundation
But no one came.
2009 - working together...we saw results

2006
6 Labs Engaged

2008
4 Labs in Production

TA launched

August 2011
30 Labs in Production

Number of state PHLs that have received TA: 50
Average number of TA engagements with state PHLs: 3.8
2009 - 2010: National Drivers make the stakes higher

Stage three will shift to outcomes improvements.
Balance policy goals, charge management reality and clinical quality imperatives.
Implementation of electronic health records for electronic data capture and sharing.

STAGES OF MEANINGFUL USE
We kept going...

AIMS

- Data Transport
- Data Validation
- Data Transformation
- Message Routing
- Application Hosting

- Trading Partners: 160
- Number of Servers: ~100
- States Cross Jurisdictional Exchange: 13

- Messages Lifetime Transferred: 25 Million
- Messages per Week via Interface Engine Processing: 20 Million
- Number of Daily Security Log Files: 26 Million

- WGS Data Processed and Counting: 2.5 TB

- Use Cases:
  - Quest: 1 Million, Number of Quest ELR Messages Per Month
  - PHLIP: 28,149, Electronic Lab Results Per Month
  - Syndromic Surveillance: 63,070
  - Other: 222,874
The days are long, but the years are short...

<table>
<thead>
<tr>
<th>Messages per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008: 9,000</td>
</tr>
<tr>
<td>2018: 250,000,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Initiatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008: 1</td>
</tr>
<tr>
<td>2018: 18</td>
</tr>
</tbody>
</table>
All of this hard work has made a difference...

- Augment electronic data exchange
- Increase efficiencies
- Share knowledge
- Improve informatics capacity
- Strengthen surge & emergency response
- Achieve a more integrated public health system
Where do we go in the next 10 years?

Assumptions:
- PHLs will use the Sync Service- HL7 between LWP to be cumbersome
- LWP needs to be more front-end flexible
- Messaging capability/translation would happen in AIMS
- New AIMS service to order/results translation service
- Bidirectional capability needed
- Database model for PHLs to support route management (use of translation service)
- Define larger problem

Reuse:
- Portal to EPI
- Sync service
- Will start with model A and then work on BC model
We want to hear from you

Share your data exchange challenges and successes- What has or hasn’t worked for you?

What opportunities has your lab had to forgo because of your data exchange capabilities?

What opportunities has your lab been able to pursue because of your data exchange capabilities?

What do you wish AIMS could do for you?

What hurdles do we face in adopting cloud services?