# AART
# Painting a Picture of Your IIS

Nathan Bunker, Senior Technical Project Manager

April 6, 2016

# Overview of this Session

- Introduction
  - Interoperability Discover Testing: Where are we today?
- Discovery Process
  - Ten Testing Steps
- AART Report Demonstration
  - How to read the AART report

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# INTRODUCTION

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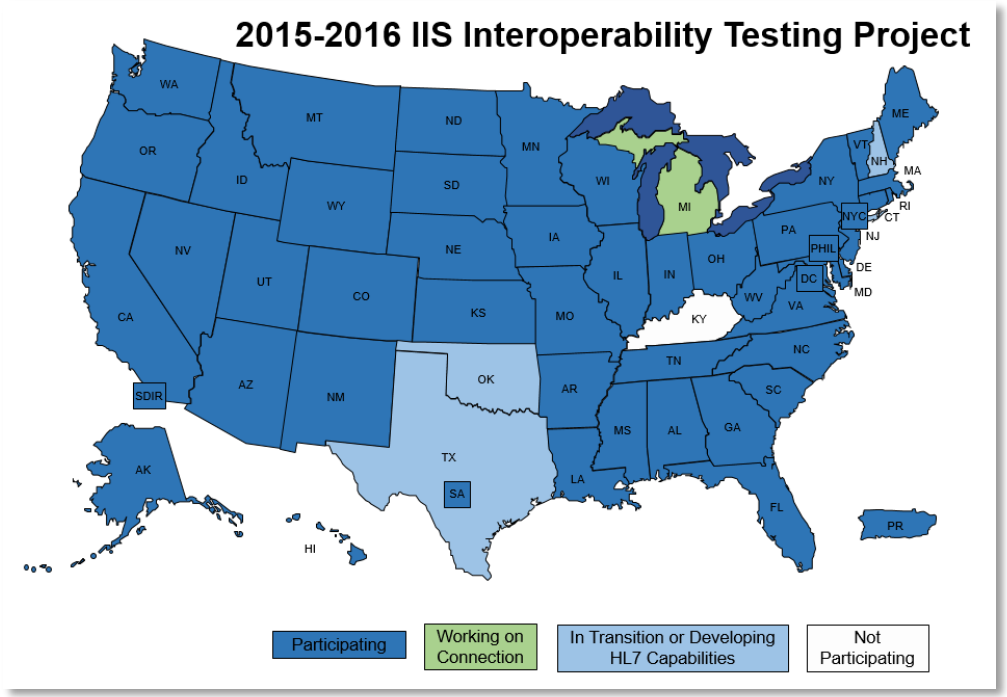
# Interoperability Discovery Testing: Where Are We Today?

Participation

- 52 IIS Programs and 2 Vendors
- Of these
  - 42 Connected
  - 1 Connection in Progress
  - 11 Manual Reporters
    - 6 are submitting manual tests
- 4 IIS Have Yet To Participate
  - Some of these are migrating to new systems




***Last Updated: March 30, 2016***

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# DISCOVERY PROCESS

# Discovery Process

- Update message (VXU) submitted, acknowledgement message (ACK) returned
- Query message (QBP) submitted, response message (RSP) returned
- Each submission and response is defined in a **test case**
- A test case is defined within a **test section**

# Test Sections

| Update Focus | |
|---|---|
| Basic | NIST 2014 |
| Intermediate | Coded Values |
| Advanced | Data Quality |
| Not Accepted | Negative ACKs |
| ONC 2015 | NIST 2015 |
| Profiling | Local IIS Guide Requirements |
| Exceptional | EHR Examples and Toleration Checks |

| Query Focus | |
|---|---|
| QBP Support | NIST 2015 |
| Deduplication Engaged | Patient/Vacc Matching |
| Forecaster Engaged | Forecast Returned |

| Message Totals |
|---|
| 1,010 VXU |
| 1,007 QBP |

# Step 1: Create Test Message

- Test messages built when tests run
- Format and type of content is consistent
- Identifying data is always new and unique
  - Last names are taken from US counties
  - First/middle names are common baby names
  - Address city, zip & state are real, street fictitious
  - Birth dates always changing
  - Other data is internally consistent

# Step 1: Create Test Message

```
MSH|^~\&|||||20160403085833-0400||VXU^V04^VXU_V04|U01W1.11x|P|2.5.1|
PID|||U01W1^^^AIRA-TEST^MR||Scott^Hirsh^R^^^^L|Davis^Sylvia|20120401|M|
   |2106-3^White^HL70005|117 Bracey Cir^^Point Aux Pin^MI^49775^USA^P|
   |^PRN^PH^^^231^6435705|||||||
   |2135-2^Hispanic or Latino^HL70005|
PD1|||||||||||
   |02^Reminder/Recall - any method^HL70215|||||A|20160403|20160403|
NK1|1|Davis^Sylvia^^^^^L|MTH^Mother^HL70063
   |117 Bracey Cir^^Point Aux Pin^MI^49775^USA^P|^PRN^PH^^^231^6435705|
ORC|RE||U01W1.3^AIRA|||||||I-23432^Burden^Donna^A^^^^^NIST-AA-1|
   |57422^RADON^NICHOLAS^^^^^^NIST-AA-1^L|
RXA|0|1|20160403||21^Varicella^CVX|0.5|mL^milliliters^UCUM|
   |00^Administered^NIP001|||||N3783EO||MSD^Merck and Co^MVX||||A|
RXR|SC^^HL70162|RA^^HL70163|
...
```

# Step 2: Set Expectations

- Expected outcome must be defined
- For update tests (VXU)
  - **Accepted**: IIS positively accepts message
  - **Rejected**: IIS indicates fix and resubmit
- For query tests (QBP)
  - **Exact Match**: Patient found
  - **Multiple Match**: More than one patient found
  - **No Match**: Patient was not found

# Step 3: Submit Vaccination Update

- VXU is submitted using available transport
  - CDC defined SOAP/WS
  - Other SOAP/WS standard
  - HTTPS POST
  - Manual (in development)
- Acknowledgement message (ACK) returned

# Step 4: Read Acknowledgement

- ACK message is categorized as either:
  - **Accepted**: Positive response, primary/essential data has been accepted, IIS is not asking for correction and resubmission
  - **Rejected**: A major issue has been identified, some/all critical data has not been accepted, IIS is asking for correction and resubmission
- Warnings or Soft Errors
  - Not yet being measured or tested

# Step 5: Validate ACK Message

- Message conformance checking
  - Expected to conform against CDC Implementation Guide release 1.5
- Validation software details:
  - Provided by National Institute of Standards and Technology (NIST)
  - Can be accessed directly here:
    - http://hl7v2-iz-r1.5-testing.nist.gov/iztool/

# Step 6: Submit Vaccination Query

- Queries are constructed from update
  - Query parameters copied directly from update
  - Intended to produce a strong single match
- All updates are queried for
  - Including updates that were rejected by IIS
- Delay between update and query
  - All updates are submitted and acks retuned
  - Then all queries are sent, 30-60 minutes later

# Step 7: Read Query Response

- **Response status** is categorized as:
  - Match: One patient returned
  - Multiple Match: More than one patient
  - No Match: No patient returned

# Step 8: Determine Store Status

- Verify essential data is returned:
  - Patient name and date-of-birth
  - All vaccination dates and CVX codes
- **Store status** determined:
  - Accepted and Returned
  - Accepted but Not Returned
  - Not-Accepted but Returned
  - Not-Accepted and Not Returned

# Step 9: Validate RSP Message

- Message conformance checking
  - Expected to conform against CDC Implementation Guide r1.5
- Validation software details:
  - Provided by National Institute of Standards and Technology (NIST)
  - Can be accessed directly here:
    - http://hl7v2-iz-r1.5-testing.nist.gov/iztool/

# Step 10: Read Forecast

- Look in OBX segments and try to read forecast
- Expecting forecast for every patient
- Forecast Status:
  - Included: At least one vaccination forecasted
  - Not Included: Unable to find a vaccination forecasted

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# AART REPORT

CULTIVATING COMMUNITY
ESTABLISHING STANDARDS
SUPPORTING IMPLEMENTATION

National Meeting
SEATTLE, WA
APRIL 5-7 2016

# AART Report

- Software and report are Beta versions
  - Under active improvement and revision
  - Looking for feedback from IIS
- Report represents discovery process
  - Based on standards and best practices
  - Contains exploratory test cases
- Reports are run monthly

AART - Home - Mozilla Firefox

AART - Home

ois-pt.org/dqacm/home?action=Select Application&applicationId=2

Search

home | report

**AART** Aggregate Analysis Reporting Tool

Access to this application allowed under these Terms and Conditions.

## Your IIS Report

| Score | Details |
| --- | --- |
| | **IIS Demo**<br>Last Run: 02/19/2016 1:08 PM EST<br>View Report |

Use of this information is restricted by the Terms and Conditions Nathan Bunker agreed to on March 3, 2016.

Software Version 1.1.10 BETA

AART - Report - Mozilla Firefox

AART - Report

ois-pt.org/dqacm/pentagon?testConductedId=536

Search

home | report

**AART** Aggregate Analysis Reporting Tool

# IIS Demo

02/19/2016

**How To Read**

| CDC Guide | NIST Test Suite | IIS Guide |
|---|---|---|

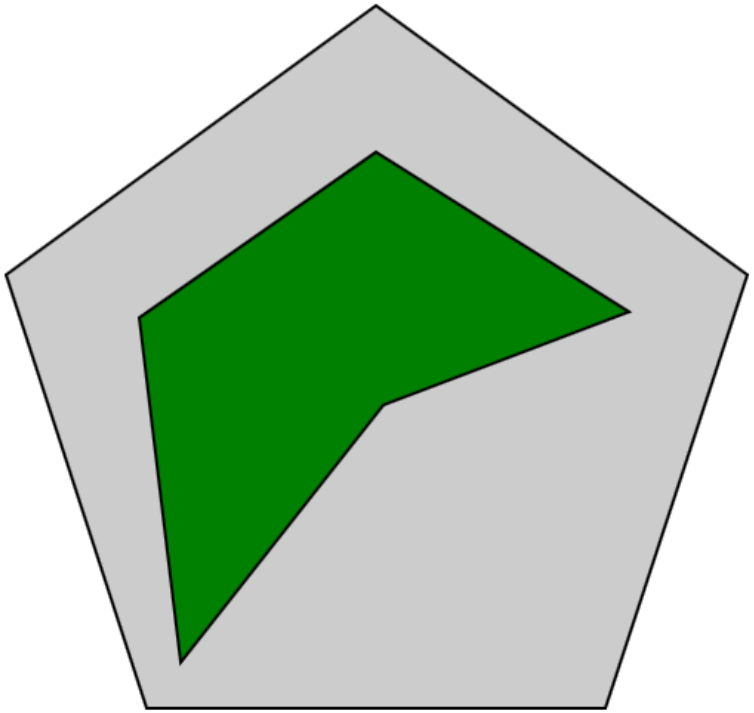
**Confidence**

| ACKs Conform to NIST 2015 | Good Messages Accepted | Bad Messages Rejected | Good Data Stored | Bad Data Not Stored |
|---|---|---|---|---|
| 0% | 100% | 100% | 100% | |

**4 Ways To Improve HL7 Interface**

**Update Functionality**

- NIST 2014 VXU Accepted: 100%
- NIST 2015 VXU Accepted: 0%
- Sensitive
- Coded Values: 100%
- Tolerant
- EHR Examples
- Performance



**Query Functionality**

- NIST 2015 QBP Supported
- Data is Available
- Deduplication Engaged
- Forecaster Engaged: 0%
- Performance: 100%

**Update Conformance**

| No Modifications | No Conflicts | No Constraints | Acks Conform |
|---|---|---|---|
| 100% | 100% | 100% | |

**Query Conformance**

| Responses Conform | CDC WSDL Conforms |
|---|---|
| | |

## Beta Test No

Access to this report has been given to you as part of a beta report to guide improvements you might make to your IIS bu limitations and conditions:

- This report shows the results of a testing discovery prc You will see this report change as improvements are m
- The scoring and graphics shown in the report are to fo be most critical for interoperability. While this report le standards wherever possible, it does not represent a c the IIS supports these standards.
- We need your help to make this report better. Notice a improve this report? Please tell us!

### Your Question or Feedback

Submit

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Software Version 1.1.10 BETA

# IIS Demo

02/19/2016

| How To Read | | |
|---|---|---|
| CDC Guide | NIST Test Suite | IIS Guide |

| ACKs Conform to NIST 2015 | Good Messages Accepted | Bad Messages Rejected | Good Data Stored | Bad Data Not Stored |
|---|---|---|---|---|
| 0% | 100% | 100% | 100% | |

**Confidence**

**4 Ways To Improve HL7 Interface**

**Update Functionality**

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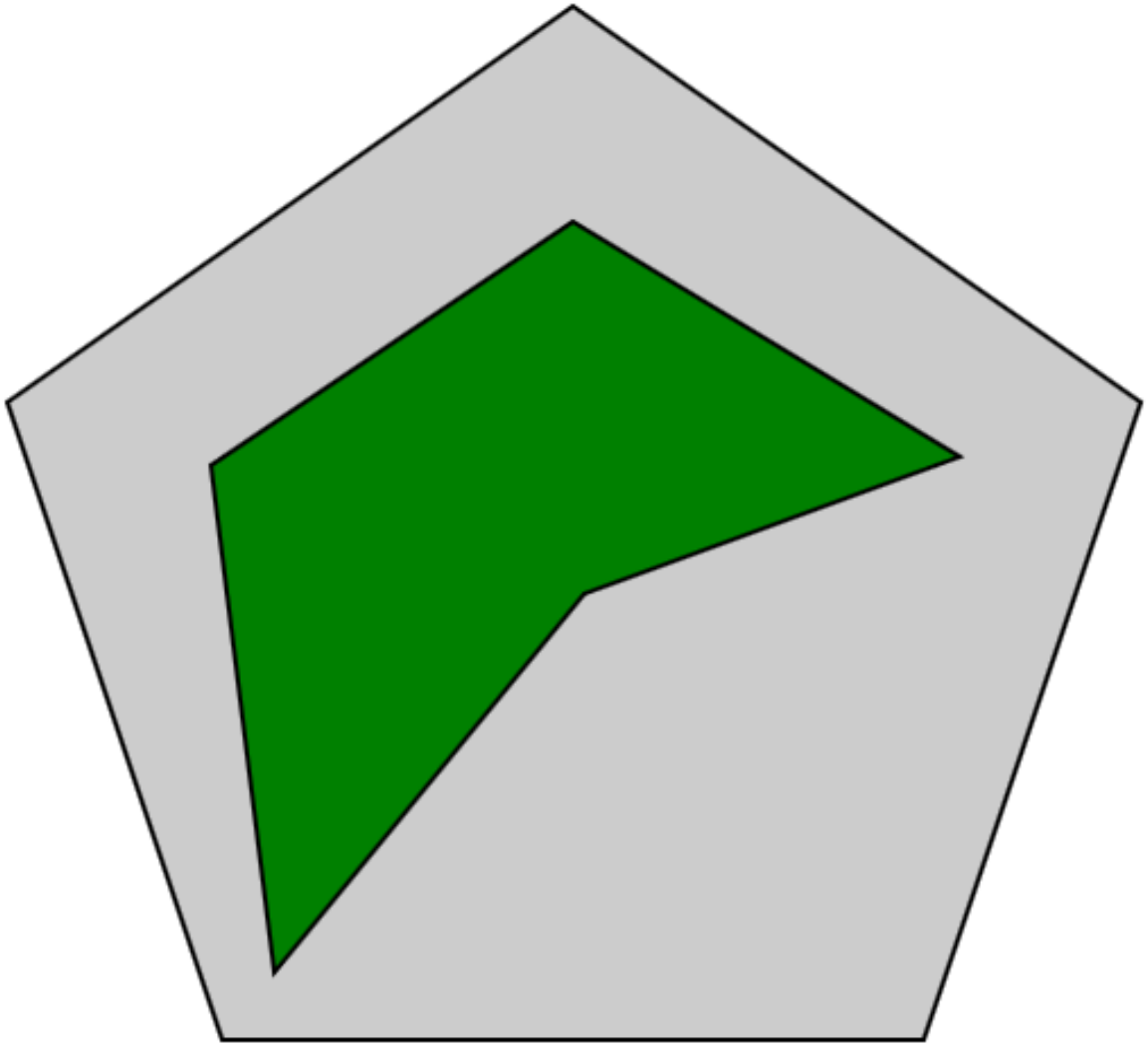
- EHR Examples
- Performance



**Query Functionality**

- NIST 2015 QBP Supported
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- Deduplication Engaged
- Forecaster Engaged: 0%
- Performance: 100%

# IIS Demo

02/19/2016

| How To Read | | |
|---|---|---|
| CDC Guide | NIST Test Suite | IIS Guide |

| ACKs Conform to NIST 2015 | Good Messages Accepted | Bad Messages Rejected | Good Data Stored | Bad Data Not Stored |
|---|---|---|---|---|
| 0% | 100% | 100% | 100% | |

**4 Ways To Improve HL7 Interface**

NIST 2014 VXU Accepted 100%

NIST 2015 VXU Accepted 0%

Sensitive

Coded Values 100%

Tolerant

EHR Examples

Performance

## Confidence: ACKs Conform to NIST 2015

Close

Overview | Details | Improve | Calculation | History | Comparison

### Fail - ACK Message Conformance Problems

The following test cases had ACK messages which failed NIST 2015 Conformance.
Click on each test case for further details.

| Test Case |
|---|
| NIST IZ #1: Administered for Child (replica) |
| NIST IZ #2: Administered for Adult (replica) |
| NIST IZ #3: Historical for Child (replica) |
| NIST IZ #4: Consented for Child (replica) |
| NIST IZ #5: Refused for Toddler (replica plus immunization) |
| NIST IZ #6: Varicella History for Child (replica plus immunization) |
| NIST IZ #7: Complete Record (replica) |
| PID: Patient identifier segment is missing |
| PID-3: Patient id is missing |
| PID-5: Patient name is missing |
| PID-7: Patient dob is missing |
| PID-7: Patient dob is unreadable |
| PID-7: Patient dob is in the future |

NIST 2015 QBP Supported

Data is Available

Deduplication Engaged

Forecaster Engaged 0%

Performance 100%

# NIST IZ #1: Administered for Child (replica)

Close

Overview Data HL7 Conformance Preparation History Comparison

## Update Message Submitted *

```
MSH|^~\&|||||||VXU^V04^VXU_V04|1ong-A.01.01.1wP|P|2.5.1|
PID|||1ong-A.01.01^^^AIRA-TEST^MR||Silow^Signe^P^^^^L|Burke^Abigail|20120224|F||2106-3^White^HL70005|145 Neorin Pl^^Ha
PD1|||||||||||02^Reminder/Recall - any method^HL70215||||A|20160219|20160219|
NK1|1|Boone^Abigail^^^^^L|MTH^Mother^HL70063|145 Neorin Pl^^Haslett^MI^48840^USA^P|^PRN^PH^^^517^9271832|
ORC|RE||U92Z2.3^AIRA|||||||I-23432^Burden^Donna^A^^^^^NIST-AA-1||57422^RADON^NICHOLAS^^^^^^NIST-AA-1^L|
RXA|0|1|20160219||94^MMRV^CVX|0.5|mL^milliliters^UCUM||00^Administered^NIP001|||||Q3110HZ||MSD^Merck and Co^MVX|||
RXR|SC^^HL70162|RA^^HL70163|
OBX|1|CE|64994-7^Vaccine fundi
OBX|2|CE|30956-7^Vaccine Type^
OBX|3|TS|29768-9^Date vaccine
OBX|4|TS|29769-7^Date vaccine
```

## Accepted by IIS *

```
MSH|^~\&|||||||ACK^V04^VXU_V0
SFT|OIS|1.08.03|DQA||
MSA|AA|1ong-A.01.01.1wP|
ERR|||0^Message accepted^HL703
```

* Message has been modified to remo

**Chapter 5: Segments and Message Details**

**Table 5-11 Patient Identifier Segment (PID)**

| SEQ | Element Name | Data Type | Usage | Cardinality | LEN | Conditional Predicate | Va S |
|---|---|---|---|---|---|---|---|
| 1 | Set ID - PID | SI | R | [1..1] | | | |
| 2 | Patient ID | CX | X | | | | |
| 3 | Patient Identifier List | CX | R | [1..*] | | | |
| 4 | Alternate Patient ID - 00106 | CX | X | | | | |
| 5 | Patient Name | XPN | R | [1..*] | | | |
| 6 | Mother's | XPN_M | RE | [0..1] | | | |

# Initial Impact for IIS Pilot Sites

- ACK messages significantly improved
- Workflow issues identified
- Performance problems identified
- Issues with specific coded values identified and fixed
- Test cases and associated messages used to build and improve local test processes

# Accessing AART Report

- AART URL
  - http://ois-pt.org/dqacm/home
- Stay tuned:
  - AIRA will be sending access and training information next week

# Questions/Discussion?

## Thank you!

Contact Information:

Nathan Bunker, Senior Technical Project Manager

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202-524-9567