

# HL7 Immunization User Group

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MONTHLY MEETING

JANUARY 12, 2017

2:00 PM ET

# Agenda

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- Welcome
- Updates
  - SISC Update
  - HL7 WGM – San Antonio TX – January 2017
- How to use NIST Transport Testing
- New Assessment Measures
- Questions and Answers

# SISC Update

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STANDARDS AND INTEROPERABILITY STEERING  
COMMITTEE (CRAIG NEWMAN)

# HL7 WGM

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HL7 WORK GROUP MEETING (NATHAN BUNKER)

# How to use NIST Transport Testing

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WALKTHROUGH (KEVIN SNOW & NATHAN BUNKER)

January 2017

# How to use the Transport Testing Tool

Personal experiences using the NIST Immunization Test Suite to improve Transport Assessment scores in AART

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**Microsoft**  
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CERTIFIED  
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# Overview

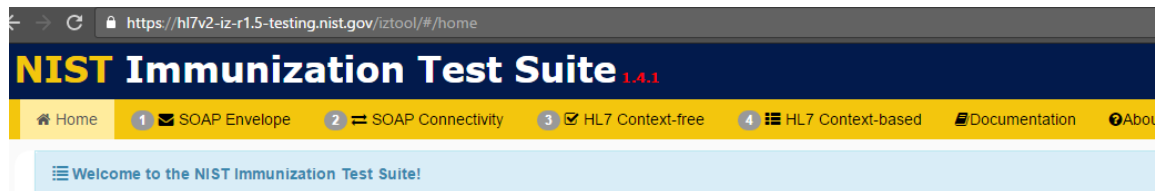
- What are we trying to accomplish
- Why are we trying to accomplish this
- How do we get there
- Links and Tools to use
- Connectivity Test
  - Valid Request
  - Valid Response
  - Using NIST Immunization Test Suite
    - SOAP Envelope
    - SOAP Connectivity
- Submit Single Message
  - Valid Request
  - Valid Message Response
    - Using NIST Immunization Test Suite
      - SOAP Envelope
      - SOAP Connectivity
  - Valid Security Fault Response
    - Using NIST Immunization Test Suite
      - SOAP Envelope
      - SOAP Connectivity
- Question and/or Discussion

# What are trying to accomplish

- For this presentation we'll go over how to use the NIST Immunization Test Suite for the measures that AART tests for

Connectivity Test	Submit Single Message	Security Fault
Fully Meets	Fully Meets	Fully Meets

To do this we'll use the tools in the **SOAP Envelope** and the **SOAP Connectivity** tab





# Why are trying to accomplish this

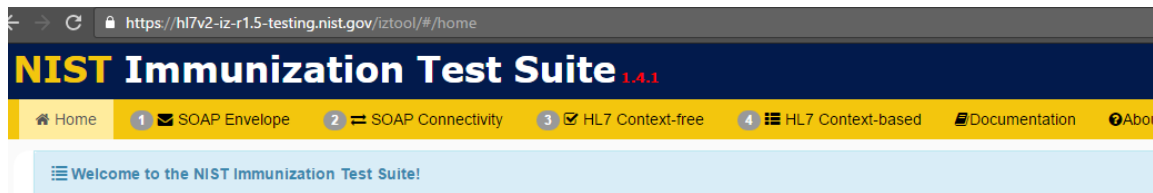
- We are trying to ensure everyone has properly implemented the CDC WSDL
  - Web methods `connectivityTest` and `submitSingleMessage`
  - Faults `UnsupportedOperationFault`, `SecurityFault`, `MessageTooLargeFault` and `UnknownFault`
- More to the point we are trying to ensure everyone implemented it the same way so that we truly have an interoperable endpoint

# How do we get there

- In order to give a valid response we must be able to accept a valid request
  - NIST Tooling can show you what a valid request and response looks like. It can also make a call to your service to verify it is working as expected
- We'll quickly go over the 3 cases AART is testing for and how to use the NIST tools to verify we are setup correctly

# Links and Tools to use

- CDC WSDL  
<https://www.cdc.gov/vaccines/programs/iis/technical-guidance/soap/services.html>
- NIST Immunization Test Suite  
<https://hl7v2-iz-r1.5-testing.nist.gov/iztool/#/home>



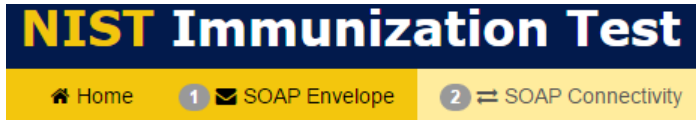
- AART  
<http://ois-pt.org/dqacm/home>
- The following tools might also help you as they let you watch your traffic
  - Fiddler  
<http://www.telerik.com/fiddler>
  - WireShark  
<https://www.wireshark.org/>
  - You may want to build your own CDC client with logging if you are running into issues or have challenges like needing a client certificate etc.

# Switch to live demo

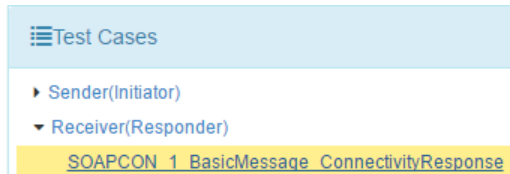
- If unable to demo live the rest of the power point has step by step instructions

# Connectivity Test Request

1. Click on the “SOAP Connectivity” tab



2. Select “SOAPCON\_1\_BasicMessage\_ConnectivityResponse”

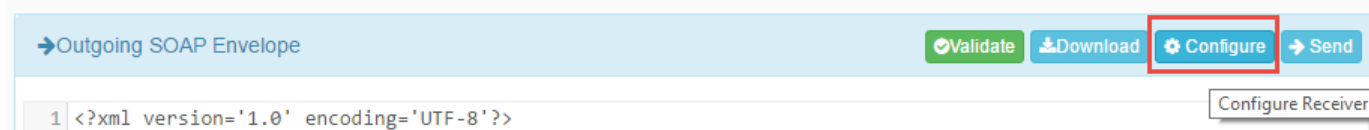


3. Select “Load Test Case”

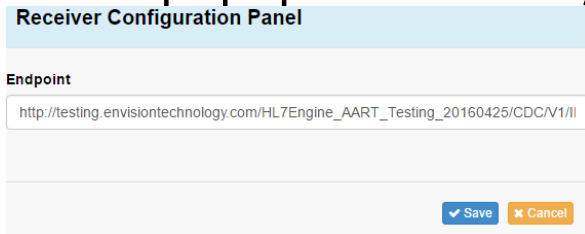


# Connectivity Test Request

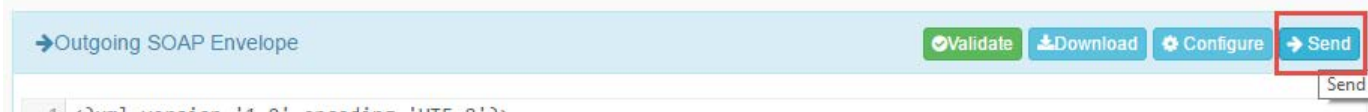
## 4. Click “Configure”



## 5. In the popup save the url/endpoint you are testing

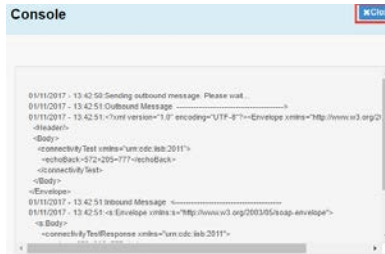


## 6. Click Send

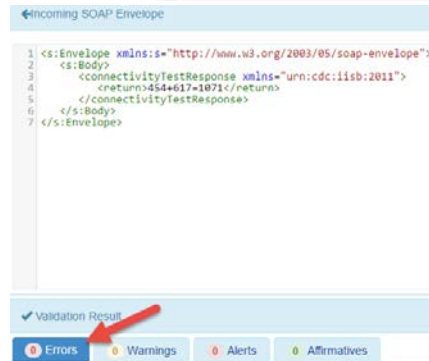



# Connectivity Test Request

7. Close the console popup



8. Verify your result



9. If errors exist in your SOAP response copy the text and navigate to SOAP Envelop tab ( **1**  SOAP Envelope ). From there you can see what changes to make to get your SOAP to pass.

# Connectivity Test Request

## 9. What you actually received was a SOAP 1.2 request based off of the CDC WSDL

### Headers:

```
Connection: Keep-Alive
Content-Length: 230
Content-Type: application/soap+xml; charset=utf-8; action="urn:cdc:iisb:2011:connectivityTest"
Accept: application/soap+xml, text/html, image/gif, image/jpeg, *, q=.2, */*; q=.2
Accept-Encoding: gzip
Host: testing.envisiontechnology.com
User-Agent: Apache-HttpClient/4.5.2 (Java/1.8.0_111)
```

### Message Body:

```
<env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope">
  <env:Header>
    <To env:mustUnderstand="1" xmlns="http://schemas.microsoft.com/ws/2005/05/addressing/none">http://testing.envisiontechnology.com/HL7Engine_AART_Testing_20160425/CDC/V1/IISService.svc</To>
    <Action env:mustUnderstand="1" xmlns="http://schemas.microsoft.com/ws/2005/05/addressing/none">urn:cdc:iisb:2011:connectivityTest</Action>
  </env:Header>
  <env:Body>
    <ns2:connectivityTest xmlns:ns2="urn:cdc:iisb:2011">
      <ns2:echoBack>393+488=881</ns2:echoBack>
    </ns2:connectivityTest>
  </env:Body>
</env:Envelope>
```

**\*NOTE: HTTP Headers are also part of accepting a valid message. HTTP Headers and SOAP combined is what allows for connectivity.**



# Connectivity Test Response

## 10. What you sent back also includes headers + SOAP

### Headers:

```
HTTP/1.1 200 OK
Cache-Control: private
Content-Type: application/soap+xml; charset=utf-8
Server: Microsoft-IIS/10.0
Date: Wed, 11 Jan 2017 21:18:16 GMT
Content-Length: 199
```

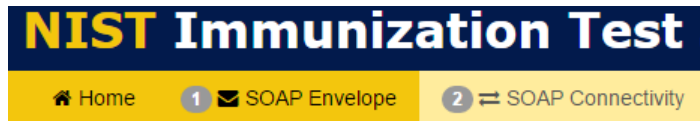
### Message Body

```
<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope">
  <s:Body>
    <connectivityTestResponse xmlns="urn:cdc:iisb:2011">
      <return>393+488=881</return>
    </connectivityTestResponse>
  </s:Body>
</s:Envelope>
```

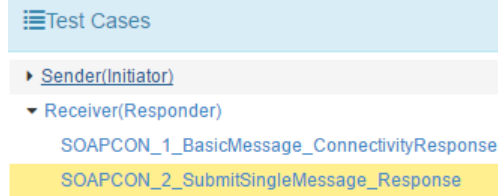
\*One of my early mistakes was I forgot to include the <return> tag

# Submit Single Message Request

1. Click on the “SOAP Connectivity” tab



2. Select “SOAPCON 2\_SubmitSingleMessage\_Response”

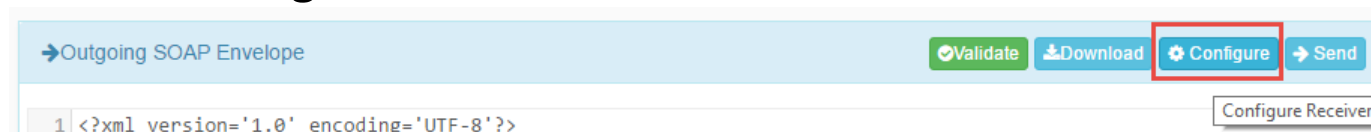


3. Select “Load Test Case”

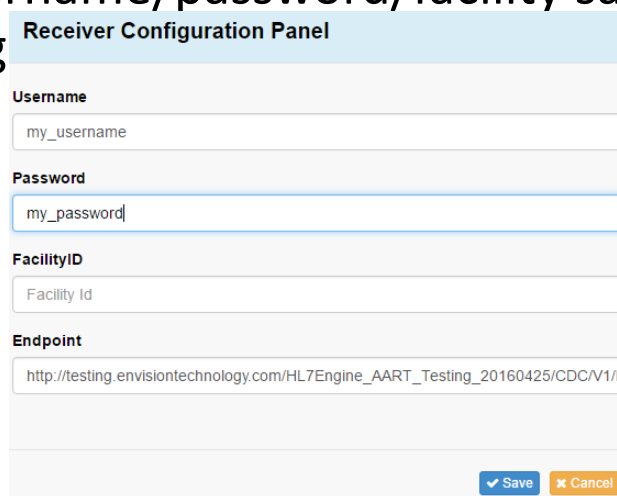


# Submit Single Message Request

## 4. Click “Configure”



## 5. In the popup set your username/password/facility save the url/endpoint you are testing



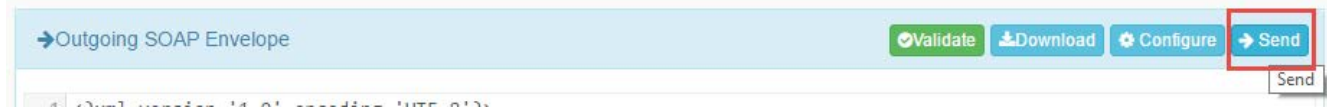
A "Receiver Configuration Panel" form with the following fields:

- Username**: Input field containing "my\_username".
- Password**: Input field containing "my\_password".
- FacilityID**: Input field containing "Facility Id".
- Endpoint**: Input field containing "http://testing.envisiontechnology.com/HL7Engine\_AART\_Testing\_20160425/CDC/V1/II".

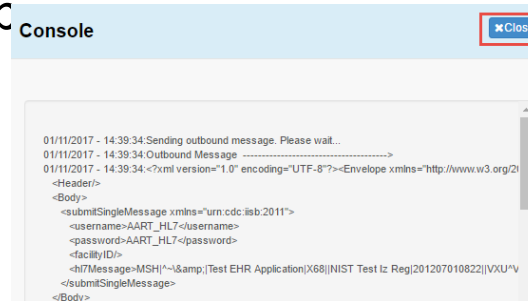
At the bottom right of the form, there are two buttons: "Save" (blue) and "Cancel" (orange).

# Submit Single Message Request

6. Click Send



7. Close the console popup



8. Verify your result

\*You're system might have security around the hardcoded MSH-4 and MSH-6 values and therefor you system returns a security fault which would "fail" the test. If this is the case you might need to ease security just for testing.

# Submit Single Message Request

## Headers:

Connection: Keep-Alive  
Content-Length: 642  
Content-Type: application/soap+xml; charset=utf-8; action="urn:cdc:iisb:2011:submitSingleMessage"  
Accept: application/soap+xml, text/html, image/gif, image/jpeg, \*, q=.2, \*/\*; q=.2  
Accept-Encoding: gzip  
Cookie: ASP.NET\_SessionId=2rem11h0dcnb4fb4ic1wwwah  
Host: testing.envisiontechnology.com  
User-Agent: Apache-HttpClient/4.5.2 (Java/1.8.0\_111)

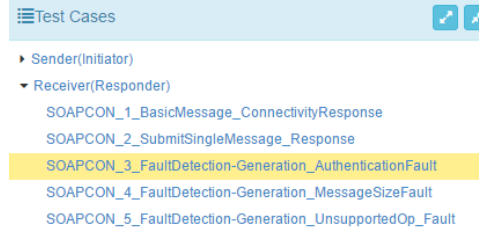
## Message Body:

```
<env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope">
  <env:Header>
    <To env:mustUnderstand="1" xmlns="http://schemas.microsoft.com/ws/2005/05/addressing/none">http://testing.envisiontechnology.com/HL7Engine_AART_Testing_20160425/CDC/V1/IISService.svc</To>
    <Action env:mustUnderstand="1" xmlns="http://schemas.microsoft.com/ws/2005/05/addressing/none">urn:cdc:iisb:2011:submitSingleMessage</Action>
  </env:Header>
  <env:Body>
    <ns2:submitSingleMessage xmlns:ns2="urn:cdc:iisb:2011">
      <ns2:username>my_username</ns2:username>
      <ns2:password>my_password</ns2:password>
      <ns2:facilityID>
      </ns2:facilityID>
      <ns2:hl7Message>MSH|^~\&amp;|Test EHR Application|X68||NIST Test Iz Reg|201207010822||VXU^V04^VXU_V04|NIST-IZ-007.00|P|2.5.1||AL|ER
PID|1||MR-99922^^^NIST MPI^MR||Montgomery^Lewis^^^^^L||20010821|M
ORC|RE||IZ-783276^NDA
RXA|0|1|20110215||118^HPV^CVX|999|||01^Historical information - source unspecified^NIP001</ns2:hl7Message>
    </ns2:submitSingleMessage>
  </env:Body>
</env:Envelope>
```

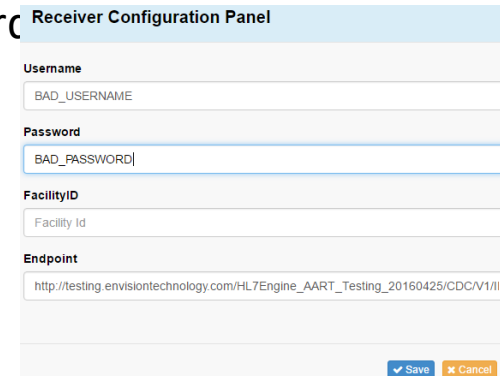
# Security Fault Request

- We're going to follow similar steps to Submit Single Message request except

- In step 2 we want to select the SOAPCON 3 FaultDetection-Generation\_AuthenticationFault

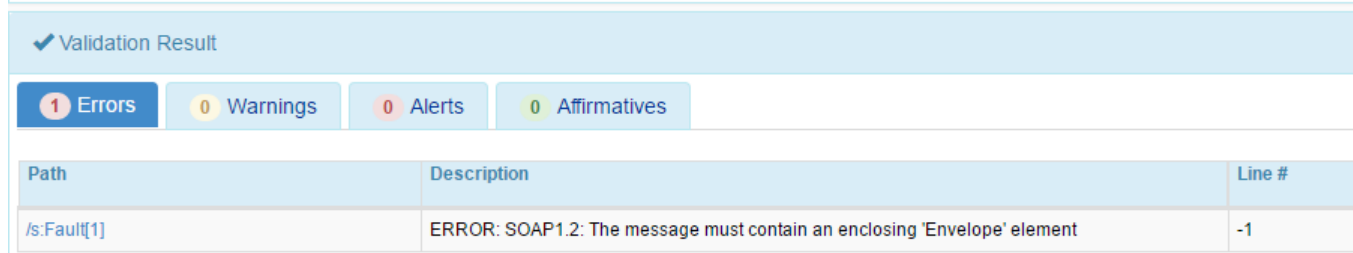


- In step 5 we want to enter a bad username/password

A screenshot of a 'Receiver Configuration Panel' form. The form has four sections: 'Username' with a text input field containing 'BAD\_USERNAME'; 'Password' with a text input field containing 'BAD\_PASSWORD|'; 'FacilityID' with a text input field containing 'Facility Id'; and 'Endpoint' with a text input field containing 'http://testing.envisiontechnology.com/HL7Engine\_AART\_Testing\_20160425/CDC/V1/I/'. At the bottom right of the form are two buttons: a blue 'Save' button and an orange 'Cancel' button.

# Security Fault Response

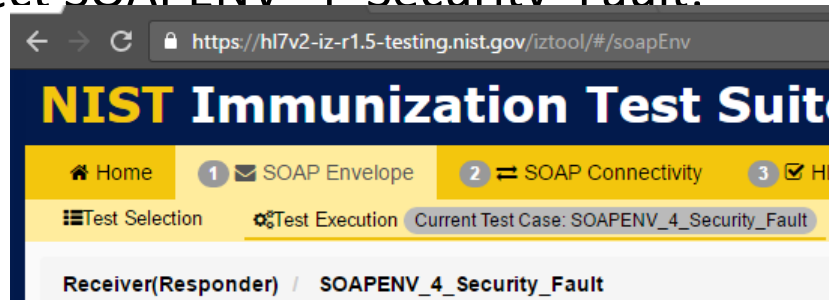
- You might see something like:



The screenshot shows a validation result interface. At the top, there is a blue header with a checkmark and the text "Validation Result". Below this, there are four buttons: "1 Errors" (highlighted in blue), "0 Warnings", "0 Alerts", and "0 Affirmatives". Below the buttons is a table with three columns: "Path", "Description", and "Line #".

Path	Description	Line #
/s:Fault[1]	ERROR: SOAP1.2: The message must contain an enclosing 'Envelope' element	-1

1. If this happened copy your fault output and navigate to the SOAP envelop test and select SOAPENV 4 Security Fault:



# Security Fault Response

2. Click Load Test Case



3. Insert an empty Envelop/Body then paste your fault inside of there

```
SOAP Envelope
1 <Envelope xmlns="http://www.w3.org/2003/05/soap-envelope">
2   <Body>
3     <!-- Insert your fault here -->
4   </Body>
5 </Envelope>
```

4. Click Validate



# Security Fault Response

HTTP/1.1 500 Internal Server Error

Cache-Control: private

Content-Type: application/soap+xml; charset=utf-8

Server: Microsoft-IIS/10.0

Date: Wed, 11 Jan 2017 23:18:21 GMT

Content-Length: 626

```
<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope">
```

```
<s:Body>
```

```
<s:Fault>
```

```
<s:Code>
```

```
<s:Value>s:Sender</s:Value>
```

```
</s:Code>
```

```
<s:Reason>
```

```
<s:Text xml:lang="en-US">Invalid userName/password.</s:Text>
```

```
</s:Reason>
```

```
<s:Detail>
```

```
<SecurityFault xmlns="urn:cdc:iisb:2011" xmlns:i="http://www.w3.org/2001/XMLSchema-instance">
```

```
<Code>10</Code>
```

```
<Reason>Security</Reason>
```

```
<Detail>Invalid userName/password</Detail>
```

```
</SecurityFault>
```

```
</s:Detail>
```

```
</s:Fault>
```

```
</s:Body>
```

```
</s:Envelope>
```

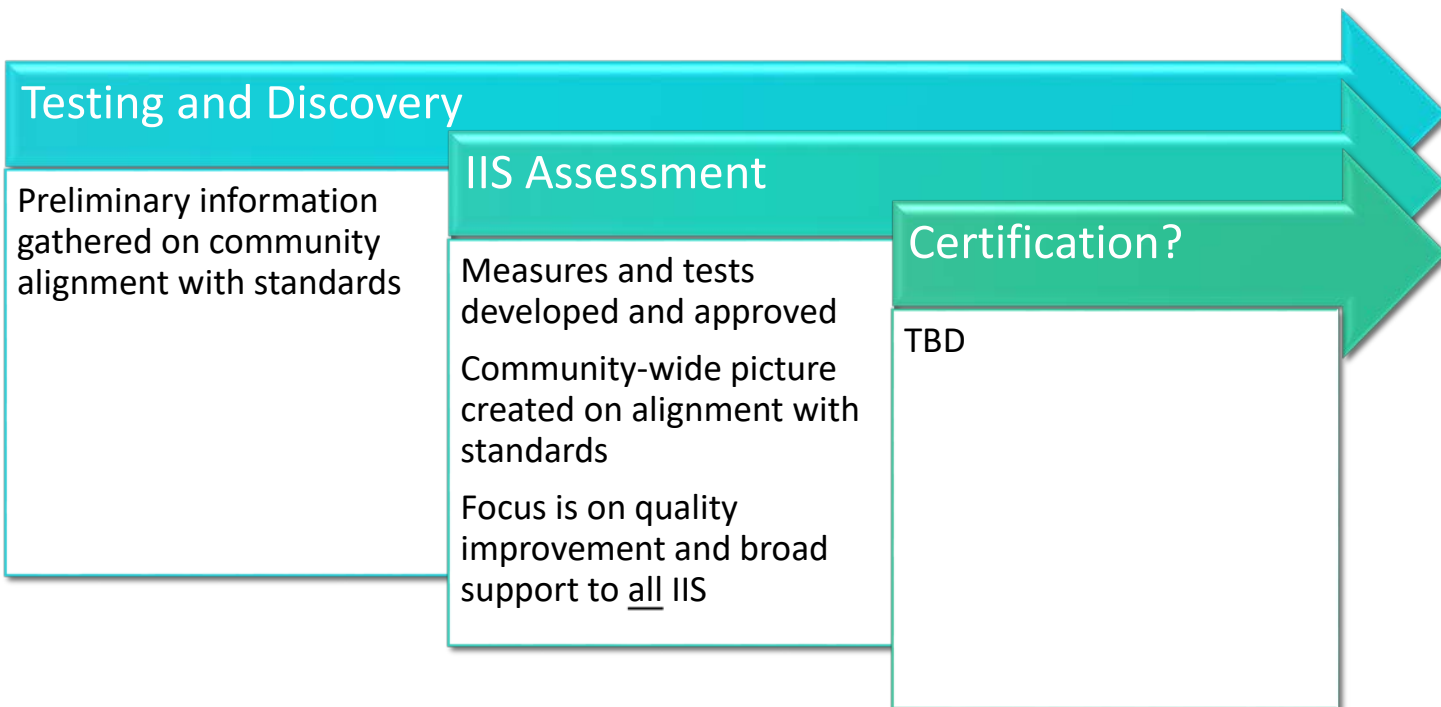
# New Assessment Measures

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AIRA ASSESSMENT PROJECT (NATHAN BUNKER)

# Assessment Update

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# Assessment Update

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- Measurement for Assessment and Certification Advisory Workgroup (MACAW)
  - Responsible for development submission and query measures
  - Work of MACAW was approved by AIRA board
- IIS must have already registered to participate in the first round
- AIRA is implementing Assessment process now
- First Assessment reports will be available end of January 2017
- Two areas being measured:
  - Submission and Acknowledgement (VXU and ACK messages)
  - Query and Response (QBP and RSP messages)

# Assessment Vocabulary

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## Measure Vocabulary

- The IIS processes
- The IIS responds

## Processes

- This means the IIS reads the incoming message and makes appropriate decisions (e.g., de-duplicates, stores, queries, rejects, etc.) based on the information in the incoming message and previously known information already in the IIS.

## Responds

- This means the IIS returns a final resolution, or outcome, of processing the message with a conformant HL7 message.

# Outcome Vocabulary

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## Fully Meets

- The IIS meets the test case expectation without modification to the test case or test case expectation(s).

## Deviates From National Standard

- The IIS can meet the test case expectation with modification to the test case or test case expectation(s) which supports the local business need, policy, or law.

## Does Not Meet

- The IIS cannot meet the test case expectation either due to non-standard requirements, capability limitations, or otherwise arbitrary requirements which do not support local business need, policy, or law.

# Guiding Principles

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Isolate the test cases to the measure

- Isolating the test cases allows for consistent measurement across IIS.

Expectations for a test case should be few, not many

- Multiple expectations – either in number or variation - leads to inconsistencies across IIS (e.g., IIS “A” could fail for one reason, IIS “B” for a different reason).

Test for Good Behavior

- Assessment should focus on the proper behavior based on standards. There is little value in negative or edge cases at this stage. Testing and Discovery has plenty of those.

# MEASURE 1:

## The IIS processes an administered vaccine for a patient.

Purpose	Supports
<p>The processing of a vaccination event is the core of EHR to IIS electronic data exchange. The purpose is to measure that an IIS can process administered vaccination events in accordance with the National IG across common scenarios. The ACK from the IIS will be reviewed for acceptance of the submitted message, but conformance to the ACK standard is not part of this measurement. Other measures address ACK conformance.</p>	<p><b>Functional Standard 1.5:</b> The IIS can receive submissions in accordance with interoperability standards endorsed by CDC for message content/format and transport</p> <p><b>OGS 1.5.4:</b> IIS accepts VXU consistent with the current CDC-endorsed HL7 IG from authorized users and systems (See HL7 Version 2.5.1 Implementation Guide for Immunization Messaging)</p> <p><b>Functional Standard 3.4:</b> The IIS can store all IIS Core Data Elements.</p> <p><b>OGS 3.4.1:</b> The IIS can receive and store all core data elements, as endorsed by CDC, from the IIS User Interface and from electronic data transfer.</p> <p><b>Note:</b> This only measures the “receipt” portion of this OGS. The “store” portion is measured leveraging query and response.</p>

Test Case	Test Case Expectation
<p>1a) A patient receives and MMRV at age 12 months. The submission is fully populated with all nationally “required” (R) and “required, but may be empty” (RE) usage segments and fields including VIS and VFC information.</p>	<p>The IIS responds with an ACK indicating it has accepted the message.</p>
<p>1b) A patient receives a <u>Tdap</u> at age 11 years. The submission contains the following:</p> <p><b>Patient Related Information:</b> All R, RE usage segments and fields are included.</p> <p><b>Vaccination Event Related Information:</b> Only NDC and vaccination date are included. All remaining R and RE usage fields related to the vaccination event (e.g., lot number, VFC, VIS, etc.) are omitted.</p>	<p>The IIS responds with an ACK indicating the message was accepted or rejected based on local business rules. If rejected, the message must be rejected due to missing information which should have been supplied per the national standard, not related to other reasons.</p>



# Submission and Update Measures

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1. The IIS processes an administered vaccine for a patient.
  - IIS must respond with an ACK indicating it has accepted the message
2. The IIS processes a historical vaccine for a patient.
  - IIS must respond with an ACK indicating it has accepted the message
3. The IIS processes the submission of a full immunization record for a patient.
  - IIS must respond with an ACK indicating it has accepted the message

# Submission and Update Measures

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4. The IIS processes an update to a previously submitted vaccination event.

- IIS must respond with a positive ACK to both the first message and the second message that updates the first.
- The ACK in the second message should not indicate the correction was ignored or otherwise not successful in updating the vaccination event.
- Three different types of updates are tested:
  - Second message corrects vaccination date of first message
  - Second message corrects vaccine type of first message
  - Second message corrects vaccination date of first message with different order information

5. The IIS processes a delete to a previously submitted vaccination event.

# Submission and Update Measures

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5. The IIS processes a delete to a previously submitted vaccination event.

- IIS must respond with ACK for both messages indicating they are accepted.
- IIS must be clear about the outcome of the processing of the delete as IIS may have policies about not accepting deletes.

6. The IIS processes a submission where the patient does not give consent (i.e., patient data is protected) to share data.

- Could be any one of the following:
  - IIS accepts message
  - IIS returns error with severity (ERR-4) of warning indicating IIS does not accept patients who do not consent to share
  - IIS returns error with severity (ERR-4) of error indicating the jurisdictional policy is mandated and PD-12 must be “N” or empty

# Submission and Update Measures

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7. The IIS processes a refusal of a vaccination.

- IIS accepts message
- IIS should not indicate that the refusal was ignored or otherwise not successfully accepted by the IIS

8. The IIS processes an adverse event.

- IIS accepts message
- IIS should not indicate that the refusal was ignored or otherwise not successfully accepted by the IIS

# Submission and Update Measures

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9. The IIS processes an observation about a patient which results in a contraindication or immunity to a vaccine preventable disease.

- IIS accepts message
- IIS should not indicate that the observation was ignored or otherwise not successfully accepted by the IIS
- Three tests
  - Message with contain a contraindication
  - Message with contain a History of Disease as Evidence of Immunity
  - Message will contain a Serology Test as Evidence of Immunity

# Submission and Update Measures

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10. The IIS processes messages in accordance with the HL7 2.5.1, release 1.5 guide.

- IIS accepts message
- IIS should not indicate that the immunization was ignored or otherwise not successfully accepted by the IIS
- Five tests with a minimally populated message with one:
  - Administered dose
  - Historical dose
  - Refusal
  - Adverse event
  - Observation

# Submission and Update Measures

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11. The IIS processes both complete and incomplete/partially administered doses.

- IIS accepts message
- IIS should not indicate that the immunization was ignored or otherwise not successfully accepted by the IIS
- Two test cases:
  - Administered dose, but patient jumped
  - Historical Dose, but patient jumped

12. The IIS responds to a correctly formatted message with no errors.

- IIS returns an ACK that:
  - Has only informational and warning error segments
  - Conforms to current standard

# Submission and Update Measures

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13. The IIS responds to a submission that has an error.

- IIS must return an ACK that:
  - Has at least one error segment with severity (ERR-4) set to error
  - Message conforms to current guide
- Two test cases:
  - Message with data quality issue (vaccination date before birth)
  - Missing critical data element (PID-7 is missing)

14. The IIS responds to a submission with an ACK within 5 seconds or less for 95% of the records submitted.

- IIS must respond to all 95% test case update messages within 5 seconds
- There are a total of 29 test cases run twice for a total of 58 updates
- This means at least 55 of the test cases must return in less than 5 seconds



# Query and Response Measures

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1. The IIS processes a query requesting a patient's immunization record.
  - IIS accepts initial VXU which preps for test
  - IIS returns with a complete immunization record response profile (RSP Z32)
2. The IIS processes a query requesting a patient's evaluated immunization record and forecast.
  - IIS accepts initial VXU which preps for test
  - IIS returns with a complete immunization record response profile (RSP Z42)

# Query and Response Measures

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3. The IIS responds to a query for a known patient (one-to-one match).
  - IIS accepts initial VXU which preps for test
  - IIS returns with a complete immunization record response profile
  - Response must conform to implementation guide
  - Two queries sent:
    - Validate Complete Immunization History Response (Z32)
    - Validate Evaluated Immunization History and Forecast Response (Z42)
  
4. The IIS responds to a query for a patient that is not in the IIS.
  - IIS returns an RSP Z33 indicating no patient found
  - Response must conform to implementation guide

# Query and Response Measures

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5. The IIS responds to a query that results in multiple possible patients.
  - IIS must accept two update submission (VXU) which contain a set of twins
  - IIS must respond with one of the following:
    - A conformant response profile (Z31) containing a list of patients. (only for Z34)
    - A conformant response profile (Z33) indicating no patients were found (QAK-2 = "NF").
    - A conformant response profile (Z33) indicating too many patients were found (QAK -2 = "TM").
  - Test is repeated twice for both profiles:
    - Z34 query
    - Z44 query
  - Then again but for response where more than the requested number of patients are found

# Query and Response Measures

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6. The IIS responds to a query that has a significant error that cannot be accepted.

- Submit a query without a name and date of birth.
- IIS must respond with a RSP Z33 with an Error indicating an error in the query

7. The IIS responds to a query for a known patient and returns known Core Data Elements.

- IIS accepts VXU update
- Query re

# Query and Response Measures

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7. The IIS responds to a query for a known patient and returns known Core Data Elements.

- IIS accepts VXU update
- Query returns matching record
- The following fields must match what was sent in the VXU:
  - Patient ID (Submitted MRN from VXU)
  - Patient Name (first, middle, last)
  - Patient DOB
  - Patient Gender
  - Vaccine Product Type Administered (CVX)
  - Vaccination Administration Date

# Query and Response Measures

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8. The IIS responds to a query with an RSP within 5 seconds or less for 95% of the queries submitted.

- IIS must respond to all 95% queries within 5 seconds
- There are a total of 10 test cases
- This means all queries must be returned within 5 seconds

# Additional Questions

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ANY ADDITIONAL QUESTIONS?

# Next Meeting

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THURSDAY, FEBRUARY 9<sup>TH</sup>

2:00 PM ET / 11:00 AM PT



# More Information

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## Web Links

- Subscribe to immunization group  
<http://www.hl7.org/participate/UserGroups.cfm?UserGroup=Immunization>
- Public User Group Wiki  
<http://www.hl7.org/special/committees/iug/index.cfm>
- Private User Group Wiki  
<http://iugwiki.hl7.org/>
- HL7 Press Release  
<http://www.hl7.org/documentcenter/public temp F760602A-1C23-BA17-0C0D326E635471F9/pressreleases/HL7 PRESS 20140402.pdf>
- AIRA Press Release  
<http://www.immregistries.org/events/2014/04/10/hl7-immunization-user-group>

# Contact Information

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Thank you!