



AIRA

AMERICAN IMMUNIZATION
REGISTRY ASSOCIATION

Transport Assessment

Aggregate Report

2019 – Quarter 1

Background

In 2015, AIRA launched a testing discovery project to determine the level of alignment between current immunization information systems (IIS) and the community's interoperability standards. The testing discovery project, still currently in place, connects with IIS pre-production systems directly and submits sample messages to these IIS development platforms.

The testing project is the first step in an overall IIS Measurement and Improvement process. The next stage is IIS Assessment. The results from the testing discovery project are used to inform the IIS Assessment process, which is heavily informed by IIS Functional Standards¹ and Operational Guidance Statements. A third stage following IIS Assessment is Validation.

In early 2016, the [Measurement for Assessment and Certification Advisory Workgroup](#) (MACAW) was initiated to systematically research and formulate key IIS assessment components, develop metrics, and implement the IIS assessment and certification process. MACAW utilizes the testing discovery project results to identify and develop assessment metrics for particular IIS components. Those measures are then vetted and approved by the IIS community. Transport Assessment is the first official measurement content area for IIS Assessment, and this report contains the aggregate results of the remeasurement completed in Quarter 1 of 2019. This process will be repeated in Quarter 2 of 2019 to determine if progress is being made in the community.

In addition to this aggregate report, a detailed individual report is provided to each jurisdiction for use within their own projects for improvements. AIRA will not redistribute any individual IIS results outside of their respective jurisdiction and self-selected sharing settings within the Aggregate Analysis Reporting Tool (AART).²

When any two systems connect to exchange data, they must use an agreed-upon transport layer to connect. To this end, an expert panel led by the Centers for Disease Control and Prevention (CDC) was tasked with selecting a transport layer and defining a technical specification. In 2011, the panel selected SOAP and defined a formal specification commonly referred to as the “CDC WSDL”³ (Web Services Definition Language).

This report contains the results of conformance testing of the community's CDC WSDL implementation where it was installed and where AIRA was able to connect with test systems. The conformance testing utilized the National Institute of Standards and Technology (NIST) Immunization Test Suite Validation Tool. This tool provides consistent conformance-based results for all measured IIS.

¹ <http://www.cdc.gov/vaccines/programs/iis/func-stds.html>

² <http://ois-pt.org/dqacm/home>

³ <http://www.cdc.gov/vaccines/programs/iis/technical-guidance/soap/services.html>

Conformance Tests

An Advisory Workgroup of IIS community members and partners crafts the measures and tests for IIS Assessment.⁴ Message transport⁵ is assessed with three measures:

Measure 1: The IIS supports the Connectivity Test Operation as defined in the SOAP Standard Interface 1.2 specification, WSDL, as endorsed by CDC.

Measure 2: The IIS supports the Submit Single Message Operation as defined in the SOAP Standard Interface 1.2 specification, WSDL, as endorsed by CDC.

Measure 3: The IIS supports the Security Fault as defined in the SOAP Standard Interface 1.2 specification, WSDL, as endorsed by CDC.

The **Connectivity Test** operation is a “ping-like” feature that allows electronic health records (EHRs) and other sending systems to perform a simple test with an IIS to verify the two systems can at least “see” each other without having to worry about the semantics of Health Level Seven (HL7) and/or authentication.

The **Submit Single Message** operation is the primary function of the CDC WSDL designed to carry an HL7 V2.x message, along with the authentication (username, password, facility ID) parameters to make data exchange possible.

The **Security Fault** shall be thrown by the IIS if the initiating system fails to authenticate (e.g., when a bad username password combination occurs).

Conformance Results

The following table highlights the possible results of each of the conformance tests in the above descriptions. If any of the conformance tests failed, then further details were outlined in individual reports with individual site results. If an IIS conforms with the standard specified above, it is reported as “Meets” for a specific test. “Deviate from Standard” occurs when an IIS is close to meeting the standard but has work to do to meet the standard. An IIS that “Does Not Meet” the standard may have substantially changed the CDC WSDL or chosen not to implement the entire CDC WSDL.

<i>Connectivity Test</i>	<i>Submit Single Message</i>	<i>Security Fault</i>
<i>Meets</i>	<i>Meets</i>	<i>Meets</i>
<i>Deviates from Standard</i>	<i>Deviates from Standard</i>	<i>Deviates from Standard</i>
<i>Does Not Meet</i>	<i>Does Not Meet</i>	<i>Does Not Meet</i>

⁴ <http://www.immregistries.org/resources/aira-initiatives/assessment/measures>

⁵ http://www.immregistries.org/events/IIS_Assessment_Measures_and_Tests_-_Transport_-_final.pdf

Summary Results

Fifty-eight IIS (comprising all 50 states plus the Commonwealth of the Northern Mariana Islands, the District of Columbia, Guam, New York City, Philadelphia, Puerto Rico, San Diego, and the Virgin Islands⁶) were encouraged to be measured in the IIS Transport Assessment.

Of the 58, 39 (67%) had a SOAP Web Services/CDC WSDL end point available for testing. This is an increase of 18 IIS since the baseline measurement in Quarter 3 of 2016. Specific results for each test were as follows:

<i>Connectivity Test</i>	<i>Submit Single Message</i>	<i>Security Fault</i>
36	36	25
0	0	8
3	3	6

Of the 39 IIS with a CDC WSDL end point available for testing:

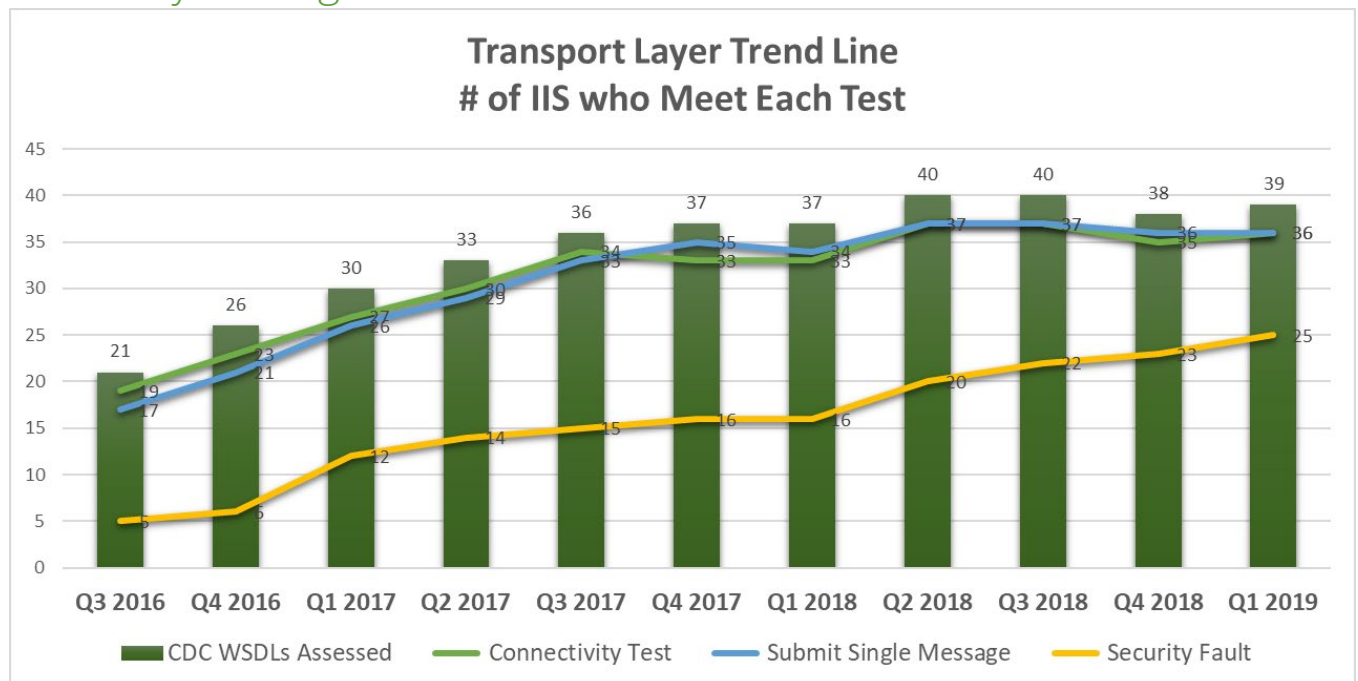
- 25 IIS met all three measures.
- 10 IIS met two out of three measures, with all 10 cases missing the Security Fault measure (Measure 3). It is important to note that the 10 IIS that passed all measures except the Security Fault are interoperable with the CDC WSDL standard as long as the correct authentication parameters are sent. For this reason, these sites are functionally compatible for production use when authentication succeeds but improperly indicate authentication failure through the use of the Security Fault.
- 2 IIS met one out of three measures.
- 2 IIS met zero out of three tests.

Finer details on the testing results where IIS deviated or did not meet the standard can be seen in [Appendix A](#).

The next snapshot will take place in Quarter 2 of 2019, and we hope to show increases in both the number of measured IIS and in the number of IIS who meet measures and tests for Transport.

⁶ Note that the six Pacific Islands were not initially targeted for measurement due to limited transport technology. As capabilities and ability to be measured expand, Pacific Islands are being included in this report.

Summary of Progress



Since the initial baseline measurement in Quarter 3 of 2016, the following progress has been seen:

- **Aligned with CDC WSDL specification:** 25 IIS have a compliant WSDL. This is 20 more than the baseline.
- **Nearing alignment:** 10 additional IIS meet two of the three tests and are likely interoperable in production.
- **Known CDC WSDL implementations:** 44 IIS have a CDC WSDL implementation. This is 23 more CDC WSDL implementations achieved since the baseline. 5 of these were unable to be tested during this quarter due to various technical reasons (e.g., endpoints down, server migrations, etc.)
- **Updated resources:** AIRA and CDC have refreshed their CDC WSDL content to be easier for EHRs and IIS to use and align with.

Limitations of Report

One limitation is noted in this report. This report is based on conformance requirements that align with the standard, but it is not meant to suggest IIS can't achieve interoperability outside of this standard. For example, many IIS do not meet conformance on the Security Fault test, but this does not imply the IIS is unable to interoperate using the Submit Single Message operation when authentication passes. It specifically means the IIS does not conform to the CDC WSDL when throwing a Security Fault during authentication failure. However, full conformance to standards across the IIS and EHR community will smooth interoperability and speed onboarding going forward.

General Recommendations for All IIS

1. Review conformance test results and work to improve areas of non-conformance. In doing so, it is important to consider if the changes to conform will break existing connections. If the changes will break existing connections, it may be better to leave the existing non-conformant connection operational and provide a new end point that conforms with the CDC WSDL. This will provide an easy and natural transition strategy to the conformant CDC WSDL as new and existing providers/EHRs develop or upgrade their interfaces.
2. Utilize the conformance tool provided by NIST when developing and/or improving implementation of the CDC WSDL. The tool can aid the software development process. The tool is located at <https://hl7v2-iz-r1.5-testing.nist.gov/iztool/#/home> and is free to use without installation or registration.
3. Publish and make available all transport layer requirements for use by potential trading partners. Almost all IIS publish their HL7 guide, but only a limited number publish their transport layer requirements for use by trading partners prior to beginning the onboarding process. Waiting until onboarding may delay or unnecessarily burden the onboarding process. The earlier a trading partner can access the requirements, the better chance it will have at developing to the requirements.
4. Consider sharing your Assessment results in AART with others, including EHRs. This can be helpful as they prepare to exchange with your IIS. Sharing settings can be set in AART.

Questions and/or Comments

Please direct questions and/or comments on this aggregate report to the [AIRA Technical Assistance Team](#).

Appendix A

The following appendix provides the specific details on the reasons why IIS either deviated from or did not meet the CDC WSDL standard across the three tests. In some cases, an IIS may have more than one reason it deviated or didn't meet the test.

Connectivity Test

Deviates from Standard	Does Not Meet
	Changed request and response construct: The IIS modified the request and/or response construct of the Connectivity Test operation. This varied from changing the operation name to adding parameters to changing the return construct to be different from the CDC-defined Connectivity Test. The functional requirements are the same but are implemented technically differently.

Submit Single Message

Deviates from Standard	Does Not Meet
	Changed response construct: The IIS modified the response (e.g., information being returned) construct of the XML ever so slightly but not based on any understood business requirements. The CDC WSDL returns information (e.g., the ACK or the RSP) in an XML element called <code><return></code> . This implementer renamed this from <code><return></code> to something like <code><submitSingleMessageResponse></code> or <code><hl7Response></code> with the same technical requirements. This change results in non-conformant XML with unexpected XML tags for the initiating system.
	Authentication differences: The IIS modified the CDC WSDL by adding WS-Security to its WSDL requirements. The authentication parameters defined by the CDC WSDL were ignored in favor of a different way to perform security. While WS-Security is based on standards, it is

	different from the definition of the CDC WSDL. Sending systems would be required to adhere to WS-Security requirements to successfully exchange data.
	Base64 encoding/decoding: The IIS requires the HL7 message (VXU or QBP) be base64 encoded. Further, the response (ACK or RSP) will be returned base64 encoded and will need to be base64 decoded. While base64 encoding/decoding is based on standards, it is different from the definition of the CDC WSDL. Sending systems would be required to base64 encode submissions (VXU or QBP) and base64 decode return messages (ACK or RSP) to have meaningful communication between the two systems.

Security Fault

Deviates from Standard	Does Not Meet
Non-conformant fault: The IIS throws a fault as required by the standard, but the fault thrown by the IIS does not conform to the fault defined by the CDC WSDL.	Does not throw a fault: The IIS properly catches an authentication failure but returns the authentication failure where only HL7 responses are supposed to be returned rather than throwing a SOAP fault dedicated to authentication failures.