

An Open Source Quality Assurance Tool for HL7 v2 Syndromic Surveillance Messages



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Agenda

- History of the Project
- Project Description
- System Architecture
- Validation Tool Display
- QA Tool Display
- Next Steps



History of the Project

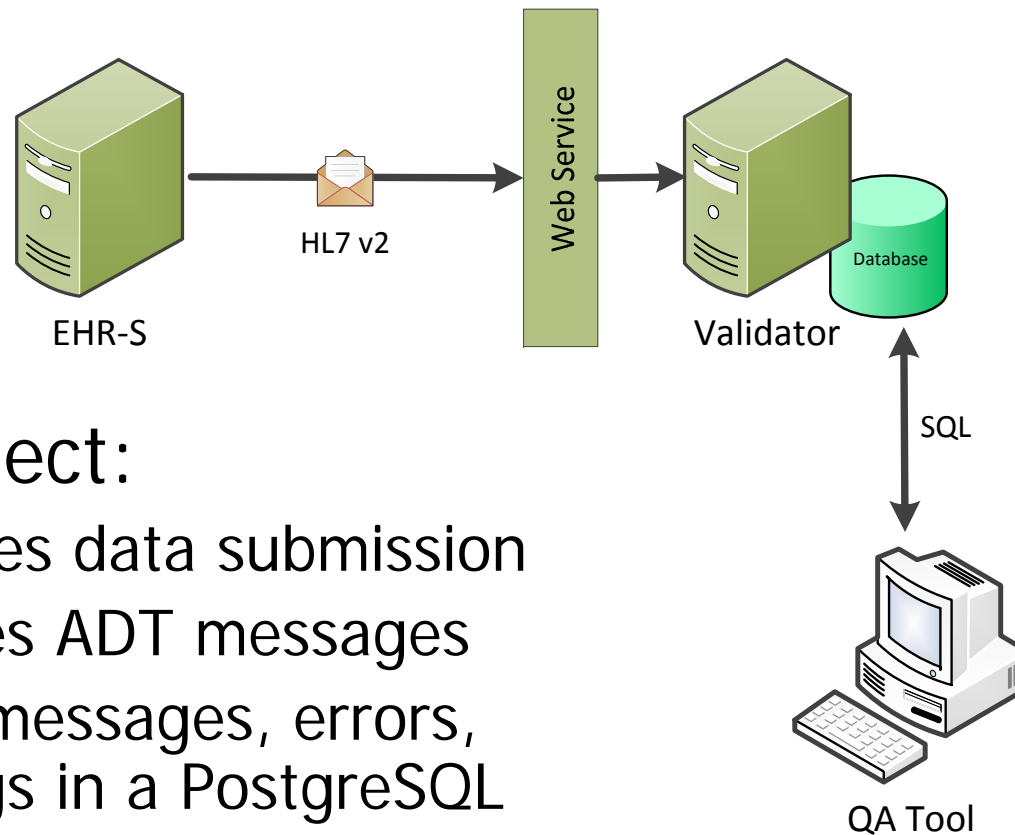
- CMS EHR Incentive Programs:
Syndrome Surveillance data submission
- HL7 v2 ADT Messages
- NIST provides CEHRT online testing tool
- No consistent want to monitor quality of data submissions in production
- NYC CIR has an Open Source Immunization Domain QA Tool



Project Description

- Build on foundation of Open Source software to develop “proof of concept”
 - NIST validation tool for ADT messages
 - NYC QA Tool modified for ADT messages
- Demonstrate “end-to-end” work flow
- Create tools that could work with Biosense or stand-alone system

System Architecture



Our project:

- Simulates data submission
- Validates ADT messages
- Stores messages, errors, warnings in a PostgreSQL database
- Provides QA Tool review

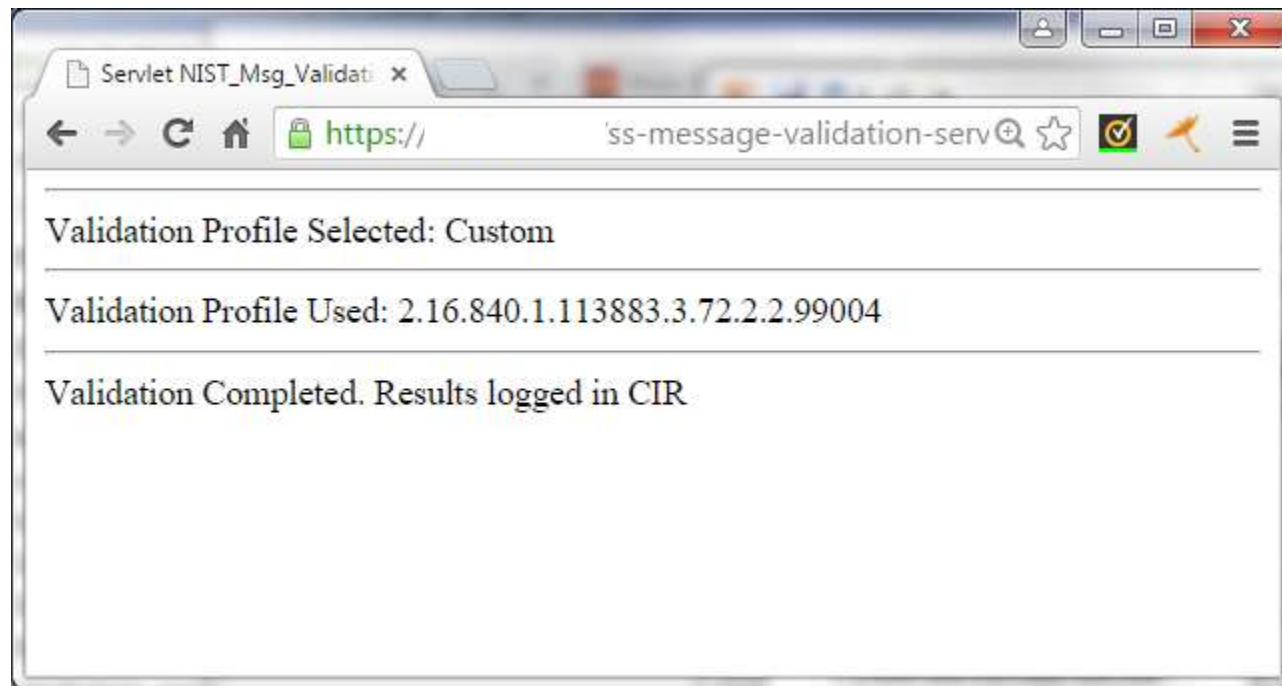
Validation

The screenshot shows a web browser window with the title 'HL7 Message Validator'. The address bar shows 'https://ss-message-validation-service/'. The page header features the 'astho' logo and the text 'ASSOCIATION OF STATE AND TERRITORIAL HEALTH OFFICIALS'. Below the header, there is a text input field containing an HL7 message. The message is as follows:

```
MSH|^~\&|NHACHldrnUrgntCar^1111111111^NPI||201012272015||ADT^A01^ADT_A01|NIST-SS-003.43|P|2.5.1|||||PH_SS-NoAck^SS
Sender^2.16.840.1.114222.4.10.3^ISO
EVN||201012272000|||NHACHldrnUrgntCar^1111111111^NPI
PID|1||33333^MR||^S||M||2106-3^CDCREC|^85001^04013|||2135-2^CDCREC
PV1|1|||||33333_001^VN|||201012271530
PV2||4870^Influenza with pneumonia^I9CDX
OBX|1|CWE|SS003^PHINQUESTION|261QE002X^Emergency Care^NUCC||||F
OBX|2|NM|21612-7^LN|10|a^UCUM||||F
OBX|3|CWE|8661-1^LN|^fever, cough and difficulty breathing||||F
```

Below the input field, there is a section titled 'Choose validation profile:' with two radio buttons: 'Standard' and 'Custom'. The 'Custom' radio button is selected. Below these options, there is a button labeled 'HL7 Message Check', which is circled in red. At the bottom of the page, there is a 'Patient Confidentiality Notice' and a 'Disclaimer' section. The footer features the 'HIN Consulting, LLC' logo and the tagline 'A Collaborative Approach to Health Information Technology'.

Validation Processing Verification



Switch to QA Tool

The screenshot shows a web browser window with the URL `cat-hl7/login.jsf`. The page header displays **C.A.T. HL7 QA Tool** and **Development**. The main content area features a login form titled **Please Login**. The form contains two input fields: **Username:** with the value `arzt` and **Password:** with masked characters. A **Login** button is positioned below the password field. The entire login form is circled in red. Below the form, a message states: "Please enter your User Name and Password and click the Login button." The footer of the page provides version and build information: "CAT Version: 0.9.0 Build#: bee866ea9ea0 Build Time: 201511171152 Plugin List: CORE/HL7" and the status "Status: Idle".

ADT Message Search

The screenshot displays the C.A.T. HL7 QA Tool interface. The top header shows 'C.A.T. HL7 QA Tool' and 'Development' mode. A user is signed on as 'arzt' with links for 'Preferences' and 'Logout'. The main section is titled 'HL7 ADT QA' and contains search criteria: Facility Code (111111112), Start Date (11/18/2015), Stop Date (11/19/2015), and Facility Search Type (Reporting). A red circle highlights these search criteria. Below the search section, the 'Selected Facility' is 'Reporting Facility - 111111112'. The results section, titled 'Reporting Facility - false', shows a table with columns: Facility Code, Account Name, Error Stats, All Messages, Success (No Errors), Success (Non-Fatal Errors), Partial Success, and Failed. A red circle highlights the 'Failed' column value '2'. The footer shows the CAT Version (0.9.0) and Build Time (201511171152).

C.A.T. HL7 QA Tool Development

Signed on: arzt [Preferences] [Logout]

CAT Manager HL7

HL7 ADT QA

Enter or select search criteria, then click the Search button to perform your search.

Facility Code: 111111112

Start Date: 11/18/2015

Stop Date: 11/19/2015

Facility Search Type: Reporting

Search Clear

Selected Facility: Reporting Facility - 111111112 Export All

Reporting Facility - false

Facility Code	Account Name	Error Stats
111111112		
All Messages	Success (No Errors)	Success (Non-Fatal Errors)
3	1	0
	Partial Success	Failed
	0	2

CAT Version: 0.9.0 Build#: bee866ea9ea0 Build Time: 201511171152 Plugin List: CORE/HL7

Status: Complete

2 Failed Messages

The screenshot shows the C.A.T. HL7 QA Tool interface. The top header displays 'C.A.T. HL7 QA Tool' and 'Development'. A user is signed on as 'arzt' with links for 'Preferences' and 'Logout'. The main section is titled 'HL7 ADT QA' and contains search criteria: Facility Code (111111112), Start Date (11/18/2015), Stop Date (11/19/2015), and Facility Search Type (Reporting). A 'Search' button is present. Below the search criteria, the 'Selected Facility' is 'Reporting Facility - 111111112' with an 'Export All' button. The 'Reporting Facility - false' section shows a summary table with columns: All Messages, Success (No Errors), Success (Non-Fatal Errors), Partial Success, and Failed. The values are 3, 1, 0, 0, and 2 respectively. Below this is a table of failed messages, which is circled in red. The table has columns: Id, Msg Cntr ID, Type, Received, Admin Facility, Message Status, Fatal Errors, and Non-Fatal Errors. It shows two failed messages with Id 9997661 and Msg Cntr ID NIST-SS-003.43, both of type ADT, received on 11/18/2015, with a status of FAILURE and a fatal error of TABLEVALUENOTFOUND (1). The bottom of the interface shows the CAT Version (0.9.0), Build#, Build Time, Plugin List, and Status (Complete).

C.A.T. HL7 QA Tool Development

Signed on: arzt [Preferences](#) [Logout](#)

CAT Manager HL7

HL7 ADT QA

Enter or select search criteria, then click the Search button to perform your search.

Facility Code: 111111112

Start Date: 11/18/2015

Stop Date: 11/19/2015

Facility Search Type: ☒ Reporting

[Search](#) [Clear](#)

Selected Facility: Reporting Facility - 111111112 [Export All](#)

Reporting Facility - false

Facility Code: 111111112 Account Name: Error Stats

All Messages	Success (No Errors)	Success (Non-Fatal Errors)	Partial Success	Failed
3	1	0	0	2

Failed

Id	Msg Cntr ID	Type	Received	Admin Facility	Message Status	Fatal Errors	Non-Fatal Errors
9997661	NIST-SS-003.43	ADT	11/18/2015 6:16 PM		FAILURE	TABLEVALUENOTFOUND (1)	
9997661	NIST-SS-003.43	ADT	11/18/2015 6:21 PM		FAILURE	TABLEVALUENOTFOUND (1)	

10 (1 of 1)

CAT Version: 0.9.0 Build#: bee866ea9ea0 Build Time: 201511171152 Plugin List: CORE/HL7 Status: Complete

Message Detail: Fields with Values

Message Information

Previous

Next

Message log ID:

99976617

Reporting facility name:

111111112

Reporting facility code:

111111112

Number of errors:

1

Filter Rows:

☐ Supported fields
 ☒ Fields with values
 ☐ Fields with errors

Fields with fatal errors

Fields with non-fatal errors

Supported fields

Unsupported fields

		1	EVN-7.2	ID	111111112
		1	EVN-7.3	Event Facility:Universal ID Type	NPI
		1	PID-1	Set ID - PID	1
		1	PID-3.1	Patient Identifier List:ID Number	33333
		1	PID-3.5	Patient Identifier List:Identifier Type Code	MR
		1	PID-5.7 (2)	Patient Name:Name Type Code	S
The value "Z" specified in the message does not match any of the values in the table "PHVS_AdministrativeSex		1	PID-8	Administrative Sex	Z
		1	PID-10.1	Race:Identifier	2106-3
		1	PID-10.3	Race:Name Of Coding	CDCREC

ADT Message

```
MSH|^~\&||NHACHldrnUrgntCar^111111112^NPI||201012272015||ADT^A01^ADT_A01|NIST-SS-003.43|P|2.5.1|||||PH_SS-NoAck^SS_Sender^2.16.840.1
EVN||201012272000|||NHACHldrnUrgntCar^111111112^NPI
PID|1||33333^MR||^S||Z||2106-3^CDCREC|^85001^04013|||2135-2^CDCREC
PV1|1|||||33333_001^VN|||||201012271530
PV2||4870^Influenza with pneumonia^I9CDX
```

Message Detail: Supported Fields

Previous

Next

Message log ID: 99976617
Reporting facility name: 111111112
Reporting facility code: 111111112
Number of errors: 1

Filter Rows:
☒ Supported fields
☐ Fields with values
☐ Fields with errors

☐ Fields with fatal errors
☐ Fields with non-fatal errors
☐ Supported fields
☐ Unsupported fields

		1	PID-5.3 (2)	And Further Given Names Or Initials Thereof	
		1	PID-6.1.1	Mother's Maiden Name:Family Name:Surname	
		1	PID-6.2	Mother's Maiden Name:Given Name	
		1	PID-7.1	Date/Time of Birth:Time	
The value "Z" specified in the message does not match any of the values in the table "PHVS_AdministrativeSex"		1	PID-8	Administrative Sex	Z
		1	PID-10.1	Race:Identifier	2106-3
		1	PID-10.2	Race:Text	
		1	PID-10.3	Race:Name Of Coding System	CDCREC
		1	PID-10.4	Race:Alternate Identifier	
		1	PID-10.5	Race:Alternate Text	
		1	PID-10.6	Race:Name Of Alternate Coding System	
		1	PID-11.1.1	Patient Address:Street Address:Street Or Mailing Address	
		1	PID-11.1.2	Patient Address:Street	

ADT Message
 MSH|^~\&|NHACHldrnUrgntCar^111111112^NPI||201012272015||ADT^A01^ADT_A01|NIST-SS-003.43|P|2.5.1|||||PH_SS-NoAck^SS Sender^2.16.840.1
 EVN||201012272000|||NHACHldrnUrgntCar^111111112^NPI
 PID|1||33333^MR||^S||Z||2106-3^CDCREC|^85001^04013|||2135-2^CDCREC
 PV1|1|||33333_001^VN|||201012271530
 PV2||4870^Influenza with pneumonia^I9CDX

Search for "PID"

Message Information

Message log ID: 99976617
 Reporting facility name: 111111112
 Reporting facility code: 111111112
 Number of errors: 1

Filter Rows:

- ☐ Supported fields
- ☒ Fields with values
- ☐ Fields with errors

Fields with fatal errors ☐
 Fields with non-fatal errors ☐
 Supported fields ☐
 Unsupported fields ☐

Search all fields: pid

Fatal Error	Non Fatal Error	Seq	Segment	Name	Value
		1	PID-1	Set ID - PID	1
		1	PID-3.1	Patient Identifier List:ID Number	33333
		1	PID-3.5	Patient Identifier List:Identifier Type Code	MR
		1	PID-5.7 (2)	Patient Name:Name Type Code	S
The value "Z" specified in the message does not match any of the values in the table "PHVS_AdministrativeSex"		1	PID-8	Administrative Sex	Z
		1	PID-10.1	Race:Identifier	2106-3
		1	PID-10.3	Race:Name Of Coding System	CDCREC
		1	PID-11.5	Patient Address:Zip Or Postal Code	85001
		1	PID-11.9	Patient Address:County Parish Code	04013
		1	PID-22.1	Ethnic Group:Identifier	2135-2
		1	PID-22.3	Ethnic Group:Name Of Coding System	CDCREC

ADT Message

```
MSH|^~\&|NHACHldrnUrgntCar^111111112^NPI||201012272015|ADT^A01^ADT_A01|NIST-SS-003.43|P|2.5.1|||||PH_SS-NoAck^SS Sender^2.16.840.1
EVN||201012272000||||NHACHldrnUrgntCar^111111112^NPI
PID|1||33333^MR||^S||Z||2106-3^CDCREC|^85001^04013|||||2135-2^CDCREC
PV1|1|||||33333_001^VN|||||201012271530
PV2||4870^Influenza with pneumonia^I9CDX
```


Search for "22"

Message Information

Message log ID: 99976617
 Reporting facility name: 111111112
 Reporting facility code: 111111112
 Number of errors: 1

Filter Rows:
☐ Supported fields
☒ Fields with values
☐ Fields with errors

Fields with fatal errors ☐
 Fields with non-fatal errors ☐
 Supported fields ☐
 Unsupported fields ☐

Search all fields: 22

Fatal Error	Non Fatal Error	Seq	Segment	Name	Value
		1	MSH-7.1	Date/Time Of Message:Time	201012271015
		1	MSH-21.3	Message Profile Identifier:Universal ID	2.16.840.1.114222.4.10.3
		1	EVN-2.1	Recorded Date/Time:Time	201012271000
		1	PID-22.1	Ethnic Group:Identifier	2135-2
		1	PID-22.3	Ethnic Group:Name Of Coding System	CDCREC
		1	PV1-4.1	Admit Date/Time:Time	201012271530

ADT Message

```
MSH|^~\&|NHACHldrnUrgntCar^111111112^NPI||201012272015||ADT^A01^ADT_A01|NIST-SS-003.43|P|2.5.1|||||PH_SS-NoAck^SS Sender^2.16.840.1
EVN||201012272000|||NHACHldrnUrgntCar^111111112^NPI
PID|1||33333^MR||^S||Z||2106-3^CDCREC|^85001^04013|||2135-2^CDCREC
PV1|1|||||33333_001^V|||||201012271530
PV2||4870^Influenza with pneumonia^I9CDX
```

Error Statistics

The screenshot shows the C.A.T. HL7 QA Tool interface in a web browser. The browser address bar shows the URL: `https://cat-hl7/module/hl7/views/hl7qaADTMGR.jsf`. The page header includes the logo "C.A.T. HL7 QA Tool", the word "Development", and a user status "Signed on: arzt" with links for "Preferences" and "Logout".

The main content area is titled "HL7 ADT QA" and contains search criteria: Facility Code (111111112), Start Date (11/18/2015), Stop Date (11/19/2015), and Facility Search Type (Reporting). There are "Search" and "Clear" buttons.

Below the search criteria, the "Selected Facility" is "Reporting Facility - 111111112" with an "Export All" button.

The "Reporting Facility - false" section displays a table with the following data:

All Messages	Success (No Errors)	Success (Non-Fatal Errors)	Partial Success	Failed
3	1	0	0	2

A red circle highlights the "Error Stats" button in the top right corner of the table area.

At the bottom of the page, the footer text reads: "CAT Version: 0.9.0 Build#: bee866ea9ea0 Build Time: 201511171152 Plugin List: CORE/HL7" and "Status: Complete".



Error Statistics Display

Reporting Facility - 111111112 (111111112)		
Search Parameters		
Facility code: 111111112		
Facility name: 111111112		
Search type: REPORTING		
Start date: 11/18/2015		
Stop date: 11/19/2015		
Error Type	Total	Severity
TABLEVALUENOTFOUND	2	FATAL

Export

The screenshot shows the C.A.T. HL7 QA Tool interface. The top header displays 'C.A.T. HL7 QA Tool' and 'Development'. The user is signed on as 'arzt' with links for 'Preferences' and 'Logout'. The main section is titled 'HL7 ADT QA' and contains search criteria: Facility Code (111111112), Start Date (11/18/2015), Stop Date (11/19/2015), and Facility Search Type (Reporting). A red circle highlights the 'Export All' button. Below the search criteria, the 'Selected Facility' is 'Reporting Facility - 111111112'. The 'Reporting Facility - false' section shows a table of results for Facility Code 111111112.

All Messages	Success (No Errors)	Success (Non-Fatal Errors)	Partial Success	Failed
3	1	0	0	2

At the bottom, the status is 'Complete'.

Export Results

HL7_Message_Log_Export-111111112-Complete.xls [Compatibility Mode] - Microsoft Excel

A1	Selected Facility:														
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Selected Facility - 111111112 (111111112)														
2															
3	Search Parameters:														
4		Facility co	111111112												
5		Facility na	111111112												
6		Search type	REPORTING												
7		Start date	11/18/2015												
8		Stop date	11/19/2015												
9															
10	Facility Na	Facility Co	Contact N	Contact N	Contact Email										
11	111111111	111111111													
12															
13	All Messages	Success (I	Success (I	Partial Suc	Failed										
14	3	1	0	0	2										
15															
16	Internal ID	Message (Date Rece	Admin Fac	Reporting I	Sending A	Message (Fatal Error#	of Fatal	{Non-Fatal	# of Non-Fatal	Errors				
17	99976617	NIST-SS-0 11/18/2015		111111111	FAILURE	TABLEVAI	1		0						
18	99976618	NIST-SS-0 11/18/2015		111111111	FAILURE	TABLEVAI	1		0						
19	99976614	NIST-SS-0 11/18/2015		111111111	SUCCESS		0		0						
20															
21															
22															
23															



Next Steps

- Project no longer funded
- HLN will continue as an Open Source effort
 - part of larger CAT Project
- Suggested enhancements:
 - Access by submitting organizations directly
 - Provide summary statistics
 - Additional configuration parameters
 - Additional features for large message volume, including better storage efficiency and reports



Contact Information

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