AIRA
AMERICAN IMMUNIZATION REGISTRY ASSOCIATION

User Guide

The Message Quality Evaluation (MQE) Tool

September, 2018

Revisions/Change Log

Version	Date	Approved By	Changes/Updates
0.1	05/05/2018	AIRA-MQE	Initial version of draft document
0.2	05/13/2018	AIRA-MQE	Internal revisions
0.3	7/25/2018	N/A	Copy editing, formatting
Final	9/30/2018	AIRA Staff	Reformatted Document

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Introduction

The Message Quality Evaluation (MQE) Tool is an open-source application that is freely available to members of the IIS community. The tool is designed to assist sites in evaluating and improving the quality of data coming into their IIS. It will allow users with varying levels of expertise to quickly and easily generate a series of reports that describe the quality of incoming immunization data. Individual users are able to take advantage of this stand-alone version of the MQE. In this implementation, users are able to evaluate messages as part of their ongoing onboarding activities as well as to augment existing data quality assurance activities in an ad hoc fashion. This level of implementation does not interface with existing IIS infrastructure, nor can it receive data in any way other than manual upload.

Purpose of the MQE Tool

Integrating this tool as part of ongoing data quality assurance activities will facilitate onboarding new submitters by quickly identifying problems in existing data feeds. Messages are quickly analyzed to show IIS staff whether data are good, fair, or poor in an easy-to-read web-based report. Using this tool will help expedite onboarding by providing fast and thorough data checks on all incoming messages. In addition, automated metrics will give confidence to staff that are directly responsible for ensuring that incoming data meet quality expectations.

While many IIS may have data quality strategies in place, the ways in which incoming data are evaluated vary from site to site. The tool itself provides access to a wide array of data quality checks that reflect the experience of the entire community. For more information on how this tool may be useful in your organization, please review the MQE Tool Business Case available on the AIRA website (http://www.immregistries.org/message-quality-evaluation-mqe-tool).

Scope of this document

The scope of this document is to describe routine use of the stand-alone implementation of the MQE Tool. If your organization is not yet ready to integrate the tool into its workflow, there is still value in reviewing the various documents available that describe the functionality and use cases for this application. In particular, review of the test script available in the Testing Guidance document that describes the expected functionality of each of the screens in the application is highly recommended. The Testing Guidance document describes detailed information on how to report issues, bugs, and enhancement requests if the use cases described below do not meet expectations.

Getting Started

Please refer to the Implementation Guide and visit the GitHub wiki (https://github.com/immregistries/mqe/wiki/Installation) for information on installation and configuration. This document will only describe how to use the application in a stand-alone implementation. For more sophisticated implementations or additional configurations, please contact the MQE Project Team.

Stand-alone MQE users need to be able to access the GitHub repository and download the application to their workstation. To do this, users must have administrative rights to the workstation (or server) they are accessing. To run the application, users must have the latest version of Java installed and must have a modern internet browser[1].

Once the application is properly installed, the user needs to ensure that the application is running. To enable address validation using an organization's SmartyStreets account while using the MQE Tool, open the validator.properties file[2] with the organization's authID and authToken and change addresscleaner.enabled from false to true before running start.bat.[3] Once the application is running in the background, the user can either double-click on the MQE Demo.url file provided as part of the download package or simply enter http://localhost:8756/mqe/#/messages as the URL in the browser of choice.

MQE Navigation and Dashboard

The dashboard is the main page that users will land on whenever they launch the application. This is also the page that contains most of the information the user will interact with. MQE users need to be able to navigate to a variety of screens to utilize the tool. These screens should be accessible by menu as well as identified in the URL. Functionality should be consistent, quick, and reliable. The user should be able to return to the main Dashboard page from anywhere in the application.

When the application is first launched, the user will display Menu in the header, and there is a text field under "Site:" where the user can enter the PIN or a provider name to search for a specific data submitter. Upon first use, there are no data to reference, so nothing will be found. However, after files have been submitted for evaluation, information provided in MSH-3 is available to search.

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[1] At present, there are known display issues with Internet Explorer, which has not been supported by Microsoft since January 1, 2016. If the user experiences issues with a particular browser, it should be reported via GitHub.

[2] This needs to be done only on the first installation or whenever a new validator.properties file is used. This functionality is actively under enhancement, and details on how to modify these values will be updated prior to publishing this document.

[3] If you are running the MQE Tool on a Mac, use the start.command file instead.

To expose available menu commands, click on the MQE Menu in the header. The user will always be able to navigate back to this screen by selecting Dashboard from the menu list.

MQE Demo Page

An MQE user may want to test a single message given by a provider during onboarding or if the submitter plans to modify a currently existing feed. While there are structural validation tools available from the National Institute of Standards and Technology (NIST), this application can be used as well to generate a report that is easy to read and, if needed, to screen-shot and share with the provider. The MQE has a built-in sample file for testing this functionality, but any single message can be pasted in for review. To interact with this feature, select MQE Demo from the menu.

To see how this feature works, you could click the Example button to load a sample message (this feature is built into the Tool). This feature is great if you need to demonstrate to new users or unauthorized users how this tool works without exposing any live data that may be in your system. Once the sample message is loaded in the Input VXU field, click the Submit button to generate a sample report[4].

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[4] Note that this demo report is an early feature of the tool and does not accurately reflect what the current functioning tool does. You may find it more useful, if you need to demo this product for some reason, to run an actual report as described in the next section.

INPUT VXU

```
MSH|^~\&||1255-60-20|MCIR|MDCH|20180505160913-0700||VXU^V04^VXU_V04|3WzJ-A.01.01.2aF|T|2.5.1|
PID|||3WzJ-A.01.01693409072^^^AIRA-TEST^MR||Dianthe^Ajitabh^^^^^L|Gore^Koko|20180201|F||2076-8^Native Hawaii
an or Other Pacific Islander^HL70005|417 Bridge St NW^^Grand Rapids^MI^49544^USA^P||^PRN^PH^^^616^9245843|||
||||||2135-2^Hispanic or Latino^HL70005|Birth Place PID-23|||
PD1|||||||||||02^Reminder/Recall - any method^HL70215|||||A|20170301|20170301|
NK1|1|Dianthe^Koko^^^^^L|MTH^Mother^HL70063|81 Page Pl^^GR^MI^49544^USA^P|^PRN^PH^^^616^9245843|
ORC|RE||V51L2.3^AIRA|||||||I-23432^Burden^Donna^A^^^^^NIST-AA-1||57422^RADON^NICHOLAS^^^^^^NIST-AA-1^L|
RXA|0|1|20180501||21^Varicella^CVX|0.5|mL^milliliters^UCUM||00^Administered^NIP001|||||||Y5841RR||MSD^Merck a
nd Co^MVX||||A|
RXR|SC^^HL70162|RA^^HL70163|
```

Submit Example

MESSAGE ACK

```
MSH|^~\&|MQE Message Hub App|MQE Facility||1255-60-20|20180505160918-0700||ACK^V04^ACK|20180505160918-0700.1|P|2.5.1|
||NE|NE|||||Z23^CDCPHINVS|
MSA|AE|3WzJ-A.01.01.2aF|
ERR||RXA^1^3^1|0^Message accepted^HL70357|W|3^Illogical Value error^HL70533^MQE0258^Vaccination admin date is before
or after when expected for patient age^L|||Vaccination admin date is before or after when expected for patient age nu
ll|
ERR|||101^Required field missing^HL70357|I|4^Invalid value^HL70533^MQE0542^Vaccination VIS is missing^L|||Vaccination
 VIS is missing null|
```

MQE EVALUATION

File Input Page

The stand-alone application allows users to load single files, batched files, or zip files containing multiple messages to the interface. The resulting message evaluation data is stored in an internal database that the user has access to whenever the application is running. Select File Input from the Menu to be able to add new messages for evaluation.

File Upload

Choose File   no file selected   Submit

From this page, click the "Choose File" button to browse for a file you want to evaluate. After the file is selected, click the "Submit" button to run the report. You will see a progress bar that indicates the status of the file being processed. The larger the file, the longer it takes. When the file is completely processed, the status bar will indicate 100%, and the ACK button will be displayed (that will allow you to download a corresponding

ACK for each message that was processed), as will a trash can icon that will allow you to discard the Acks when they are no longer needed.

File Upload

| SmallFile_10messages.txt | 10 messages | 100 % | ⬇ Acks | 🗑 |

| Choose File no file selected | Submit |

Click the download Acks button to download a batched text file containing all of the Acks from the file you uploaded. If you have uploaded a large file, you do not need to wait for the file to finish loading before you interact with the MQE Tool. You cannot download or trash the Ack file until the upload is completed. After processing one or more files, navigate back to the Dashboard to view reports.

Site-Specific Reports

After messages have been loaded into the system, users must select which site they want to see the reports for. To expose a list of sites that have submitted data, click into the Site field. If more than one site is listed, select the site you are interested in evaluating.

Site:

Type a pin or name to find a Provider

MB3.1^Michelle's Clinic
Unspecified

You will now see a "heatmap"[5] indicating the message date(s) included in the file(s) submitted for that provider. You can also change providers from this page by clearing the selected provider from the list and selecting a different provider.

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[5] A heatmap is simply a way to display data using color variation to indicate differences in data. In this case, lighter colors represent lower volume, and darker colors represent higher volume by day.

MB3.1^Michelle's Clinic

Recent Activity
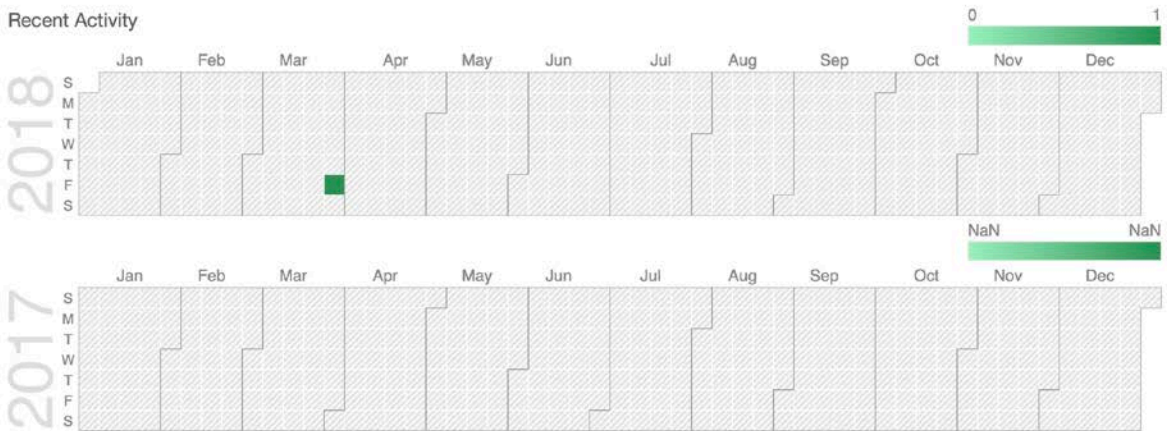
To get information about messages submitted on a particular day, click any highlighted field on the heatmap. You are now shown a summary of all messages evaluated for that provider on that date. From here, you are able to drill down for more information about particular messages that were submitted on that day. You can also navigate through the calendar by clicking the forward and back indicators near the date indicated at the top of the heatmap. To get back to the previous page to select a different date or a different provider, click the "Select Provider" in the upper left corner of the map

‹ Select Provider

Unspecified   ‹ **05 · 30 · 2017** ›
                                                      received date
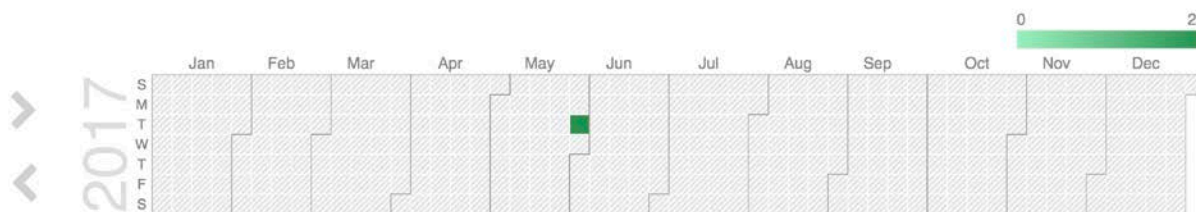
Messages   Errors/Warnings   Codes   Vaccines   Report

Messages (20)

Message Control ID	Patient Name	CVX	Message Received Date	Ack Status
3SUt-F.116.14092.14J	Stark, Alvira	110 (DTaP-Hep B-IPV), 110 (DTaP-Hep B-IPV), 110 (DTaP-Hep B-IPV), 110 (DTaP-Hep B-IPV)	2017-05-30 09:32:54	AE
3SUt-F.116.14091.14L	Ionia, Celina	110 (DTaP-Hep B-IPV), 110 (DTaP-Hep B-IPV), 110 (DTaP-Hep B-IPV)	2017-05-30 09:32:54	AE
3SUt-F.116.14095.14R	Lebanon, Ariene	110 (DTaP-Hep B-IPV), 110 (DTaP-Hep B-IPV), 110 (DTaP-Hep B-IPV), 110 (DTaP-Hep B-IPV)	2017-05-30 09:32:54	AE
3SUt-F.116.14094.14F	Marion, Kimberly	110 (DTaP-Hep B-IPV), 110 (DTaP-Hep B-IPV), 110	2017-05-30 09:32:54	AE

Note the report sections: Messages, Errors/Warnings, Codes, Vaccines, and Report. Each of these hyperlinks exposes a different section of the report[6]. In addition, the Message Control ID for each evaluated message is a hyperlink that will allow you to drill down to the specifics for that individual message. Each of these will be described below.

Messages

There are a number of reasons a user may want to dig into the details of any individual message. This provides access to both the original message as well as the ACK, allows the user to search for specific issues within the message, and clearly identifies issues within the message. This will be explored in detail below, but from this page, you can see a list of patients, the CVX codes included in that patient's message, as well as when that message was received.

Errors/Warnings

This section of the report provides a summary of errors, warnings, or informational detections in the messages processed on that day.

| Messages | Errors/Warnings | Codes | Vaccines | Report |

DETECTIONS

Errors

Count	Issue	Code	Location

Warnings

Count	Issue	Code	Location
20	Patient address is invalid	MQE0562	PID-11

Codes

This section of the report displays a count of valid and invalid codes evaluated in each message.

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[6] While not all fields present in a VXU message are evaluated, the MQE Tool was built to evaluate those components deemed important by the IIS community. For more information on which elements are evaluated and why, please refer to the MQE Tool Functional Requirements document.

CODES RECEIVED

Address Type

Code	Label	Status	Count
P	Permanent	Valid	40

Patient Ethnicity

Code	Label	Status	Count
2186-5	not Hispanic or Latino	Valid	20

Patient Race

Code	Label	Status	Count
2106-3	White	Valid	16
2054-5	Black or African-American	Valid	4

Patient Sex

Code	Label	Status	Count
F	Female	Valid	20

Person Name Type

Code	Label	Status	Count
L	Legal name	Valid	20

Vaccines
This section of the report displays a summary by age group of vaccines administered.

VACCINES ADMINISTERED

CHILD

Vaccine	Count	Percent
Polio	8	40%

BABY

Vaccine	Count	Percent
Polio	44	220%

Report

The final tab indicates the overall summary report score for the messages received on that day. The weighting of each element evaluated was determined by the MQE developers and is meant to provide the user with a measure of the quality of the data received. While this scoring may be configured, it requires manipulation of the source code at this point. Future releases will allow users to set their own thresholds for various components.

Messages   Errors/Warnings   Codes   Vaccines   Report

REPORT - SCORE: 514/541

COMPLETENESS

Completeness measures how many required, expected and recommended fields have been received and also indicates if expected vaccinations have been reported.

Score

Completeness Score	Description
514/541	Good

Patient

Patient Fields	HL7 Field	Score	Value Present
Overall		272/292	
Patient Id		30 / 30	20 / 20
First Name		20 / 20	20 / 20
Last Name		20 / 20	20 / 20
Birth Date		20 / 20	20 / 20
Sex		20 / 20	20 / 20
Complete Address		0 / 20	20 / 20
	INVALID	-20	20 / 20
Street		20 / 20	20 / 20

Individual Message Review

There are a number of reasons a user may want to dig into the details of any individual message. This provides access to both the original message as well as the ACK, allows the user to search for specific issues within the message, and clearly identifies issues within the message. To view details of an individual message, click on one of the Message Control ID hyperlinks.

The Message Information section at the top of the page provides the same information as is provided on the previous page but only for this message. Below that are any errors, warnings, or informational detections for this individual message. This screen also displays the entire message and response in native HL7 for review. Though this information is static, the Message Received section does provide additional location information when any of the elements are selected.

Beneath the Message Received section, the user is presented with an additional way to interact with the message as well as specific location information about the message. This allows the user to search for specific locations within the message that might not

be easy to spot for users less familiar with HL7. You can see in the examples above and below that if a specific location is selected in the Message Received it is also selected in the parsed message below. Similarly, when an element is selected from the parsed message below, it is highlighted in the Message Received above.

Message Received

```
MSH|^~\&|||||20170530103254-0600||VXU^V04^VXU_V04|3SUt-F.116.14093.14H|P|2.5.1|
PID|||SUt-F.116.14093^^^AIRA-TEST^MR||Brikke^Kaede^Buffy^^^^L|Johnson^Avanti|20090809|F||2106-3^White^CDCREC|370 Wrigley Ave^^Luna Pie
r^MI^48157^USA^P||^PRN^PH^^^734^7785249|||||||||2186-5^not Hispanic or Latino^CDCREC|
NK1|1|Sherman^Avanti^^^^^L|MTH^Mother^HL70063|370 Wrigley Ave^^Luna Pier^MI^48157^USA^P|^PRN^PH^^^734^7785249|
ORC|RE||111382^TCH-FT|
RXA|0|1|20091009||110^DTaP-Hep B-IPV^CVX|999|||01^Historical^NIP001|
ORC|RE||111383^TCH-FT|
RXA|0|1|20091209||110^DTaP-Hep B-IPV^CVX|999|||01^Historical^NIP001|
ORC|RE||111384^TCH-FT|
RXA|0|1|20100409||110^DTaP-Hep B-IPV^CVX|999|||01^Historical^NIP001|
ORC|RE||111385^TCH-FT|
RXA|0|1|20101005||110^DTaP-Hep B-IPV^CVX|999|||01^Historical^NIP001|
```

Find in message:

type / click message

	Value	Segment	Location	Field Repetition	Location Description
MSH	NK1	2	NK1-0	1	Next of Kin / Associated Parties
PID	1	2	NK1-1	1	Set ID - NK1
NK1	Sherman	2	NK1-2-1-1	1	Name - Family Name - Surname
ORC	Avanti	2	NK1-2-2	1	Name - Given Name
RXA	L	2	NK1-2-7	1	Name - Name Type Code
ORC	MTH	2	NK1-3-1	1	Relationship - Identifier
RXA	Mother	2	NK1-3-2	1	Relationship - Text
ORC	HL70063	2	NK1-3-3	1	Relationship - Name of Coding System
RXA	**370 Wrigley Ave**	**2**	**NK1-4-1-1**	**1**	**Address - Street Address - Street or Mailing Address**
ORC	Luna Pier	2	NK1-4-3	1	Address - City
RXA	MI	2	NK1-4-4	1	Address - State or Province
	48157	2	NK1-4-5	1	Address - Zip or Postal Code
	USA	2	NK1-4-6	1	Address - Country

An additional feature allows the user to select for a specific element (PID-11), subcomponent (NK1-4-1-1), data type (address), or value (DTaP) by entering text into the "Find in message" field. As data are entered, the available results dynamically filter until the user finds the element they are looking for.

Find in message:

Add

Value	Segment	Location	Field Repetition	Location Description
370 Wrigley Ave	1	PID-11-1-1	1	Patient Address - Street Address - Street or Mailing Address
Luna Pier	1	PID-11-3	1	Patient Address - City
MI	1	PID-11-4	1	Patient Address - State or Province
48157	1	PID-11-5	1	Patient Address - Zip or Postal Code
USA	1	PID-11-6	1	Patient Address - Country
P	1	PID-11-7	1	Patient Address - Address Type
370 Wrigley Ave	2	NK1-4-1-1	1	Address - Street Address - Street or Mailing Address
Luna Pier	2	NK1-4-3	1	Address - City
MI	2	NK1-4-4	1	Address - State or Province
48157	2	NK1-4-5	1	Address - Zip or Postal Code
USA	2	NK1-4-6	1	Address - Country
P	2	NK1-4-7	1	Address - Address Type

MSH
PID
NK1
ORC
RXA
ORC
RXA
ORC
RXA
ORC
RXA

Closing

The application will continue to be available through a browser as long as it is running in the background. Data processed through the MQE will be available via browser indefinitely, provided the application is running and there is adequate storage. In stand-alone implementations, users will likely need this application in an ad hoc fashion only. These steps will ensure that users have access to the application and the data following a reboot, etc. Simply close the web browser to leave the application. If the system is not responding when you relaunch the browser, simply restart the application by double-clicking the .bat file.