Integrating Existing Tools to Monitor HL7 Message Quality

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Agenda

- Background
  - Motivation
  - Michigan landscape
- Describe Existing tools
- Describe Plan
- Pilot results

Goals

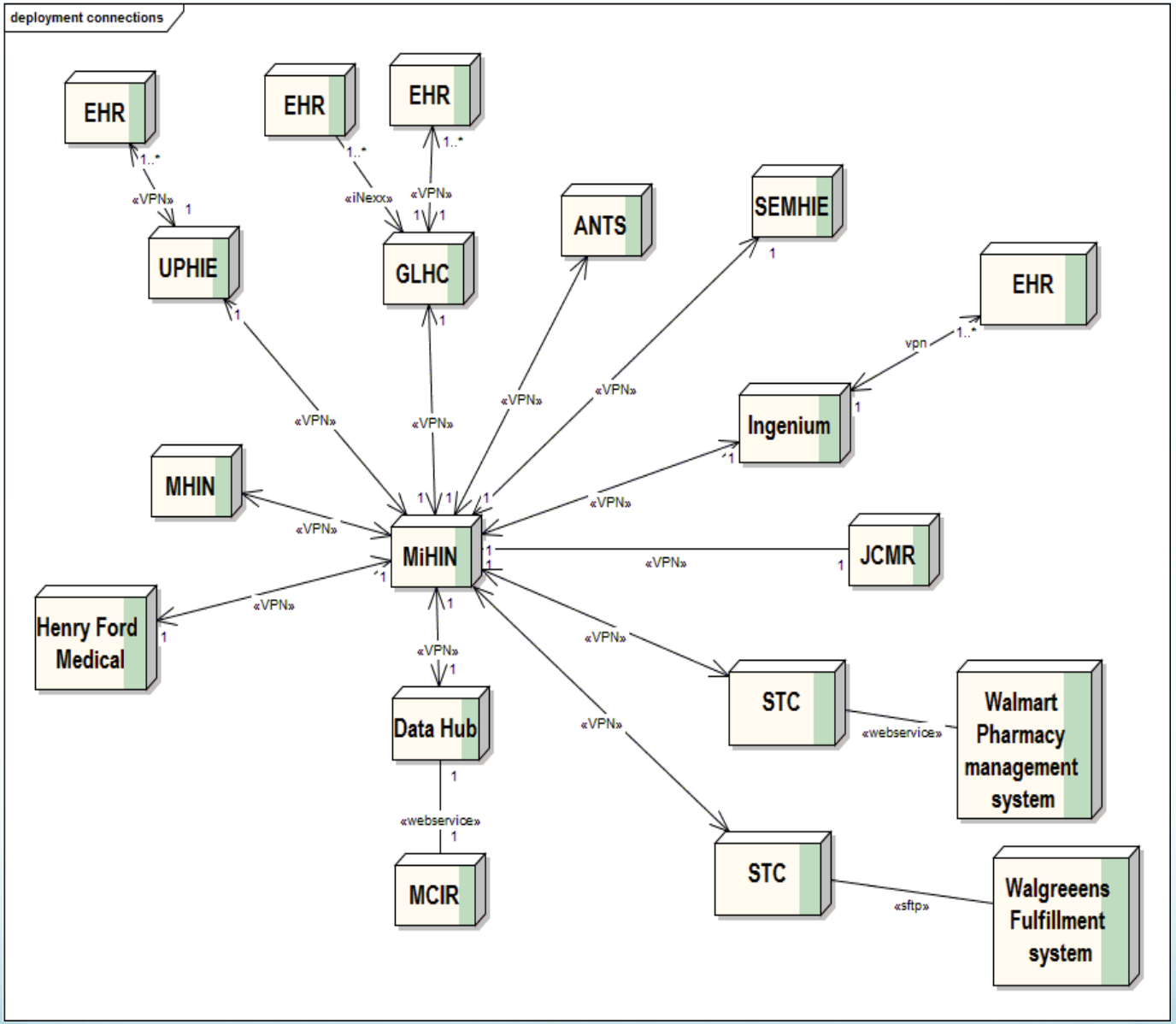
- Robust, timely message evaluation tool for HL7 V2 messages
- Utilize profiles to test messages (QBP/RSP/VXU/ACK)
- Minimize new development/Reuse existing tools
- Results available for both line item and aggregate analysis
- Ability to add business rule testing evaluation and analysis

Motivation

- Thousands of messages per day
- Small changes at sender can cause new messaging issues
- Automated monitoring will facilitate problem identification and resolution
- Storage of evaluation results can support analysis

Michigan Landscape

- MCIR
  - Numbers
    - 9,529,286 Clients as of 12/31/15
    - 6,835,226 immunizations administered in 2015
    - 8,206,989 immunization reported in 2015
    - 4,701 Active Providers
    - 2,139 Providers sending HL7 messages
    - 6,945,186 HL7 messages received in 2015
  - HL7 Version 2.5.1, Release 1.4
  - Beginning to on-board QBP/RSP


deployment connections
EHR
EHR
EHR
UPHIE
GLHC
ANTS
SEMHIE
EHR
Ingenium
MHIN
MiHIN
JCMR
Henry Ford Medical
Data Hub
STC
Walmart Pharmacy management system
MCIR
STC
Walgreeens Fulfillment system
«VPN»
«iNexx»
vpn
«webservice»
«sftp»
1
1..*

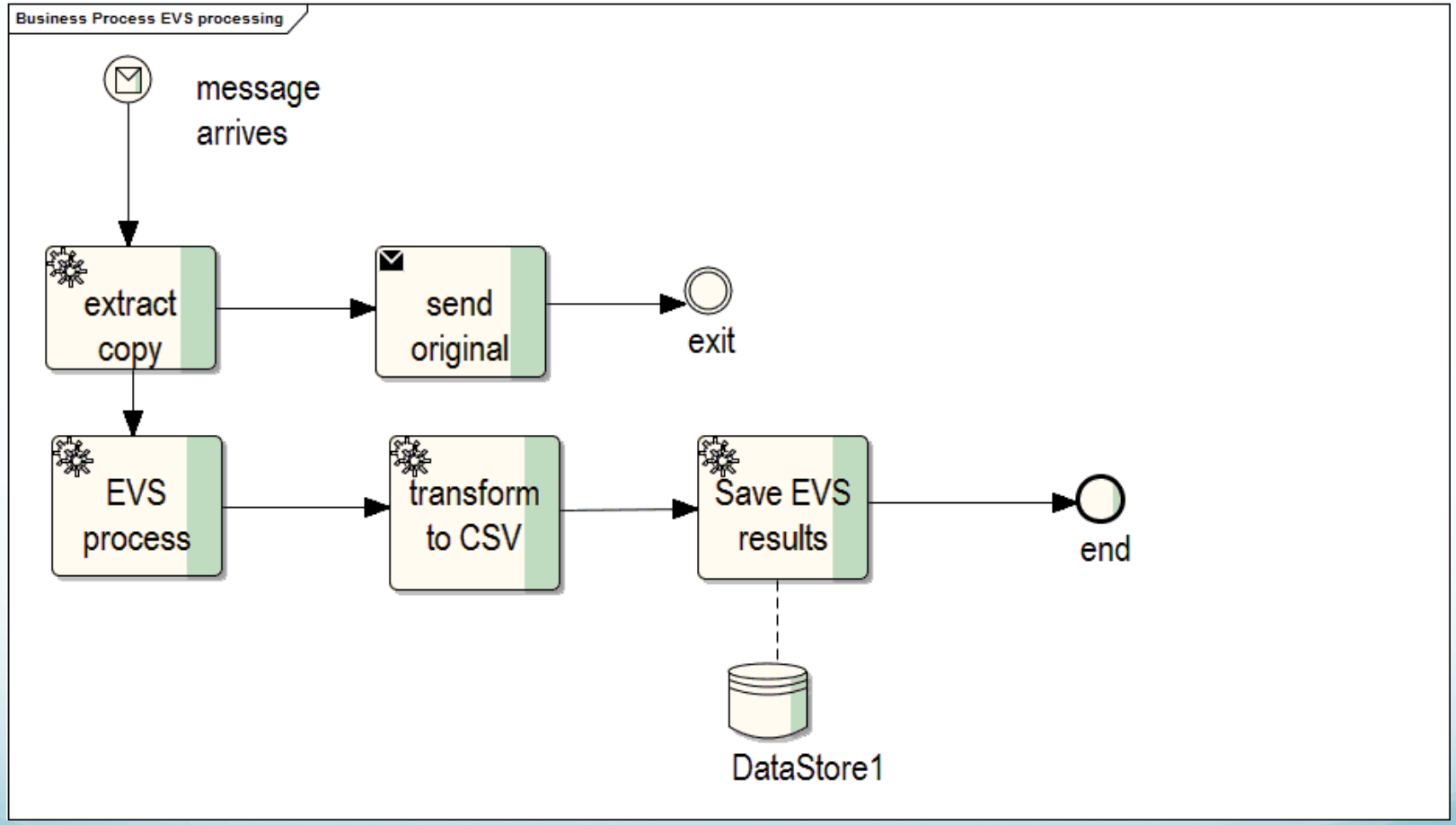
Existing tools

- External Validation Service (EVS)
  - Evaluates message against a profile
  - Created by NIST to support ONC certification
  - Modified to support local use
  - Includes DQA functionality
- Data Quality Assessment (DQA) tool
  - Created by Nathan Bunker and integrated into EVS
- Reporting tools
  - SAS to prototype reports

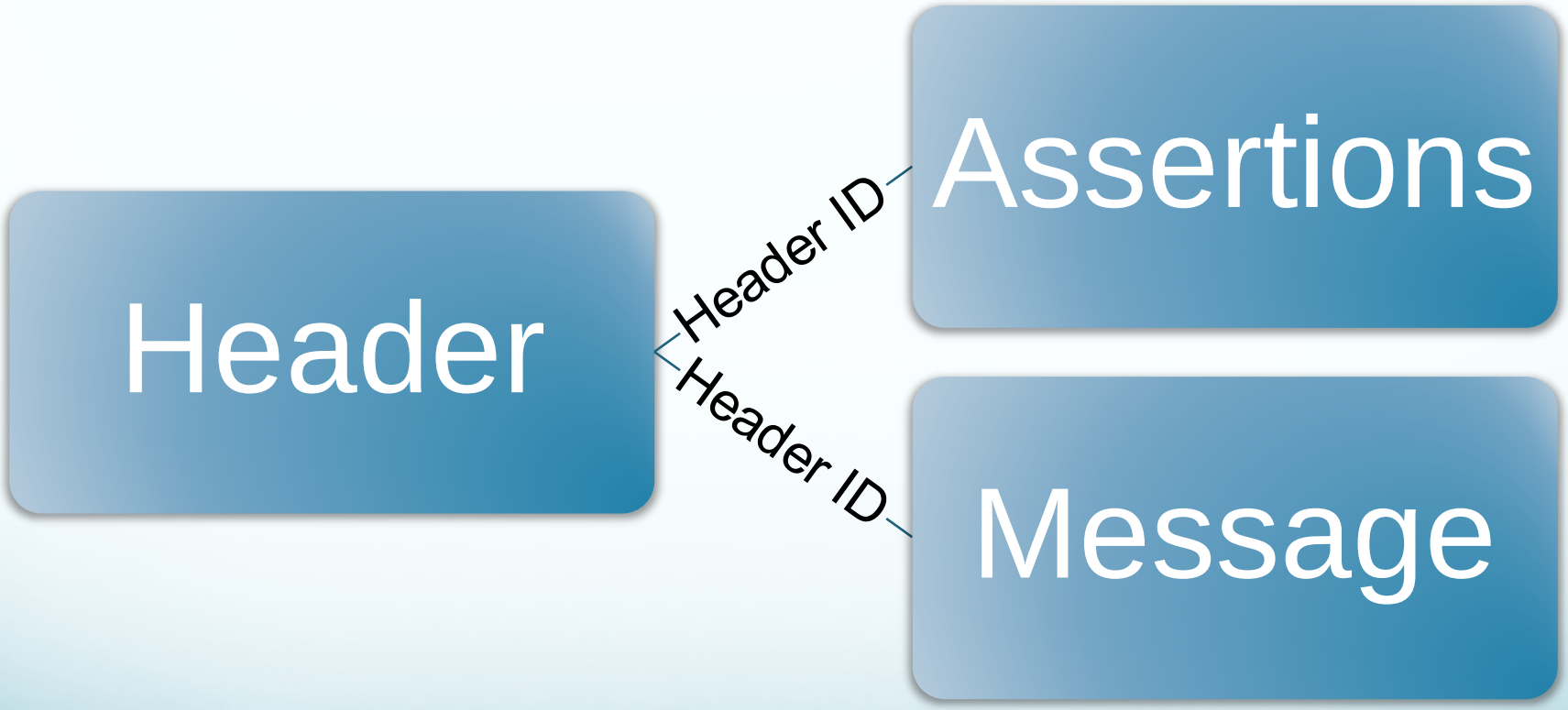
EVS Should Live at MDHHS Data Hub

- VXU message passed to MCIR which parses
- QBP message parsed by MDHHS Data Hub and sent via web call to MCIR
- MDHHS Data Hub logs messages (in and out)
- MDHHS Data Hub accepts other V2 messages and EVS can be applied to any V2 profile definition to test

Business Process --EVS Tool



Report Data Table



Header Table

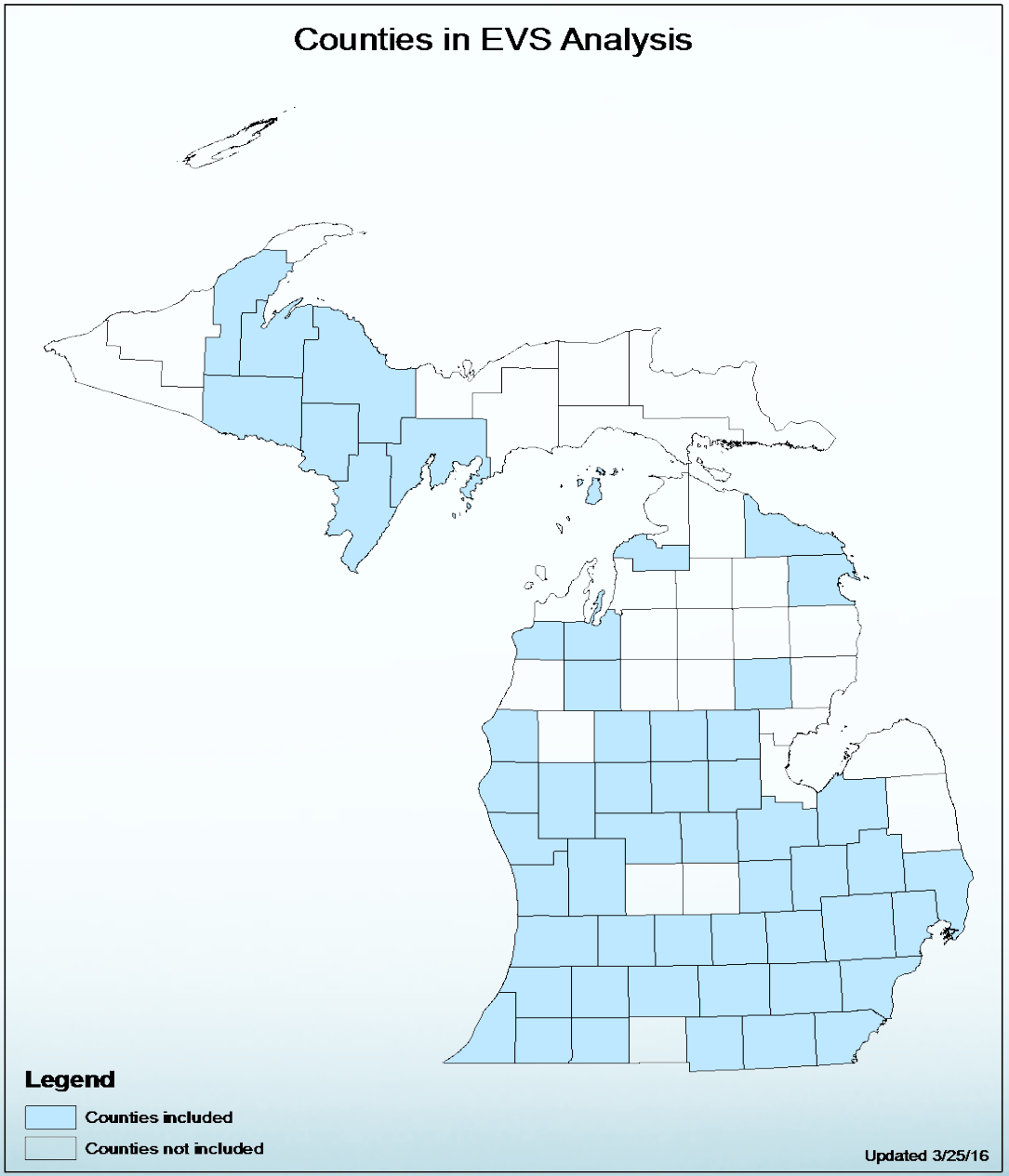
Element	Description
Header ID	Unique key
Send date/time	MSH-7
Affirmative Count	Provides a positive confirmation to an validation assertion
Error Count	Message errors (e.g. bad data in required element)
Warning Count	Warning that message component not compliant, but not required.
Alert Count	
Profile ID used	Profile ID used to evaluate message conformance
Sending profile ID	MSH-21
Sender	MSH-4

Assertion Table

Element	Description
Header ID	Foreign key to Header table. Groups by message
Assertion ID	Unique key for assertion record
Assertion type	Category of assertion
Segment number	Message segment number
Column number	Column in segment
Location path	Identifier of element linked to this assertion
Text description	Human readable description of problem

Pilot

- Routed 975 messages logged at MCIR through EVS
  - Converted report to CSV format
  - Analyzed with SAS
- Working with NIST to improve process and data output
- EVS based on release 1.5 and messages on MCIR rules and release 1.4


Counties in EVS Analysis
Legend
Counties included
Counties not included
Updated 3/25/16

Header Results—Counts per Message

Label	Mean	Minimum	Maximum
Affirmative Count	105	35	715
Error Count	29	10	178
Warning Count	21	11	137
Information count	0	0	0
Alert Count	12	8	60

Mean Header Counts by QO

Label	HIE A	HIE B	HIE C	HIE D	MiHIN
N	650	78	78	51	195
Affirmative Count	96	141	715	187	99
Error Count	28	39	178	35	24
Warning Count	20	26	137	17	22
Information count	0	0	0	0	0
Alert Count	12	11	60	21	11

N = 975

MiHIN includes several QO which Connect directly to MiHIN

Assertion Location Counts

Error Path	Alert	Error	Warning	Total
MSH[1]-7.1 (date/time of message)	0	950	0	950
MSH[1]-9.3 (Message type)	0	255	0	255
OBX	0	278	0	278
PID[1]-6[1].7 (DOB)	0	974	0	0
RXA[15]-9[1].9 (admin note)	0	5	0	5
RXR[1]	0	0	341	341

Error Examples

Location	EVS Description	Example
MSH[1]-9.3 (Message type)	The required Component MSH-9.3 (Message Structure) is missing	|VXU^V04|
MSH[1]-7.1 (date/time of message)	IZ-TS_Z - The value of MSH-7.1 (Time) SHALL be formatted with YYYYMMDDHHMMSS+-ZZZZ.	|201204021604|

Reports to Anticipate

- Reports specific to a single provider organization, health system or QO
- Summary reports for problem message elements
- On boarding reports and evaluations

Next Steps

- Automate the process at the MDHHS Data Hub
- Work with NIST to improve and to include DQA assertions
- Use SAS to pilot reports and to support ad hoc reports
- Develop canned reports

Thanks

- Derek Van
- Hannah Jary
- NIST team