

# Rhapsody Development of an Electronic Vital Records FHIR Messaging System

---

Mike Yaskanin  
Sr. Product Manager  
Altarum Institute



# Agenda

---



## Terminology and Processes

An overview of the organizations, formats and exchange methods involved in Vital Records FHIR Modernization



## Implementation Details

A brief look into Altarum's implementation for Death Records FHIR Modernization



## Tools and Resources

A list of meetings and resources to help achieve Vital Records FHIR Modernization



## Questions

# Terminology and Processes

---

An overview of the organizations, formats and exchange methods involved in Vital Records FHIR Modernization



# Organizations

## Organizations

- ▲ NVSS: [National Vital Statistics System](#)
  - ▲ Part of NCHS
  - ▲ Provides data on US births and deaths
  - ▲ [Modernization](#) efforts and [Community of Practice](#) (CoP)
- ▲ NCHS: [National Center for Health Statistics](#)
  - ▲ Part of CDC
  - ▲ Provides US health statistics
  - ▲ Coding for Cause of Death, Demographics
- ▲ NIOSH: [National Institute for Occupational Safety and Health](#)
  - ▲ Part of CDC
  - ▲ Coding for Industry and Occupation, sends to NCHS
- ▲ STEVE: [State and Territorial Exchange of Vital Events](#)
  - ▲ Part of [National Association for Public Health Statistics and Information Systems](#) (NAPHSIS)
  - ▲ Federal (NCHS) and interjurisdictional vital records message exchange
- ▲ DACEB: Data Acquisition, Classification and Evaluation Branch
  - ▲ Part of NCHS
  - ▲ Runs Pre-Certification and Certification

# Formats & Exchange Methods

## Current - IJE

- ▲ Fixed length format
- ▲ Delivered in batch files via manual upload/download to/from STEVE or automated upload via STEVE Thin Client
- ▲ Message delivery must be researched
- ▲ Current methods:
  - ▲ MOR: Mortality NCHS/Interjurisdictional Exchange (Original, Update, Jurisdictional-Only, Alias, Void)
  - ▲ NAT: Natality NCHS/Interjurisdictional Exchange (Original, Update, Jurisdictional-Only, Void)
  - ▲ FET: Fetal Death NCHS/Interjurisdictional Exchange (Original, Update, Jurisdictional-Only, Alias, Void)
  - ▲ TRX: Mortality Cause of Death Codes
  - ▲ CFD: Fetal Death Cause of Death Codes
  - ▲ MRE: Mortality Race and Ethnicity Codes
  - ▲ NRE: Natality Race and Ethnicity Codes
  - ▲ FRE: Fetal Death Race and Ethnicity Codes
  - ▲ MIO: Industry and Occupation Codes\*

## Modern – FHIR

- ▲ JSON format
- ▲ Delivered automatically in near real-time via API
- ▲ Automatically generated acknowledgements
- ▲ New (“modern”) methods:
  - ▲ VRDR: [Vital Records Death Reporting](#) FHIR IG
    - ▲ Death record submission (Original, Update, Alias, Void, Jurisdictional-Only)
    - ▲ CCOD: Coded Cause of Death Content (~ TRX)
    - ▲ BRE: Coded Demographic Content (~ MRE)
  - ▲ BFDR: [Birth and Fetal Death Reporting](#) FHIR IG
    - ▲ Birth record submission (Original, Update, Void, Jurisdictional-Only)
    - ▲ Fetal Death record submission (Original, Update, Alias, Void, Jurisdictional-Only)
    - ▲ CCOD: Coded Cause of Death Content (~ CFD)
    - ▲ BRE: Coded Demographic Content (~ NRE/FRE)
  - ▲ VRFM: [Vital Records FHIR Messaging](#) FHIR IG
    - ▲ Message transfer scenarios and wrappers
    - ▲ Acknowledgement (ACK), status, and error messages

\* Industry and Occupation Codes are not currently being sent to jurisdictions using FHIR

# Implementation Details

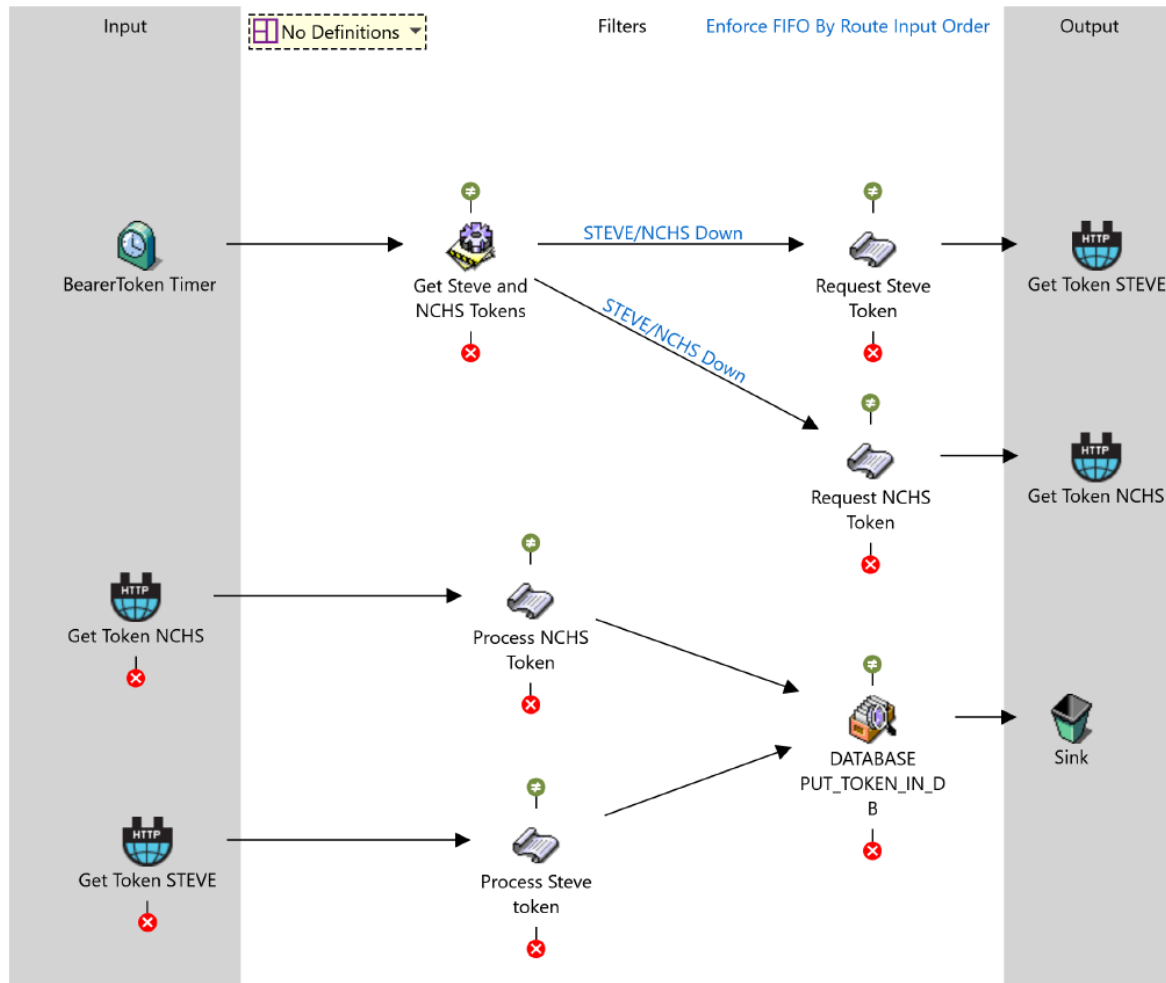
---

A brief look into Altarum's implementation  
for Death Records FHIR Modernization



# What is Rhapsody and Why Use It?

- ▲ Rhapsody is an integration engine from Rhapsody (<https://rhapsody.health>)
- ▲ Swiss Army Knife for integration that supports HL7 v2, v3, CCDA and FHIR standards
- ▲ Many state health departments already use Rhapsody for immunizations, syndromic surveillance, cancer reporting, lab reporting, and communicable disease reports
- ▲ Can serve as a FHIR façade for vital records systems that do not support FHIR
- ▲ Handles tracking of outbound and inbound IJE and FHIR messages



## Rhapsody Route: Bearer Token Management

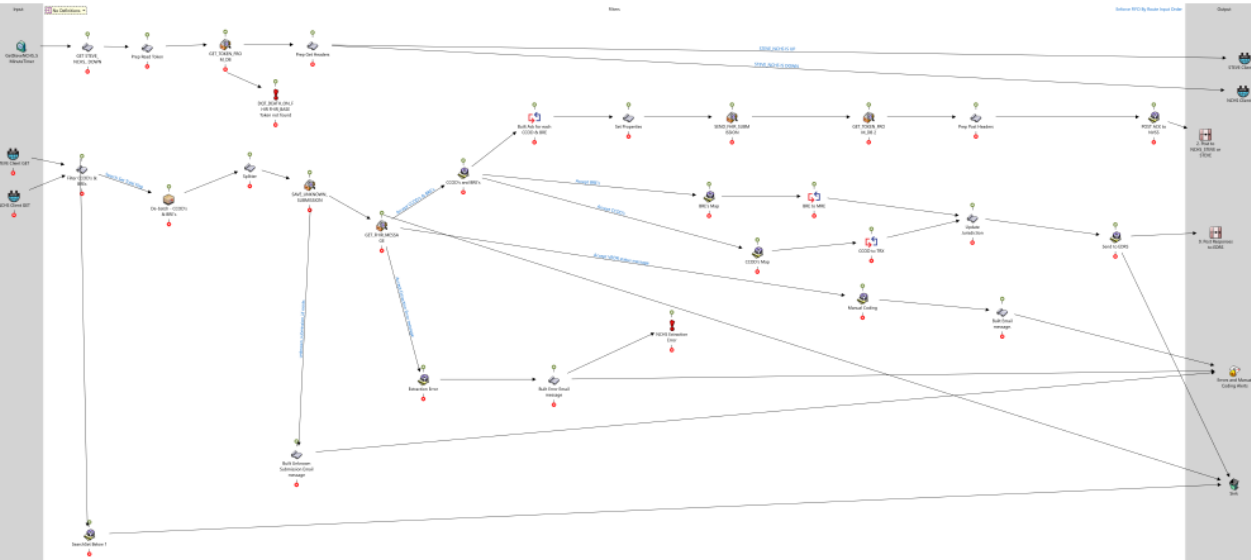
- ▲ Runs on a timer (e.g., every three (3) minutes)
- ▲ Refreshes bearer token for both STEVE and NVSS
- ▲ Stores bearer token values in a database



- ▲ Receives IJE files from EDRS via API, SFTP, or directory folder and saves to database
- ▲ Calculates which type of death message was sent
  - ▲ Original submission
  - ▲ Updated submission
  - ▲ Updated non-NCHS submission (STEVE only)
  - ▲ Alias
  - ▲ Void
- ▲ Maps to correct version of VRDR and VRFM FHIR message
- ▲ Gets current bearer token from database
- ▲ Sends to STEVE or NCHS depending on Rhapsody variable
- ▲ Saves FHIR message and response code to database
- ▲ Resends five (5) times in case of failure, then sends email if there is still a failure
- ▲ Also handles sending of acknowledgement messages from Rhapsody to STEVE/NCHS for CCOD/BRE receipts



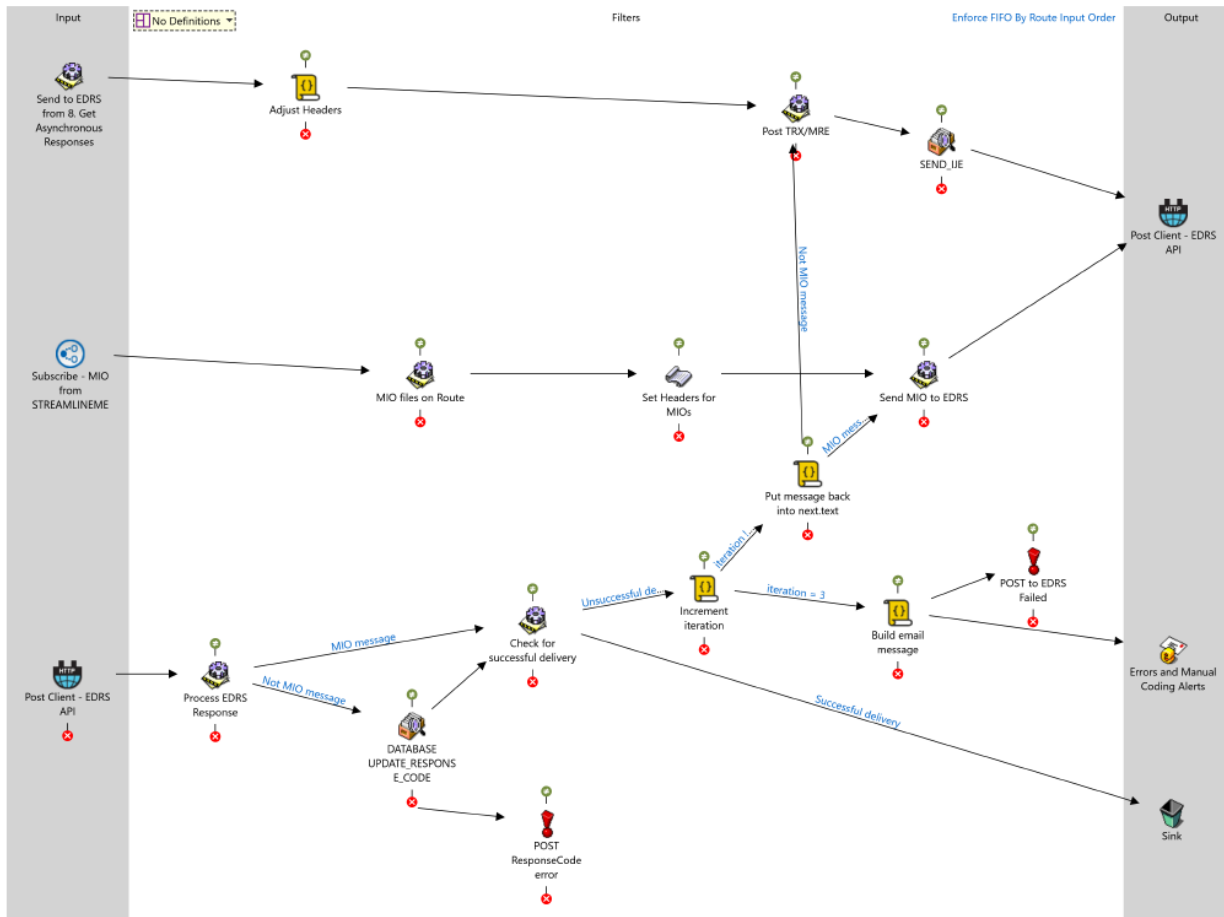
# Rhapsody Route: GET Asynchronous Responses



- ▲ Runs on a timer (e.g., every five (5) minutes)
- ▲ Gets current bearer token from database
- ▲ Gets messages from STEVE or NVSS API queue, depending on Rhapsody variable
- ▲ Saves messages to the database
- ▲ Acts according to type of message:
  - ▲ CCOD: Maps to TRX, sends to EDRS route
  - ▲ BRE: Maps to MRE, sends to EDRS route
  - ▲ Status: Sends email to appropriate group
  - ▲ Error: Sends to Rhapsody error queue, sends email
  - ▲ ACK: No further action needed

# Rhapsody Route: Send to EDRS

- ▲ Puts appropriate headers on TRX and MRE files
- ▲ Sends to EDRS via API, SFTP, database insert, or directory folder
- ▲ Gets response from EDRS API, if applicable, and saves to database
- ▲ If failure, tries three (3) times then sends to error queue and emails
- ▲ Sends legacy MIO messages from STEVE Thin Client, if applicable, to EDRS via designated delivery method



# Death Message Tracking Database

- ▲ Saves original death record submission and each event that happens to that submission
- ▲ Records external URL sent to/received from and response codes
- ▲ Saves full text of messages, which can be viewed in SSMS via the VIEW\_EVENTS view
- ▲ Links related events to each other

EVENT ID	SUBM. ID	UNIQUE IDENTIFIER	EVENT DESCRIPTION	LINKED EVENT_ID	CONTENT_TEXT	CLICK_FOR_FULL_CONTENT	RESP. CODE	CREATED_DATE	CREATED_BY	UPDATED_DATE	UPDATED_BY	EXTERNAL ENDPOINT
133	21	2022M001777	Received UE		2022M0017770	05her		2023-03-17 16:08:13	EDRS			EDRS
134	21	2022M001777	Sent FHIR Death Message		{ "resourceType": "Bundle", "id": "c8", "resourceType": "Bundle", "id": "c8a6f		204	2023-03-17 16:08:14	SEND_FHIR_SUBMISSION	2023-03-17 16:08:15	UPDATE_RESPONSE_CODE	STEVE
139	21	2022M001777	Received Acknowledgement Message	134	{ "resourceType": "Bundle", "id": "35abdd", "resourceType": "Bundle", "id": "35abdd1a			2023-03-17 16:12:16	GET_FHIR_MESSAGE	2023-03-17 16:12:16	GET_FHIR_MESSAGE	STEVE
142	21	2022M001777	Received Cause Of Death Coding Message	134	{ "resourceType": "Bundle", "id": "8da6c2", "resourceType": "Bundle", "id": "8da6c22f			2023-03-17 16:12:16	GET_FHIR_MESSAGE	2023-03-17 16:12:16	GET_FHIR_MESSAGE	STEVE
140	21	2022M001777	Sent Acknowledgement Message	142	{ "resourceType": "Bundle", "id": "90", "resourceType": "Bundle", "id": "90b6c		204	2023-03-17 16:12:16	SEND_FHIR_SUBMISSION	2023-03-17 16:12:18	UPDATE_RESPONSE_CODE	STEVE
141	21	2022M001777	Saved TRX .dxf file	142	2022M0017771	44299999999		2023-03-17 16:12:16	SEND_UE			EDRS
150	21	2022M001777	Received Demographics Coding Message	134	{ "resourceType": "Bundle", "id": "760977", "resourceType": "Bundle", "id": "7609773f			2023-03-18 08:17:17	GET_FHIR_MESSAGE	2023-03-18 08:17:17	GET_FHIR_MESSAGE	STEVE
151	21	2022M001777	Sent Acknowledgement Message	150	{ "resourceType": "Bundle", "id": "e5", "resourceType": "Bundle", "id": "e56c		204	2023-03-18 08:17:17	SEND_FHIR_SUBMISSION	2023-03-18 08:17:18	UPDATE_RESPONSE_CODE	STEVE
149	21	2022M001777	Saved MRE .dxf file	150	2022M001777	NNNN		2023-03-18 08:17:17	SEND_UE			EDRS

# Tools and Resources

---

A list of meetings and resources to help achieve Vital Records FHIR Modernization



# Tools and Resources

## FHIR IGs and Related Documents

- ▲ [VRDR IG 2.2.0 STU 2.2](#)
  - ▲ Based on [FHIR R4.0.1](#)
- ▲ [BFDR IG 2.0.0 STU 2](#)
  - ▲ Based on [FHIR R4.0.1](#)
- ▲ [VRFM IG 1.0.1](#)
  - ▲ Based on [FHIR R4.0.1](#)
  - ▲ Supports exchange of death records
- ▲ [VRFM IG 2.0.0-Preview5](#)
  - ▲ Based on [FHIR R4.0.1](#)
  - ▲ Adds support for exchange of birth and fetal death records
- ▲ [IJE to FHIR conversion](#)
- ▲ [Nightingale Project](#)

## NVSS Resources

- ▲ [NVSS Modernization Community of Practice](#)
  - ▲ Need SAMS login
  - ▲ Email [NVSSModernization@cdc.gov](mailto:NVSSModernization@cdc.gov) for access
- ▲ [NVSS Modernization COP Offerings](#)
- ▲ [NVSS Modernization Tool Kit](#)
- ▲ [NVSS Newsletters](#)
- ▲ [Zulip Death on FHIR Chat](#)
- ▲ [Canary Testing Framework](#)
- ▲ [Canary on CDC](#)

## NVSS COP Meetings

- ▲ Weekly office hours every Tuesday
- ▲ Monthly COP call on the 3rd Wednesday of every month
- ▲ Technical Subgroup call on the 4th Wednesday of every month
- ▲ Email [NVSSModernization@cdc.gov](mailto:NVSSModernization@cdc.gov) for invitations





## Altarum can help!

Altarum has implemented Michigan, Colorado and North Dakota for IJE to FHIR Death Messaging and we have been awarded a contract with Wisconsin to implement Death, Birth and Fetal Death.

Altarum partners with jurisdictions to navigate the testing and go-live process:

- Participate in and work through the NVSS testing events
- Conduct pre-certification and certification testing
- Work with state IT to implement the solution in production
- Work with state staff to validate the solution in production
- Provide support to ensure solution is working as expected

# Thank You!

## Questions?

### Contacts:

Mike Yaskanin, Public Health Systems Sr. Product Manager  
[michael.yaskanin@altarum.org](mailto:michael.yaskanin@altarum.org)

Robert Breig, Public Health Systems Product Director  
[robert.breig@altarum.org](mailto:robert.breig@altarum.org)

