

Leveraging FHIR for IIS Bulk Data and Modernization

CDC-ONC Industry Days
Public Health Data Modernization
February 28, 2023

Agenda

- Background:
 - IIS
 - FHIR
- FHIR and IIS – Bulk FHIR
- Rhode Island IIS Implementation
- Helios FHIR Accelerator for Public Health
- Leveraging FHIR Bulk Data for Modernization

Background: Immunization Information Systems (IIS)

- ❑ Confidential, population-based systems
- ❑ Collect and consolidate immunization data in a given jurisdiction
- ❑ Provide actionable information for clinical and public health decision making. (Source: CDC)

IIS Background (continued)

- Inbound data exchange:
 - HL7 version 2 Unsolicited Vaccination Update (VXU)
 - Flat file
 - Interactive web applications
- Outbound data exchange:
 - HL7 version 2 Query/Response (QBP/RSP)
 - Flat file (CDC Data Clearinghouse, HEDIS data, etc.)
 - Interactive web applications

FHIR in a Nutshell

- ❑ Fast Healthcare Interoperability Resources (FHIR)
- ❑ Next generation HL7 standard
- ❑ Set of Resources and a modern RESTful API for accessing them
- ❑ FHIR Bulk Data – FHIR-based approach for exporting large amounts of data from a FHIR server
- ❑ SMART on FHIR – health app interface based on FHIR and other open standards

FHIR Server Models

□ FHIR Façade

- Data translation – translate FHIR REST calls to the underlying legacy database or service (no native FHIR storage)
- Intermediate FHIR server – synchronize native FHIR storage to underlying legacy database or service

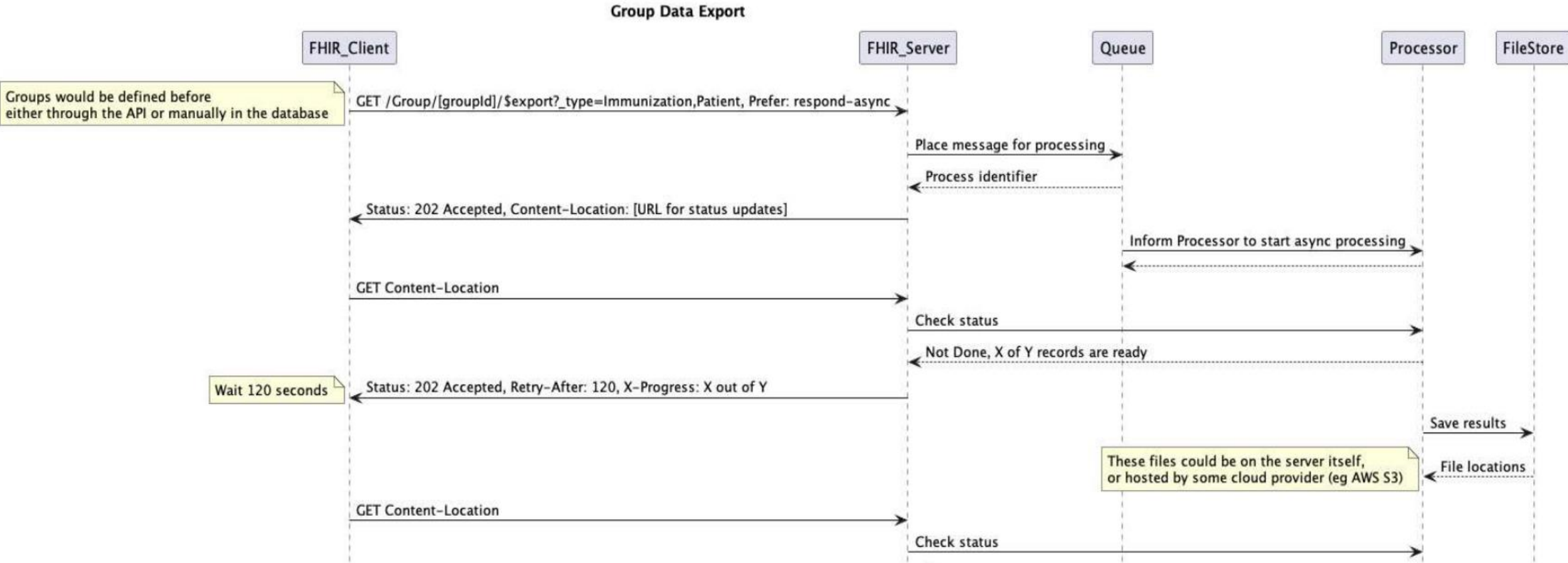
□ Native FHIR server

- FHIR storage is the operational data store

Why FHIR for IIS Data Access?

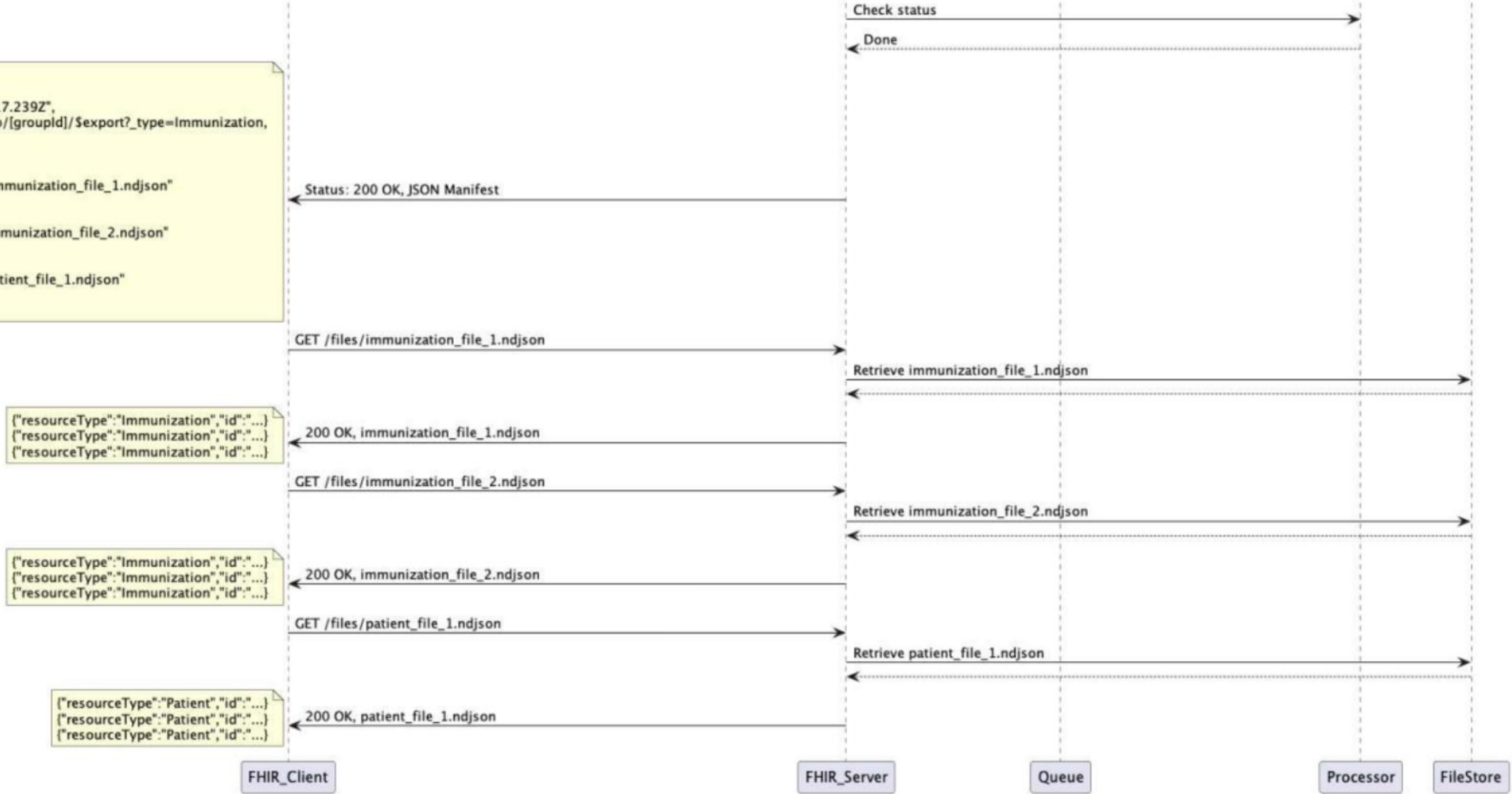
- Accessible to general purpose developers
- Modern APIs, software, tools, resources, and support
- FHIR Bulk Query:
 - Efficiently access up-to-date immunization data
 - Reduce redundant queries
 - Easy to parse bulk data format
 - Flexibility for different use cases: Hospitals, physicians, schools, payers, etc.

Bulk FHIR Workflow for IIS



Bulk FHIR Workflow for IIS (continued)

```
JSON Manifest:  
{  
  "transactionTime": "2020-07-13T13:28:17.239Z",  
  "request": "https://example.com/Group/[groupId]/$export?type=Immunization",  
  "requiresAccessToken": true,  
  "output": [{  
    "type": "Immunization",  
    "url": "https://example.com/files/immunization_file_1.ndjson"  
  }, {  
    "type": "Immunization",  
    "url": "https://example.com/files/immunization_file_2.ndjson"  
  }, {  
    "type": "Patient",  
    "url": "https://example.com/files/patient_file_1.ndjson"  
  }  
}]
```



Rhode Island IIS Implementation

- ❑ Rhode Island Child and Adult Immunization Registry (RICAIR)
- ❑ FHIR Façade Model (with translation layer) using open source HAPI FHIR server
- ❑ Bulk Query:
 - Predefined Groups, or search and define custom groups
 - Query Patient, Immunization, ImmunizationRecommendation, and ImmunizationEvaluation resources
 - Download up to 100k patients or more in a fraction of the time of HL7 v2 QBP/RSP
 - Server has flexibility in scheduling and allocating resources to query

Helios FHIR Accelerator for Public Health

- Part of the **Immunization Integration Program (IIP)** Workgroup – collaborative to improve EHR/IIS interoperability
 - Convening Partners: CDC, AIRA, HIMSS, Drummond & SME Consultants
- **IIS Bulk Data Query - Make Data in Public Health Systems Accessible in Bulk**
 - Leverage bulk FHIR to develop a uniform process for querying IIS data
 - Develop Implementation Guidance & vision for bulk data exchange
 - Test & pilot solutions

HL7 FHIR Connectathon 32

- HL7 Working Group Meeting - January 14-15, 2023
- American Immunization Registry Association (AIRA) & National Institutes of Standards and Technology, MITRE, Envision Technology Partners, HLN & Rhode Island Department of Health, STChealth, Epic, AWS, Intersystems
- Exchanged groups of up to 100,000 patients & immunizations

Now that we have a FHIR server, what else can we do with it?

03/01/2021	ADMINISTERING PRO...	FK0101	DTaP,IPV,Hib,HepB (Vaxelis) ...	GlaxoSmithKline (for...	01/01/2024
03/01/2021	ADMINISTERING PRO...	FK0101	Pneumococcal conjugate PCV...	Merck & Co., Inc.	01/01/2024
05/01/2021	ADMINISTERING PRO...	FK0101	DTaP,IPV,Hib,HepB (Vaxelis) ...	GlaxoSmithKline (for...	01/01/2024
05/01/2021	ADMINISTERING PRO...	FK0101	Pneumococcal conjugate PCV...	Merck & Co., Inc.	10/10/2024
07/01/2021	ADMINISTERING PRO...	FK0101	DTaP,IPV,Hib,HepB (Vaxelis) ...	GlaxoSmithKline (for...	01/01/2024
07/01/2021	ADMINISTERING PRO...	FK0101	Pneumococcal conjugate PCV...	Merck & Co., Inc.	01/01/2024
01/01/2022	ADMINISTERING PRO...	FK0102	Measles, Mumps,Rubella, live ...	Merck & Co., Inc.	01/01/2024

Information

Immunization record added for patient 11468369, MMR given on 1/1/2023
Immunization record added for patient 11468369, MMR given on 1/1/2022

Okay

IIS Web App – FHIR behind the scenes

Name	Headers	Payload	Preview	Response	Initiator	Timing	Cookies
_search?lot-number:exact=FK0102&_sort=-expiration-...							
_search?lot-number:exact=FK0102&_sort=-expiration-...							
_search?lot-number:exact=FK0102&_sort=-expiration-...							
_search?lot-number:exact=FK0102&_sort=-expiration-...							
fhir/							
11468369							
_search?patient=Patient/11468369&_sort=date							
ValueSet							
_search?type=prov&_count=1000							
_search?type=bus&_count=1000							

Request Payload view source

```
{resourceType: "Bundle", type: "batch", total: 2,...}
  entry: [{request: {url: "Immunization?updateProvider=false", method: "POST"},...},...]
    0: {request: {url: "Immunization?updateProvider=false", method: "POST"},...}
      request: {url: "Immunization?updateProvider=false", method: "POST"}
        method: "POST"
        url: "Immunization?updateProvider=false"
      resource: {resourceType: "Immunization", status: "completed", id: "11468369.03.2023-01-01",...}
        doseQuantity: {system: "http://unitsofmeasure.org", unit: "mL", value: 0.5}
          system: "http://unitsofmeasure.org"
          unit: "mL"
          value: 0.5
        expirationDate: "2024-01-01"
        extension: [{url: "https://health.ri.gov/immunization-source-of-update", valueString: "01"}]
          0: {url: "https://health.ri.gov/immunization-source-of-update", valueString: "01"}
            url: "https://health.ri.gov/immunization-source-of-update"
            valueString: "01"
          id: "11468369.03.2023-01-01"
          lotNumber: "FK0102"
        manufacturer: {type: "Organization", reference: "MSD", display: "Merck & Co., Inc."}
          display: "Merck & Co., Inc."
```

Leveraging FHIR Bulk Data for DMI

- FHIR Server for IIS can double as an application modernization strategy
- Replace legacy web applications with modern front-ends that communicate with the FHIR back-end:
 - Immunization Data Entry/Update
 - Other potential uses:
 - Immunization Display, Patient Demographics, SMART Health Cards, School Forms, etc.
 - SMART on FHIR apps
 - Consumer apps
 - IIS-to-IIS - IZ Gateway

Questions?

- Mike Berry
berrym@hln.com