Public Health on FHIR

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HLN Consulting
Innovators in Health Informatics

Public Health Informatics Consulting Company

We help public health solve informatics problems

Founded in 1997

Academic heritage

Unique combination of strategic and tactical projects

Partnership approach with clients leveraging Agile methodologies

Engagement in IIS, eCR, Helios, DMI, PHIG, TEFCA, USCDI+ activities

Thanks to:

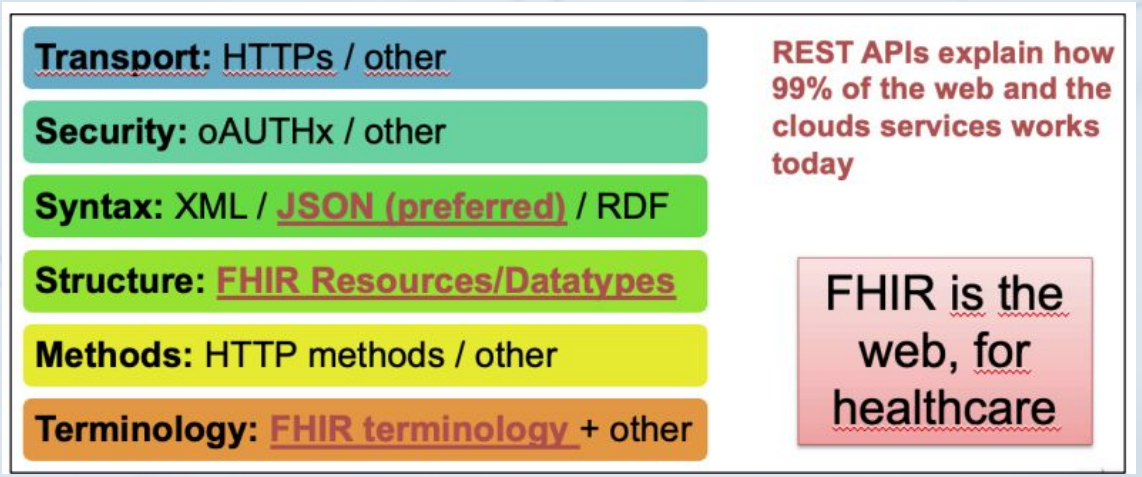
- Minnesota Department of Health
- Hennepin County, MN
- Craig Newman, Forrest White and Sujata Malik, program managers of the Helios activities
- Rhode Island department of Health
- Mike Berry, HLN

Agenda

- Overview of what FHIR is
- Discussion about why public health should be on FHIR
- Examples of a few ongoing FHIR projects in public health
- Knowledge sharing

What is FHIR in a Nutshell

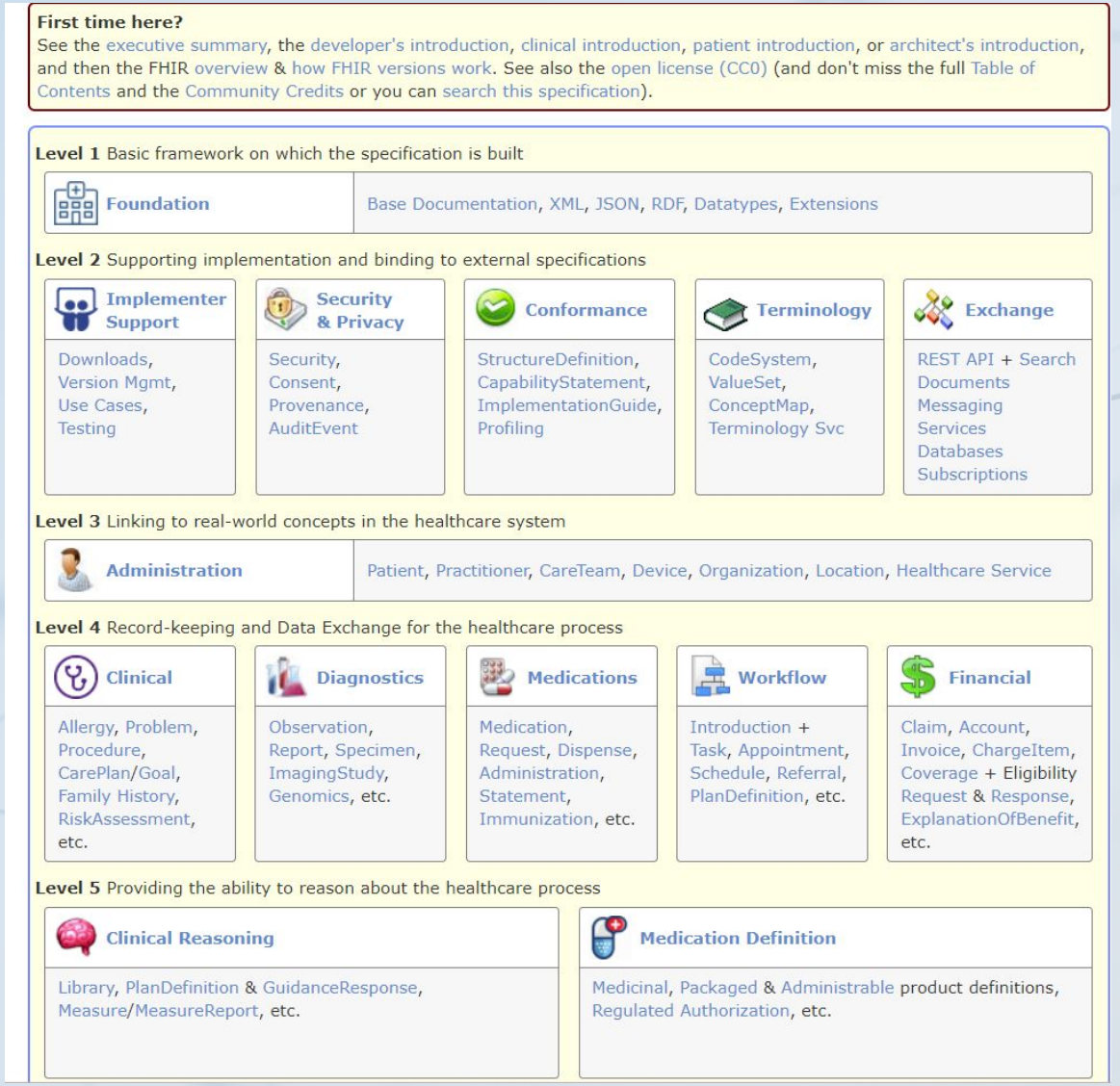
- Fast Healthcare Interoperability Resources
- The scope of FHIR includes all aspects of healthcare related interoperability, clinical care, administration, research etc.
- Set of Resources and a modern RESTful API for accessing them
- Next generation HL7 standard
  - Introduced in 2010 – fairly new with broad uptake



Source: Introduction to FHIR training, FHIR.org

Structure

- FHIR data is organized into resources



First time here?
See the executive summary, the developer's introduction, clinical introduction, patient introduction, or architect's introduction, and then the FHIR overview & how FHIR versions work. See also the open license (CC0) (and don't miss the full Table of Contents and the Community Credits or you can search this specification).

Level 1 Basic framework on which the specification is built

Foundation	Base Documentation, XML, JSON, RDF, Datatypes, Extensions

Level 2 Supporting implementation and binding to external specifications

Implementer Support	Security & Privacy	Conformance	Terminology	Exchange
Downloads, Version Mgmt, Use Cases, Testing	Security, Consent, Provenance, AuditEvent	StructureDefinition, CapabilityStatement, ImplementationGuide, Profiling	CodeSystem, ValueSet, ConceptMap, Terminology Svc	REST API + Search Documents Messaging Services Databases Subscriptions

Level 3 Linking to real-world concepts in the healthcare system

Administration	Patient, Practitioner, CareTeam, Device, Organization, Location, Healthcare Service

Level 4 Record-keeping and Data Exchange for the healthcare process

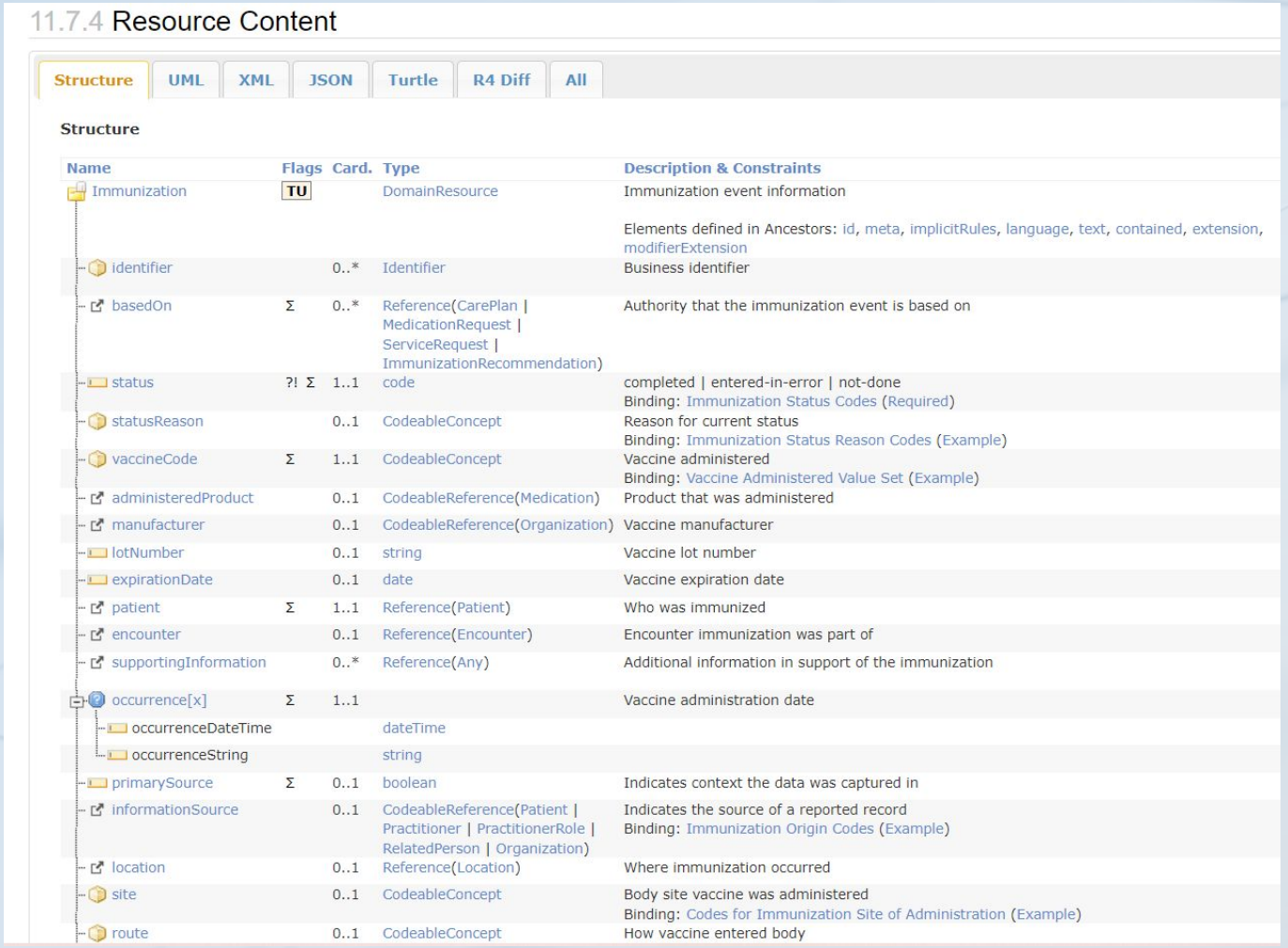
Clinical	Diagnostics	Medications	Workflow	Financial
Allergy, Problem, Procedure, CarePlan/Goal, Family History, RiskAssessment, etc.	Observation, Report, Specimen, ImagingStudy, Genomics, etc.	Medication, Request, Dispense, Administration, Statement, Immunization, etc.	Introduction + Task, Appointment, Schedule, Referral, PlanDefinition, etc.	Claim, Account, Invoice, ChargeItem, Coverage + Eligibility Request & Response, ExplanationOfBenefit, etc.

Level 5 Providing the ability to reason about the healthcare process

Clinical Reasoning	Medication Definition
Library, PlanDefinition & GuidanceResponse, Measure/MeasureReport, etc.	Medicinal, Packaged & Administrable product definitions, Regulated Authorization, etc.

Source: http://hl7.org/fhir

Example of a resource: Immunization



11.7.4 Resource Content

Structure | UML | XML | JSON | Turtle | R4 Diff | All

Structure

Name	Flags	Card.	Type	Description & Constraints
Immunization	TU		DomainResource	Immunization event information Elements defined in Ancestors: id, meta, implicitRules, language, text, contained, extension, modifierExtension
identifier		0..*	Identifier	Business identifier
basedOn	Σ	0..*	Reference(CarePlan | MedicationRequest | ServiceRequest | ImmunizationRecommendation)	Authority that the immunization event is based on
status	?! Σ	1..1	code	completed | entered-in-error | not-done Binding: Immunization Status Codes (Required)
statusReason		0..1	CodeableConcept	Reason for current status Binding: Immunization Status Reason Codes (Example)
vaccineCode	Σ	1..1	CodeableConcept	Vaccine administered Binding: Vaccine Administered Value Set (Example)
administeredProduct		0..1	CodeableReference(Medication)	Product that was administered
manufacturer		0..1	CodeableReference(Organization)	Vaccine manufacturer
lotNumber		0..1	string	Vaccine lot number
expirationDate		0..1	date	Vaccine expiration date
patient	Σ	1..1	Reference(Patient)	Who was immunized
encounter		0..1	Reference(Encounter)	Encounter immunization was part of
supportingInformation		0..*	Reference(Any)	Additional information in support of the immunization
occurrence[x]	Σ	1..1		Vaccine administration date
occurrenceDateTime			dateTime	
occurrenceString			string	
primarySource	Σ	0..1	boolean	Indicates context the data was captured in
informationSource		0..1	CodeableReference(Patient | Practitioner | PractitionerRole | RelatedPerson | Organization)	Indicates the source of a reported record Binding: Immunization Origin Codes (Example)
location		0..1	Reference(Location)	Where immunization occurred
site		0..1	CodeableConcept	Body site vaccine was administered Binding: Codes for Immunization Site of Administration (Example)
route		0..1	CodeableConcept	How vaccine entered body

Source: http://hl7.org/fhir

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?

- Increased use of FHIR standards in healthcare -> greater need for adoption of FHIR in Public Health.
- Created by HL7, community driven.
- Created with the intention to be easier to develop and implement than earlier HL7 standards.
- Open standard, while it is developed by HL7 there is no need to be an HL7 member to use it.

FHIR Strengths and Weaknesses

+ Accessible to general purpose developers
+ Modern APIs, software, tools, resources, and support
+ Great for queries and bulk queries
+ Good fit for DMI
+ New and exciting
+ SMART and SMART Authentication
+ Subscriptions

- Strong client/sever model
- Doesn’t replace HL7 V2 unsolicited push very well
- Doesn’t replace CDA very well
- Implementation variations and extended operations
- Access control is complicated.
- USCDI is the min. data set that hosp. is supposed to be able to serve up.
- Not the answer for everything
- Everything is a facade

3 Examples of a few FHIR Projects in Public Health

- Helios
- PHFIC activities in MN
- FHIR IIS activities in Rhode Island

Example 1: Helios: HL7 FHIR Public Health Accelerator

Helping public health to align with and benefit from the widespread standardization and transformation that is happening around digital health data,

- Focusing on impact
- Bring People Together
- Aligning Effort

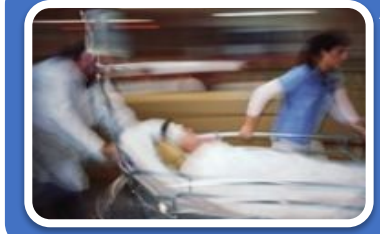
Helios: 2024-Community led priority areas

Deliver Aggregate data to public health

Make data in public health systems accessible in bulk

Public Health Query and Response

Helios: Examples of use cases



Aggregate data:

- ICU Beds reporting.
- ICU Beds Current occupancy.
- ICU Bed staffed capacity.
- Confirmed COVID Patients.

Bulk FHIR

- Efficient access of large volume of information on a group of individuals.
- Designed to support sharing any data that can be represented in FHIR.
- Primary use case is providing immunization data in bulk from jurisdictional immunization registries.

Query and Response

- Obtain demographic and contact info.
- Query EHR for supplemental information (Newborn screening, infectious disease).
- Cancer reporting.

From a participant's perspective: How does this work?

- Calls to discuss the use cases, learn from each other and drill down into the details
- Participating in connectathons to develop solutions and try things out.
- Feedback learnings to the community
- Begin pilot projects with an aim to move to real-world use

Get involved! Everyone is welcome

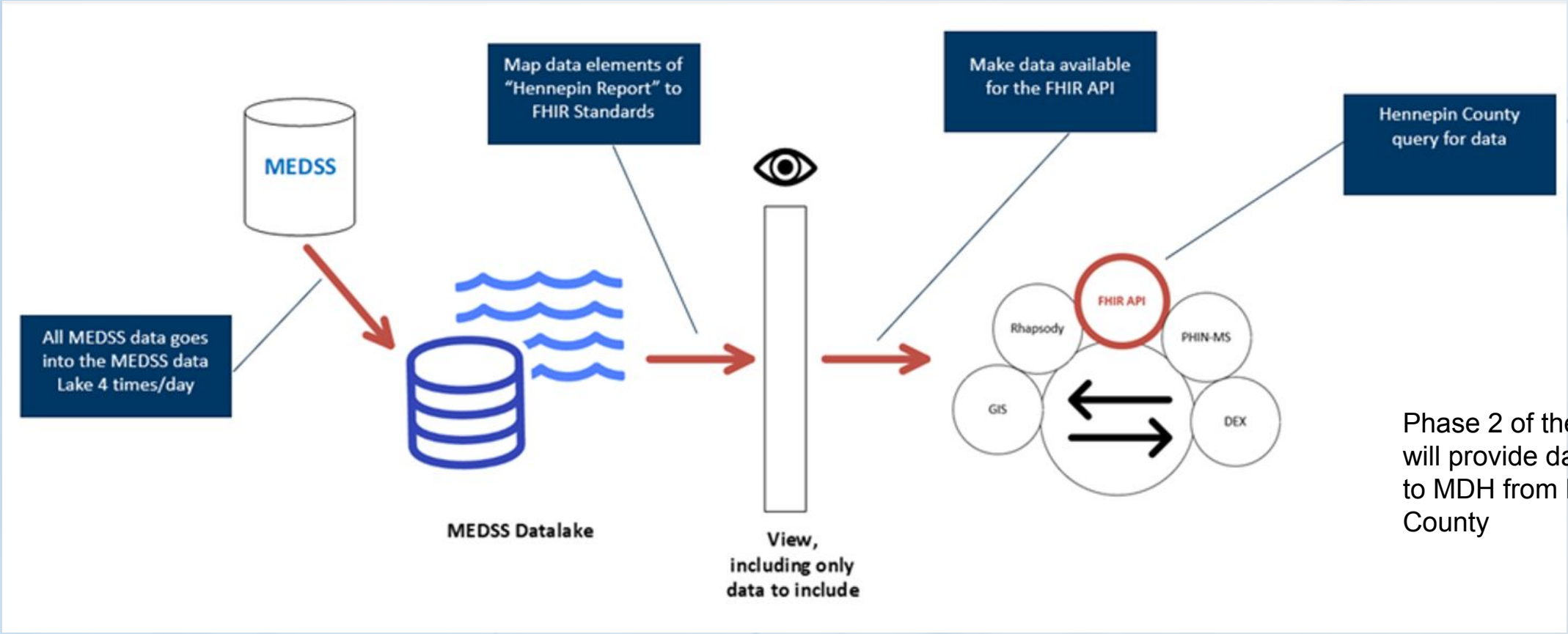
- Bulk Data
  - Bi-weekly on Mondays at 12:00PM
  - Contact: craig.newman@altarum.org
- Aggregate Data
  - Bi-weekly on Wednesdays at 1:00PM
  - Contact: forrest.white@altarum.org
- Query & Response
  - Bi-weekly on Thursdays at 1:00PM
  - Contact: helios@hl7.org

- Helios Email Inbox: helios@hl7.org
- Helios Conference Calls: http://www.hl7.org/concalls/index.cfm
- Helios Confluence Page: https://confluence.hl7.org/display/PH/Helios+FHIR+Accelerator+for+Public+Health+Home
- Helios HL7 Homepage: https://www.hl7.org/helios/
- Helios Zulip Chat: https://chat.fhir.org/#narrow/stream/307807-Helios-Accelerator
- Helios HL7 ListServ: http://www.hl7.org/myhl7/managelistservs.cfm (manage ListServ subscriptions)

Example 2: FHIR projects in Minnesota

- Vital records
  - Pilot and test FHIR interoperability for death reporting to MDH Vital records from medical examiners
- FHIR Bi-directional exchange for STD data
  - Started as one of the PHFIC projects
  - Funding provided to MDH and Hennepin county thru CSTE, initial technical assistance from MITRE
  - Replace current manual methods of exchanging STD data

MDH – Hennepin County data flow



Phase 2 of the project will provide data back to MDH from Hennepin County

Example 3: Rhode Island IIS Implementation

- Rhode Island Child and Adult Immunization Registry (RICAIR)
- FHIR Façade Model using open source HAPI FHIR server and SMART Backend Services Authorization
- Bulk Query - Helios FHIR Accelerator for Public Health
  - Match and Bulk Match
  - 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

Other FHIR project and activities in public health

- PACER (Public Health Automated Case Event Reporting)
  Automates case reporting between public health and health care by leveraging ELR data and using FHIR. Pilot project to query appropriate healthcare system to collect relevant data to support public health case investigation and follow-up for STI cases. (Presentation on Tue, June 11, 2024: 2:15 PM - 3:30 PM, “Fast Healthcare Interoperability Resources - FHIRing on all Cylinders”)
- CCHD/Newborn Screening
- Clinical decision support with FHIR (ImmDS – Immunization Decision Support)

Round table conversation

- Is your agency doing anything with FHIR? If you are, what are you doing?
- What positive outcomes have you seen from Public Health using FHIR? What outcomes do you hope to see from ongoing efforts?
- What challenges do you see in implementing FHIR at public health agencies?

Questions?

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Thank you!