





Designing a FHIR Onboarding Framework for School-Based Data Providers

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Agenda



- Learning Objectives
- KIDSNET/RICAIR and the road to FHIR
- Helios and FHIR Implementation
- Onboarding Metrics
- Auditing
- FHIR Readiness Scale
- Overcoming the Barriers to FHIR Adoption
- Results

Learning Objectives



By the end of this session, participants will be able to:

- **Identify** technical requirements for implementing FHIR-based interoperability in a state-level IIS.
- **Utilize** national resources (AIRA workgroups, Helios) to guide standards adoption.
- **Describe** the phased onboarding process for non-traditional partners like schools.
- **Evaluate** system performance using quantitative metrics and qualitative frameworks.

KIDSET/RICAIR: From Flat Files to FHIR



1997: Manual Entry and Flat-File Submissions

- **KIDSNET** launched as Rhode Island's integrated child health information system and IIS
- Immunization data came in through direct data entry or flat-file submissions from providers.

Early 2000's: HL7v2

- **HL7v2** messaging was introduced to automate data exchange with EHRs and other clinical systems.

2022: Introducing FHIR

- Joined the Helios FHIR Accelerator.
- Stood up an initial FHIR Façade to begin translating between legacy KIDSNET data and FHIR resources.
- **Goal:** Prepare for future innovation and improve high-volume data exchange.

KIDSET/RICAIR: From Flat Files to FHIR



2023-2024: FHIR Testing, Refinement, and Recruitment

- Tested the FHIR Façade with Helios partners in HL7 FHIR Connectathons
- Refined technical specifications using the US Core and Bulk Data Access IGs
- Added SMART public key-based authentication
- Reached out to potential FHIR data exchange partners

December 2025: First School-to-IIS FHIR Go-Live

- Successfully onboarded a community college of 16,000 students using school-to-IIS FHIR implementation; Use case is for student immunization status during onboarding

Rhode Island's Implementation Roadmap



- **Requirements & Resource Selection:**
 - Prioritized technical needs based on partner query workflows.
- **System Configuration:**
 - Updated endpoints and adapted internal workflows for FHIR standards.
- **Testing & Iterative Validation:**
 - Conducted multiple cycles of validation and error correction.
 - Ensured stability and conformance through iterative "stress tests."
- **Deployment & Go-Live:**
 - Phased rollout that integrated new capabilities without interrupting existing legacy services.

Standardizing High-Volume Data Access



- Helios FHIR Accelerator for Public Health -
IIS Bulk Data Query
 - Create a uniform process for querying immunization data in IIS, leveraging Bulk FHIR
 - Develop implementation guidance
 - Engage the community with a vision for bulk data exchange
 - Test and pilot solutions for real-world implementation

Making Data Accessible in Bulk (Deep-Dive)



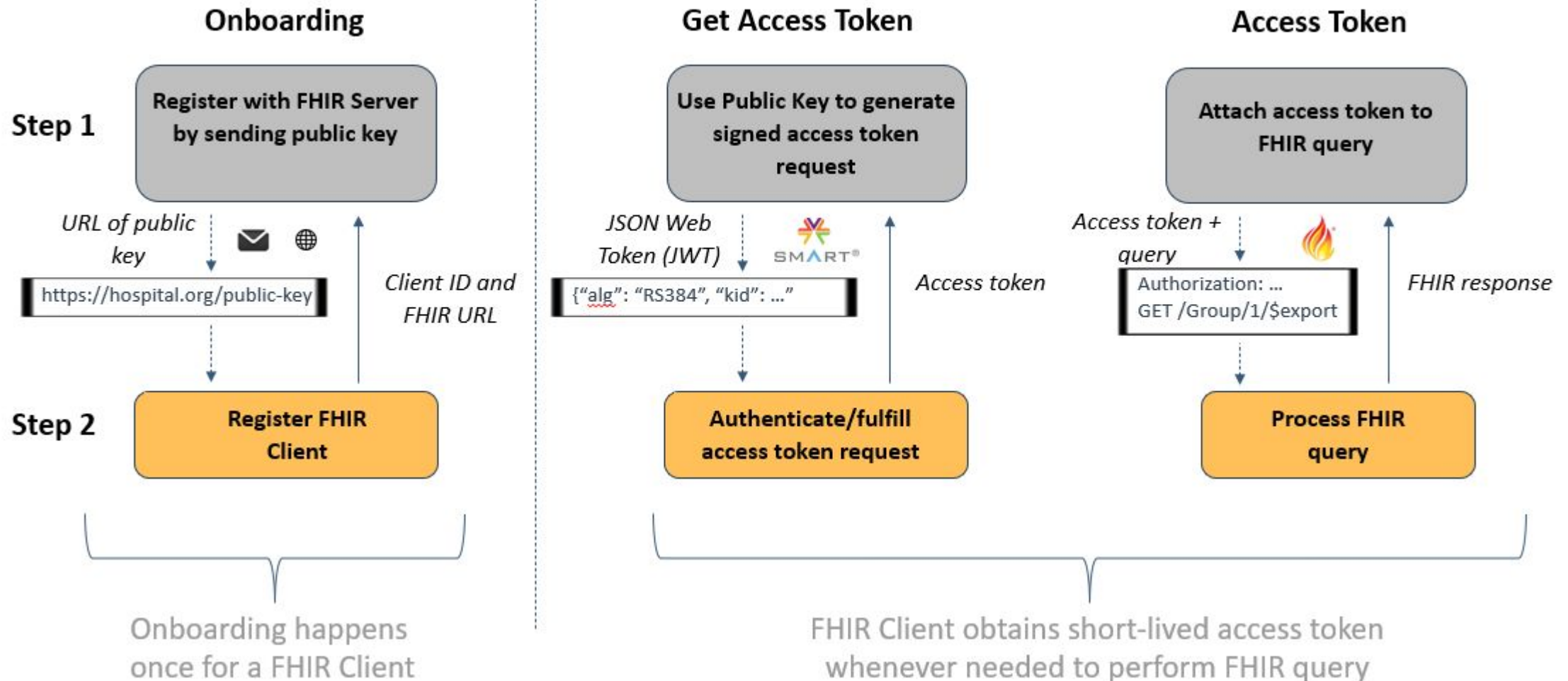
- FHIR Façade Model using open source HL7 Application Programming Interface (HAPI) FHIR server
- Doubles as an application modernization strategy: replacing legacy web applications with modern front-ends that communicate with the FHIR back-end
- Bulk Query:
 - Predefined groups, or search and define 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
 - Server has flexibility in scheduling and allocating resources to query

Authentication



- **HL7 v2 Authentication**
 - Typically involves username/password – tedious to share and can leak or be weak
 - Some use certificate authentication, but also tedious
- **SMART Backend Services Authentication**
 - Makes it possible to not have to share passwords with senders during onboarding
 - Partners provide IIS a URL containing their public key
 - Leverages public key authentication to securely provide FHIR access tokens
 - **No passwords, but implementation is more complex**

SMART Backend Services Authentication



- Quantitative metrics: Validation success, error frequency, onboarding duration, match rate
 - onboarding duration: 12 months
 - error frequency: errors early in onboarding process were resolved
 - match rate: calculated ratio of \$match operations / Patient resources
- Qualitative assessment: Focused on FHIR complexity
 - complexity - good fit because their use case was closely mapped to the FHIR queries
 - system readiness, vendor experience,
- Data sources: Meeting notes, FHIR audit log, and system documentation

- What we capture
 - Every FHIR operation (reads, searches, creates, updates) produces record
 - Each record includes: the user, the operation type, the URL and parameters, the patients and resources touched, the HTTP response, and a timestamp
 - Noisy or irrelevant operations can be excluded via configuration; auditing itself can be toggled off entirely
- How it's stored
 - Audit records land in a MongoDB collection (`auditLog`), written asynchronously so they never slow down the request
 - A document database is a natural fit — audit shape is flexible and query patterns are ad-hoc
 - Slice by patient, user, date range, operation, etc. with one-line queries
 - Plugs directly into existing analytics, dashboarding and reporting workflows

FHIR Auditing



FHIR Server Audit Report

Database: fhir-kidsnet-iz-prod | Report Generated: 2026-03-01 23:55:07 EST | Period: Last 24 Hours

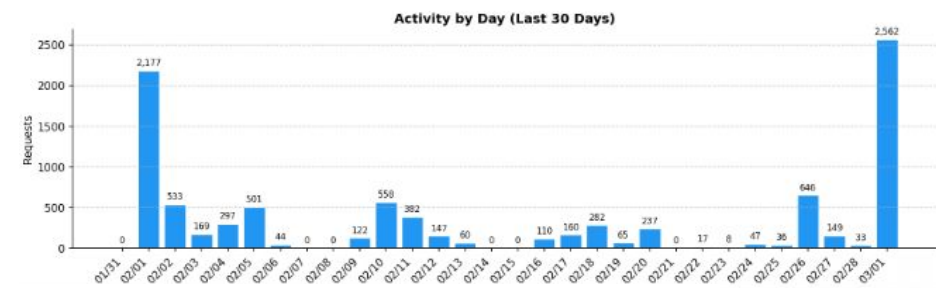
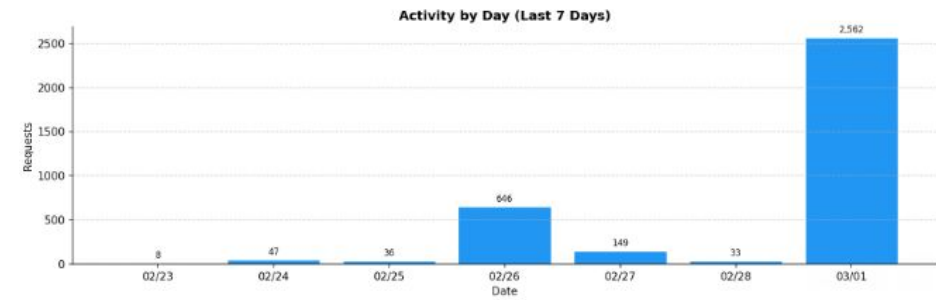
Summary Metrics

2,562
Total Requests (24h)

100.0%
Success Rate

1
Unique Users

1,148
Unique Patients



Top Activity (by Total Resources, excluding "Organization")

User	Organization	Operation	Op Count	Resources	Total
ellucianbanner	COMMUNITY COLLEGE OF RI (N/A)	SEARCH_TYPE	1,148	35,087 Immunization, 1,148 Bundle	36,235
ellucianbanner	COMMUNITY COLLEGE OF RI (N/A)	EXTENDED_OPERATION_TYPE/\$match	1,414	1,414 Bundle, 1,148 Patient	2,562

IIS FHIR Partner Readiness Scale (0-5)



Readiness Attribute	Points
Organizational willingness (technical and programmatic)	0.5
Enterprise infrastructure	0.5
Technical Capacity	
Familiarity with FHIR	0.5
Familiarity with REST, JSON	0.5
Familiarity with OAuth	0.5
Use Case for Bulk Query	0.5
Interoperability Documentation or Strategy	0.5
Mapping of FHIR Resources to internal data model	0.5
Not heavily invested in HL7 v2 already	0.5
REST API or FHIR client already exists	0.5

Overcoming the Barriers to FHIR Adoption



- What worked well
 - Partner didn't know FHIR or health data standards, but knew REST and JSON → built a working proof-of-concept fast.
- Challenges
 - Stop-and-start engagement: Bursts of work, then months of silence. Hard to hold momentum.
 - SMART on FHIR authentication. OAuth-based, but no drop-in library for partners to adopt → trial and error and low-level debugging
 - Partners may not always follow implementation guidance.
 - Prototyped with bulk FHIR, but partner's final implementation was FHIR without bulk query.

Results & Future Contributions



- IIS FHIR adoption is achievable, even with partners new to immunization standards.
- Our experience can help provide a blueprint for other jurisdictions seeking to modernize their IIS using FHIR.
- Rhode Island will continue to document challenges and successes to help refine implementation guidance for FHIR adoption in collaboration with HL7 and Helios.
- Our hope is that this work will contribute to the broader adoption of FHIR in IIS and public health.



Resource Repository:

Visit AIRA's ["FHIR and Emerging Standards"](#) page.

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