HL7 FAST: Scaling FHIR Based APIs

An Invitation to Join the Effort to Increase Long Term Adoption
Professional Associations, such as HL7, which bring together competing entities are subject to strict scrutiny under applicable antitrust laws.

HL7 recognizes that the antitrust laws were enacted to promote fairness in competition and, as such, supports laws against monopoly and restraints of trade and their enforcement.

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1. Problem: Moving to a modern, restful, API-based digital exchange architecture in healthcare is necessary to advance improved cost and quality on behalf of patients.

2. A growing pace of regulations drive FHIR adoption: Price transparency, Prior Auth, Patient Access APIs, Payer to Payer Exchange, etc.

3. And we believe that TEFCA will eventually look for exchange scale via FHIR.

4. But, FHIR based APIs are not positioned to scale today.

5. Solution: A group of payers and providers convened a work effort under ONC to identify solutions for scalability barriers. This is the FHIR at Scale Taskforce (FAST) industry project.

6. We made good progress: Implementation guides in progress or approved for dynamic scalable security, identity matching, exchange across networks, and endpoint directory.

7. This effort has transitioned to HL7 as an “accelerator”, or “home base” of activity for the industry to continue to drive FHIR scale, remove infrastructure barriers, and drive adoption.

We want you to join this effort and sign up as member. This organization will be the home base for driving infrastructure scale for FHIR.
What is the Problem?

**TODAY - Exchange**

Exchange characterized by point-to-point interfaces

Adoption trajectory is slow, expensive, and fragmented

**FUTURE - Interoperability**

A consistent infrastructure approach to API implementation

Consensus on implementation guides for key enablers, such as directory, security, patient matching, exchange and testing

**DESIRED RESULT:**

A national interoperability approach that enables consistent data exchange via API. We have this for administrative transactions (X12, clearinghouses, WEDI) and pharmacy transactions (NCPDP, Surescripts). We do not have this for HL7-FHIR.
What is FAST?

The FHIF at Scale Taskforce (FAST) is a representative community of motivated healthcare industry stakeholders and health information technology experts who have identified HL7® Fast Healthcare Interoperability Resources (FHIR®) scalability gaps and are actively working on solutions to address current barriers to enable scalable data exchange using FHIR APIs.

Oct 2017 – Payer + Provider (P2) FHIR Taskforce Established
Originally focused on Payer/Provider collaboration

2017

Analysis, Barrier identification, Solution Concepts, Gather Industry Feedback

2018

2019

2020

Implementation Guide Dev Begins

2021

Transition to FHIR Accelerator

2022 and the Future

Continue collaborative work to develop FAST solutions (IGs) under the HL7 FHIR Accelerator Program

All content is available on the FAST Project Page
Conceptual Architecture

FAST CAPABILITIES

REQUESTING SYSTEM
- Patients
- Providers
- Payers
- IT Vendors
- EHRs
- Population Health
- Public Health
- Social Services

RECEIVING SYSTEM
- Payers
- Providers
- Patients
- Intermediaries
- Networks
- Research
- IT Vendors
- EHRs
- Population Health
- Public Health
- Social Services

Identity
Digital Identity/Patient Matching

Global Extensibility

National Directory
Endpoints - Profiles - Versioning
Trust - Conformance

Hybrid/Intermediary Exchange

Security
(Authenticate/Authorize)
UDAP Trusted Dynamic Client Registration
UDAP Tiered OAuth User Authentication
UDAP JWT-Based Client Authentication
UDAP JWT-Based Authorization Assertions

Consent

Future Capabilities

VERSIONING
TESTING
Current Scope of Work & Progress

**Ongoing Active Work**

- **Hybrid/Intermediary Exchange** – STU 1 published; paused to assess future use cases
- **Security for Scalable Registration, Authentication & Authorization** – STU 1 published; considering STU 2 enhancements
- **National Directory** – September 2023 STU 1 ballot reconciliation
- **Interoperable Digital Identity & Patient Matching** – STU 1 published; reviewing and gathering STU 2 requirements with the community

**Discovery Projects**

- **Consent** – FAST member discovery report-out completed in August; obtaining community feedback and considering scope of formal project
- **Testing & Versioning** – Ongoing Connectathon testing and gathering requirements from the community regarding testing best practices and versioning concerns
**FAST as FHIR Accelerator**

**HL7® FHIR® ACCELERATOR / COMMUNITY**

- **Payers/Providers**
- **Provider/Provider**
- **Public Health**
- **Other FHIR Initiatives**

**Functional Use Cases**
- **DA VINCI** (HL7 FHIR)
- **ARAGON PROJECT** (HL7 FHIR)

**Social Determinants of Health**

**Cancer Care and Research**

**Consumers**

**ARCHITECTURE**
- **FAST** (FHIR at Scale Taskforce)
- **TBD**
- **HL7 Working Groups**

**Standards**

**HL7 Governance Structure**

**STAKEHOLDERS**
- Non-Accelerator/Use Case Specific Initiatives
- SDOs
- Networks/ HIEs
- IHE

**ADOPTION AND FEEDBACK**
- Standards Pilots & Certification TBD

**Government Participation/Contributions (ONC, CMS, CDC, VA, DoD, etc.)**

**And More...**

**Others - Future**

**Networks/ HIEs**

**Non-Accelerator/Use Case Specific Initiatives**

**SDOs**

**IHE**
Membership Value & Approach

Drive cost-effective interoperability to achieve the triple aim (cost, quality, outcomes)

Lead Strategy & Decision-Making
- Prioritize projects and use cases moving forward
- Drive what becomes the standard and how they are implemented

Provide Industry Thought Leadership
- Position yourself and your organization as an industry thought leader

Gain Efficiencies
- Save money by minimizing the need across industry stakeholders to repeatedly address common implementation barriers encountered in most projects
- Scalable FHIR solutions leads to more ubiquitous FHIR adoption to support real-time, secure data exchange between the right stakeholders at the right time
Governance Structure Key: Cross Stakeholder

Executive Committee: SC Chairs + PMO

STEERING COMMITTEE

Payers
Providers
Tech/ HIT Vendors
Govt. Agencies
HL7

OPERATING COMMITTEE

Use Case 1 Project Lead
Use Case 2 Project Lead
Use Case n+ Project Lead
## Engagement Opportunities

An industry effort works best when key organizations drive purpose, fund the work, and support prioritization and focus.

<table>
<thead>
<tr>
<th></th>
<th>Premier</th>
<th>Principal</th>
<th>Sponsor</th>
<th>Sponsored Member</th>
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<td><strong>Access to use case artifacts</strong></td>
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<td><strong>Provide feedback</strong></td>
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* Levels other than Premier will be considered for Steering Committee membership depending upon the need to provide balance on the Steering Committee

** Founders are organizations who have committed in writing to join by the end of March 2022
Determining Next Steps

• Clear on scope and needs for HL7 FAST Accelerator?
• Initial take on opportunity?
• Areas of interest in which to engage?
• Interest in being a funding member?
• How to proceed?
Appendix
Active FAST Work

Exchange

Endpoint Query

Attestation and Verification

Security

Digital Identity & Patient Matching

Hybrid/Intermediary Exchange

National Directory
<table>
<thead>
<tr>
<th>Implementation Guide</th>
<th>Project Page</th>
<th>Scenarios Included</th>
<th>IG Status</th>
<th>Reference Implementation</th>
<th>Number of Connectathons</th>
<th>Sponsoring Workgroup</th>
<th>Project Number</th>
<th>PSS</th>
<th>Zulip Stream</th>
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<tr>
<td>Hybrid/Intermediary Exchange</td>
<td>FHIR at Scale (FAST): Exchange with or without Intermediaries</td>
<td>Passive intermediaries</td>
<td>STU 1 Published</td>
<td>TBD</td>
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<td>FHIR-I WorkGroup Home</td>
<td>1653</td>
<td>PSS for FAST Exchange Metadata Using RESTful Headers</td>
<td>FHIR at Scale (FAST): Exchange with/without intermediaries</td>
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</table>

https://confluence.hl7.org/display/FAST/FAST+Implementation+Guide+Dashboard
• **What is FAST National Directory?**

  – **Exchange**
    - FHIR API to exchange directory information between the Validated Healthcare/Endpoint Directory and the Federated Healthcare/Endpoint Directories
    - Allows validated directory information to be shared with federated directories for scalability and regional use

  – **Endpoint Query**
    - FHIR API to find all FHIR endpoints of entities in the National Directory and their associated capabilities and attributes
    - Provide a common, standard method for client applications and systems to find the FHIR endpoints for the entities with which they need to interact

  – **Attestation and Verification**
    - FHIR API and workflow process for submitting, updating, and attesting and verifying the accuracy of the National Directory information
    - Ensures that information distributed to Directories and client applications has been verified to be accurate

• **Status:** September 2023 STU 1 ballot reconciliation

**REFERENCE MATERIAL**

- Implementation Guide (Balloted Version)

- Hosted Reference Implementation
  - [https://national-directory.fast.hl7.org/](https://national-directory.fast.hl7.org/)

- Test Scripts
  - [https://github.com/HL7-FAST/test-scripts](https://github.com/HL7-FAST/test-scripts)

- Connectathon

- Project Page
  - [https://confluence.hl7.org/display/FAST/National+Healthcare+Directory](https://confluence.hl7.org/display/FAST/National+Healthcare+Directory)
Security for Scalable Registration, Authentication, and Authorization

**UDAP J Northwest-Based Client Authentication:**
Uses asymmetric cryptography to authenticate client apps

**UDAP Server Metadata:**
Endpoint validation for added confidence

**UDAP Trusted Dynamic Client Registration:**
Identify and dynamically register trusted client applications, streamlining app management

**UDAP J Northwest-Based Authorization Assertions:**
Extensible JWT-based client authorization grants & other claims incidental to a token request

**UDAP Certifications & Endorsements:**
Trusted informational assertion

**UDAP Tiered OAuth:**
Reusable identities via scalable, dynamic, cross organizational use

Trademark Notice: UDAP and the ecosystem gears design are trademarks of UDAP.org and are used with the permission of UDAP.org.
• What is FAST Security?
  – Identifying solutions for security authorization and authentication processes.

• Objectives
  – Identifying current industry status security authorization and authentication processes and tools in current clinical interoperability and in advanced digital API use.
  – Building a proof of concept that demonstrates the critical architectural and technical capabilities required to implement user authorization and authentication at point of request and the ability to administer granting and maintaining credentials at scale in multi-stakeholder environments.
  – Creating appropriate national standards and documentation for securing resources and data used in the exchange model.

• Status
  – STU 1 Published
We prioritized patient-facing (B2C) and payer/provider (B2B) interaction as focus areas. Trusted Identity Services provide user authentication, and unique identifiers for matching or other verified demographic data, all meeting best practice match input & minimum verification level floors.

Best practice-compliant probabilistic matching services use demographic data from health data requestor and unique identifiers when possible. Requestor follows match input floor & minimum identity verification.

**Interoperable Digital Identity & Patient Matching**

*App-Mediated Business-to-Business with Patient User*

*Networked Identity Management:*
  - Patient-Mediated Business-to-Consumer,
  - Patient-Directed Business-to-Consumer

*Mediated Patient Matching: Business-to-Business*
  - Coverage,
  - TPO, or
  - Patient Request

*Includes Patient-facing workflows IAL1.8/AAL2 Focus on identity management*

*Payer/Provider interactions IAL1.5 Focus on best practice patient matching*
• **What is FAST Identity?**
  – Identify identity-proofing and patient-matching solutions across multiple types of users.

• **Objectives**
  – Identify appropriate national standards for individual and organizational identity matching.
  – Define approach to implementation and testing.
  – Identify best practices for reconciliation of identification across multiple sources. (e.g., patient matching)
  – Build a proof of concept that demonstrates the critical architectural and technical capabilities required to implement identity cross-walk in real-time during the course of a FHIR transaction.

• **Status**
  – STU 1 Published

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**REFERENCE MATERIAL**

**Implementation Guide (STU 1)**

**Hosted Reference Implementation**

**Reference Implementation Code**
  – [https://github.com/HL7-FAST](https://github.com/HL7-FAST)

**Test Scripts**
  – [https://github.com/HL7-FAST/test-scripts](https://github.com/HL7-FAST/test-scripts)

**Connectathon**
  – 2023 - 09 FAST Infrastructure (Security & Identity)

**Project Page**
Hybrid/ Intermediary Exchange

Supporting a Hybrid Exchange Model

- PROVIDER EMR/EHR
- POPULATION HEALTH
- CLEARINGHOUSE/INTERMEDIARY
- PAYER
- PAYER
Hybrid/ Intermediary Exchange

Requests and responses use the destination’s single public FHIR service URL
The originating client submits to the destination’s public FHIR service base URL

The destination responds using its public FHIR service URL
In FHIR resources it returns (e.g., in fullUrl elements)

Trust is negotiated between client and destination
Intermediaries play a “pass through” role
• What is FAST Exchange?
  – Guidance enabling one or more intermediaries to participate in FHIR REST interactions, using a passive intermediary approach

• Objectives
  – Provide a unified model that supports both point-to-point interoperability without intermediaries and one in which one or more intermediaries exist – a “hybrid environment”
  – Don’t impose any requirements on the initiating client; the client doesn’t need to be aware that an intermediary is participating
  – Ensure compatibility with other FAST solutions including Security and Directory

• Status
  – STU 1 Published

REFERENCE MATERIAL
Implementation Guide (STU1)

Hosted Reference Implementation
  – TBD

Reference Implementation Code
  – TBD

Test Scripts
  – TBD

Connectathon

Project Page
  – [Hybrid/Intermediary Exchange](http://www.hl7.org/fhir/us/exchange-routing/STU1/)
• Consent Management
• Consent Decision and Enforcement
• Excluding authentication
• Excluding broader scope of authorization beyond consent enforcement

Authorization service determines if the consumer should have access to the data. This includes determining legally who is required to have given consent, if anyone, and evaluating any patient criteria, such as age, that might have an effect on authorization. Conditions and special situations, such as "break glass," would be evaluated here.

The Consent Decision Service is only responsible for calculating the result of the consent record, or records, that have been filed in association with the identities specified in by the Authorization Service. This includes considerations such as, has the consent expired.
US Core Consent Profile
Attributes and value sets necessary for supporting common privacy (and perhaps social services and clinical trial) use cases

• Meaningful basis for implementation of FHIR Consent
• Reliable ground for regulatory adoption
• Based on:
  – Existing initiatives such as IHE.ITI PCF
  – FAST membership and community input

Consent Management Implementation Guide
Adopt and/or develop an Implementation Guide to cover:

• Consent ceremony:
  – interactions between patient, provider, and consent management system
  – to collect and record patient’s consent
  – record a computable consent

• Consent management API
  – System-to-system interactions between consent management system and other entities
FAST Consent Recommendations: Implementation Guide – Example Use Cases

- Record and track a request for consent from a provider to a patient
  - for example, using FHIR resources such as Task

- Record and track patient’s input as they navigate and review a consent
  - for example, using Questionnaire and QuestionnaireResponse resources

- Extract a computable Consent resource from the raw responses provided by a patient
  - for example, using Structured Data Capture (SDC) extensions and corresponding operations.

- Record and track multi-party approval workflows
  - for example, using Task resource.

- Record consent revocation memos
  - for example, using the QuestionnaireResponse resource

- Record the provenance linking a computable Consent and other record material (for example, the initial QuestionnaireResponse resources or consent revocation memos).

- A notification infrastructure to communicate consent lifecycle events (such as creation, revocation, or expiry)
  - for example, using FHIR Subscription.

- Modeling delegation of consent

- Minor and adolescent use cases using FHIR resources.

- Integrating patient matching with consent discovery
  - finding the applicable consent for a given patient from a network of FHIR consent stores.

- Bulk consent management operations such as bulk invites to consent for a group or cohort.

- Disclosure audit infrastructure
  - for example, using AuditEvent
  - subscription patterns for delivering audit logs
Future FAST Work
Future FAST Work

• FAST established a Backlog Workgroup with the purpose to:
  – Review work in FAST’s original scope to determine priority
  – Assess additional work projects suggested by
    • FAST Members
    • Other FHIR Accelerators
    • Stakeholders participating in public meetings
  – Identify near and long-term project priorities and make recommendations to FAST Steering regarding resource allocation

• HL7 community can submit new ideas: FAST Use Case Submission Form
## Simple Ways to Join FAST’s Work

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<td><strong>Interoperable Digital Identity &amp; Patient Matching</strong></td>
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Public Meetings:  
- Mondays at 3pm ET  
  https://zoom.us/j/98517334633  
- Thursdays at 11 am ET  
  https://zoom.us/j/98424232906?pwd=dHVT2hrN3o1Q1NQVTNHaTVaQURSQT09  

Public Meetings the 1st and 3rd Thursdays Each Month at 2PM ET  
https://global.gotomeeting.com/join/919790117
Example Patient Journey

**REQUESTING SYSTEM**
- **1**: Formulates FHIR Request
- **2**: Looks Up the FHIR Endpoint for Recipient
- **3**: Performs Patient Matching and Sends Back Not Found If Unable To Do So
- **4**: Authenticates FHIR User’s Role
- **5**: Filters Out Data That Does Not Have Consent
- **6**: Generates & Returns FHIR Response

**RECEIVING SYSTEM**
- **1**: Receives Transaction, Validates Requestor, Validates Version
- **2**: Appropriately Configured
- **3**: Requesting System Receives Data
- **4**: Validates Version

**DIRECTORY**
- **7**: Requesting System Receives Data

**EXCHANGE**
- **8**: Transaction Information (eg, Header)

**IDENTITY**
- **9**: Authenticates FHIR User’s Role

**VERSIONING**
- **10**: Filters Out Data That Does Not Have Consent

**CONFORMANCE & CERTIFICATION**
- **11**: Security

**SECURITY**
- **12**: PILOTS