

# FHIR 101 For the Policy Community

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**HL7**<sup>®</sup>  
International

# HL7 International

- A not-for-profit organization, founded in 1987
- ANSI-accredited standards development organization
- Dedicated to providing a comprehensive framework and related standards for the exchange, integration, sharing, and retrieval of electronic health information
- Three Product Families: FHIR, V3/CDA, V2.x

# HL7's Global Reach

- 50+ Countries
- 500+ Corporate Members
- 1600+ Individual Members
- Thousands of contributors



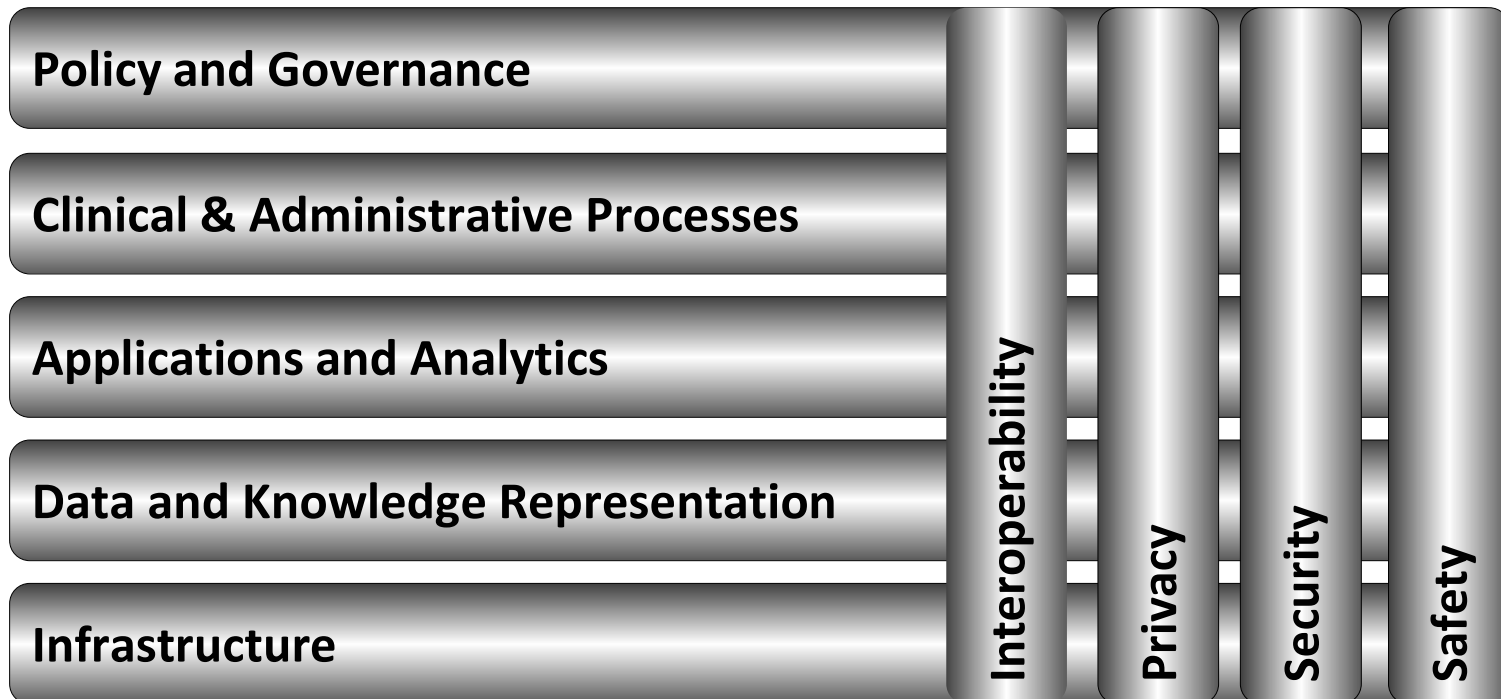
# What are health care data standards?

In the context of health care, the term data standards encompasses *methods, protocols, terminologies, and specifications* for the *collection, exchange, storage, and retrieval of information* associated with health care applications, including medical records, medications, radiological images, payment and reimbursement, medical devices and monitoring systems, and administrative processes (Washington Publishing Company, 1998).



# What do YOU mean by interoperability?

## Health IT Stack<sup>©</sup>



# Standards Stakeholders

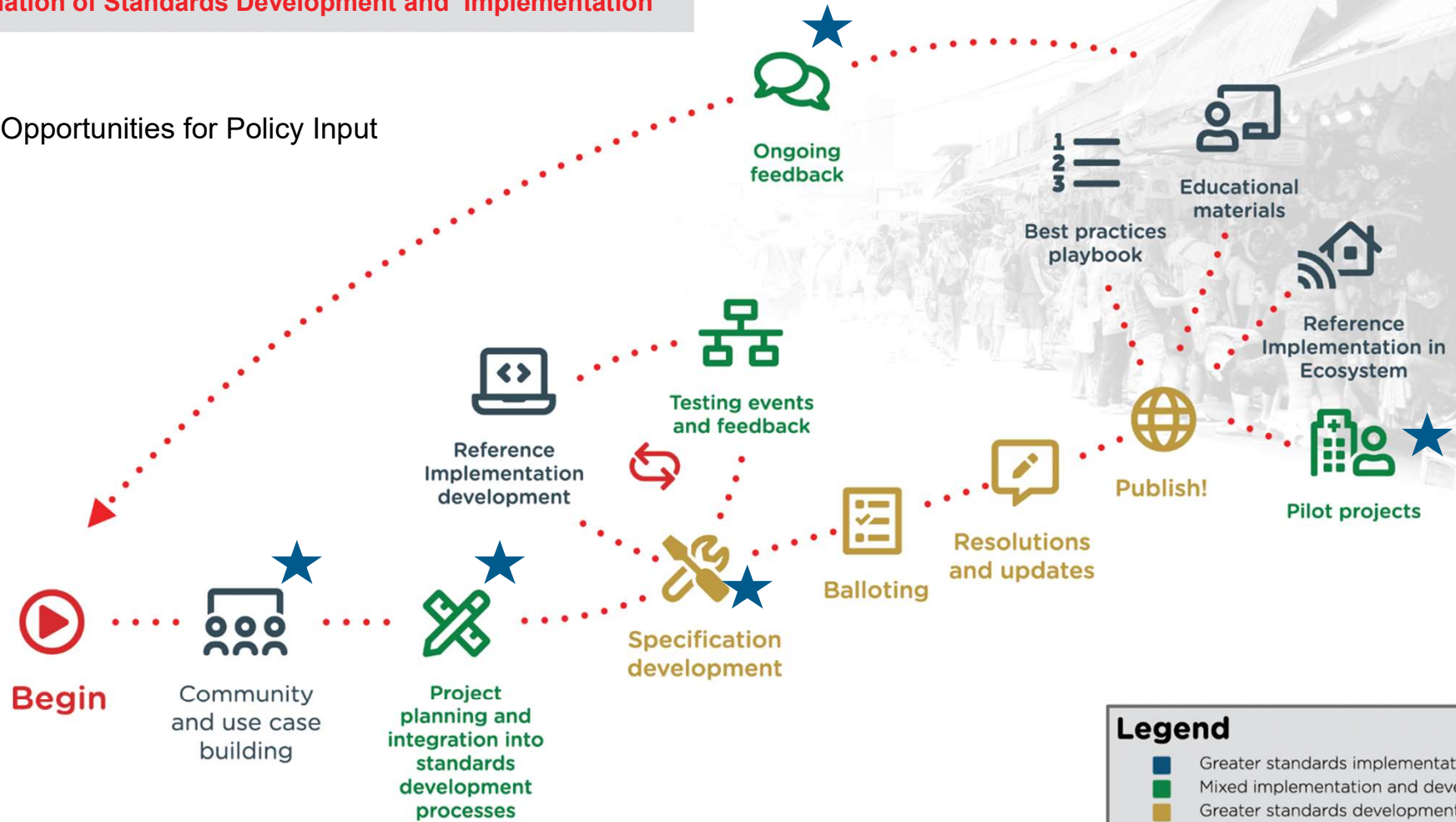


## How does policy drive standards development and adoption?

- Listening to stakeholder needs
- Direct support of standards development and adoption
- Setting of standards directly – e.g. HIPAA, ONC Cures Act
- Adoption by agencies

## Coordination of Standards Development and Implementation

★ Opportunities for Policy Input



## From Standards Development to the Global Health IT Marketplace



★ Policy is a driver  
In adoption

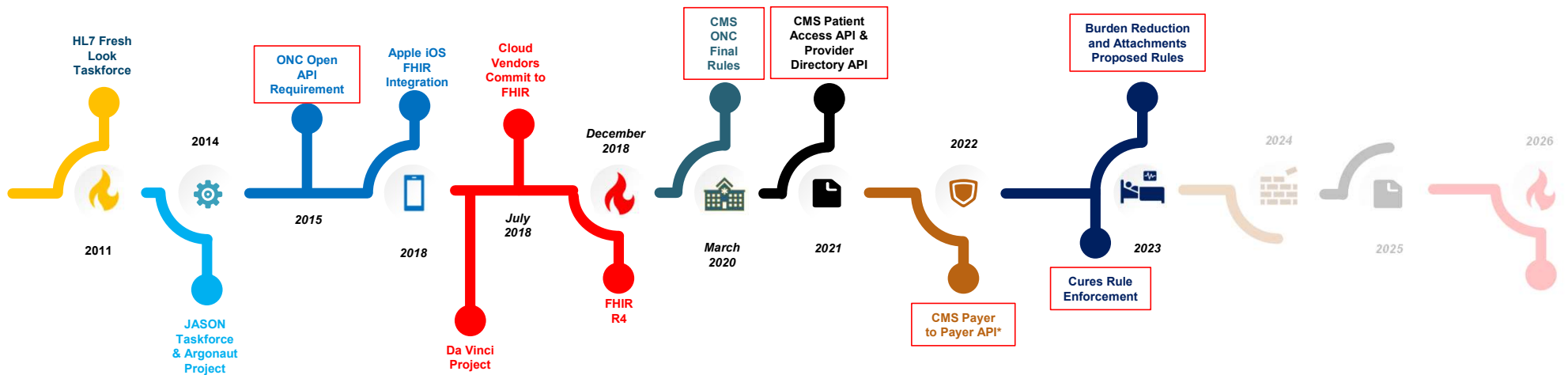
# Why are policies important to implementers?

- Legal and regulatory requirements and compliance
- Standards and guidelines for implementation for certification
- Privacy and security
- Data governance
- Consent management
- Collaboration and partnerships
- Technological infrastructure
- Education and training
- Continuous improvement

**Interoperability must move from  
a compliance activity to a  
strategic initiative.**

# FHIR Timeline and Federal Regulations

CMS and ONC have identified FHIR as the foundational standard to support data exchange via secure application programming interfaces (APIs).



CMS identified FHIR in their final rules to establish a future where data flows freely and securely between payers, providers, and patients and to achieve truly coordinated care, improved health outcomes, and reduced costs.



# FHIR 101

# The World Has Been Changed By Application Programming Interfaces (APIs)...



What is an API and what is healthcare's API?

## What is FHIR?

**F** – Fast  
**H** – Healthcare  
**I** – Interoperability  
**R** - Resources



# Overview of FHIR

- Consistent, simple to use content model resources
  - Controlled extensibility
- Supports all paradigms of exchange
  - Real-time APIs
  - Documents, Messages & Operations
- Designed with implementers in mind
- Freely available
- Detailed on-line, hyperlinked specification
- Freely available tooling, servers, libraries
- Massive supporting community

# Benefits of FHIR

## For Patients

- Improved patient engagement, enabled through FHIR-enabled applications

## For Organizations

- Major vendor commitment
- Faster deployment
- Standards based API to support internal application development
- Data standards to support analytics and population management

## For Clinicians

- Access to a more complete patient record and improved decision-making tools, leading to:
  - Better decision making
  - More efficient diagnosis and treatment
  - Higher quality care

## For Implementers

- Familiar tooling and technologies
- Predefined resources and APIs
- Validation services
- Active and supportive community
- Open source code libraries

# Scenario

55 y.o. AA male with hypertension and diabetes

## Encounter 1

History: Patient is seen at and afterhours urgent care for a sore throat for 3 days. He has had a mild fever up to 101 Fahrenheit. He denies any other respiratory or gastrointestinal symptoms.

Medications: metoprolol and glipizide. Allergies: none. Social History: non-smoker. Married. 3 adult children.

Vital signs: temperature 100.5 F, BP 110/75, RR 12, HR 70, O2 Sat 97% on room air

On exam he has pus over his tonsils. His neck lymph nodes are enlarged. The rest of the exam is normal

Lab: Rapid strep test is positive

Assessment and Plan: Streptococcal sore throat. Patient is prescribed amoxicillin

## Encounter 2

History: Patient returns with a rash over his chest that began after he started the amoxicillin. He admits that he has never taken amoxicillin before. He has no other respiratory symptoms. His fever and sore throat have resolved.

Vital signs are normal.

Exam shows a raised rash over patient's chest and arms

Assessment: penicillin allergy. Strep throat resolving

Plan: Patient was switched to azithromycin

- Patient
- Encounter
- Condition
- Observation
- Medication
- Allergy Intolerance

# FHIR Essential Concepts


- Navigating the Specification
- FHIR Versioning
- Resources
- Profiles
- Operations
- Implementation Guides
- Key FHIR Technologies – SMART on FHIR, CDS Hooks, Bulk FHIR, and CQL

# FHIR Homepage



[Home](#) [Getting Started](#) [Documentation](#) [Resources](#) [Profiles](#) [Extensions](#) [Operations](#) [Terminologies](#)

**Home**

This page is part of the FHIR Specification (v4.0.1: R4 - Mixed [Normative](#) and [STU](#)). This is the current published version. For a full list of available versions, see the [Directory of published versions](#) .

## 0 Welcome to FHIR®

FHIR is a standard for health care data exchange, published by HL7®.

### First time here?

See the [executive summary](#), the [developer's introduction](#), [clinical introduction](#), or [architect's introduction](#), and then the [FHIR overview / roadmap & Timelines](#). See also the [open license](#) (and don't miss the full [Table of Contents](#) and the [Community Credits](#) or you can [search this specification](#)).

**Technical Corrections:**

<http://hl7.org/fhir/index.html>



# FHIR Version



[Home](#) [Getting Started](#) [Documentation](#) [Resources](#) [Profiles](#) [Extensions](#) [Operations](#) [Terminologies](#)

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# Published vs Build Versions



History

## Publication (Version) History

This table provides a list of all the versions of FHIR (Fast Health Interoperability Resources) that are available. See also the directory of [FHIR Implementation Guides](#).

The following versions of the FHIR Specification have been published:

Date	Version	Description	Links
<b>Current Versions</b>			
2019-10-30	4.0.1	FHIR Release #4: First Normative Content	      
(current)	(last commit)	Current Development build (about 30min behind change rapidly)	   
<b>R5 Sequence (Work in Progress)</b>			
2020-08-20	4.5.0	FHIR Release #5: Preview #3	    

Published Version

Build Version

# FHIR Getting Started



Home **Getting Started** Documentation Resources Profiles Extensions Operations Terminologies

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# FHIR Getting Started



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 [Table of Contents](#) > **Getting Started**

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## 1.9 Getting Started with FHIR

[FHIR Infrastructure](#)  Work Group

[Maturity Level](#): N/A

[Standards Status](#): Informative

FHIR is a platform specification that defines a set of capabilities use across the healthcare process, in all jurisdictions, and in lots of different contexts. While the basics of the FHIR specification are relatively straight-forward (see the Overviews: [General](#), [Developers](#), [Clinical](#), and [Architects](#)), it can still be difficult to know where to start when implementing a solution based on FHIR.

This page provides some guidance to help get new implementers started on their path to successful implementation. Beyond reading the overviews (previous paragraph), where should an implementer start? Generally, an implementer needs to resolve:

# FHIR Documentation



[Home](#) [Getting Started](#) [Documentation](#) [Resources](#) [Profiles](#) [Extensions](#) [Operations](#) [Terminologies](#)

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**Technical Corrections:**

<http://hl7.org/fhir/index.html>

# FHIR Documentation

## 1.1 Documentation Index

<a href="#">FHIR Infrastructure</a> <a href="#">Work Group</a>	Maturity Level: N/A	Standards Status: Informative
--	---------------------	-------------------------------

This page provides an index to the key commonly used documentation pages for FHIR.

### Framework

- [Conformance Rules](#) **N**
- [Resource Life Cycles](#)
- [References between Resources](#) **N**
- [Compartments](#)
- [Narrative](#) **N**
- [Extensibility](#) **N**
- [Formats: \*\*N\*\* XML \*\*N\*\*, JSON \*\*N\*\*, & RDF](#)
- [Terminologies \*\*N\*\* \(Code Systems, Value Sets\)](#)
- [FHIRPath](#) **N**
- [Mappings](#) to other standards

### Version Management

- [Change Management & Versioning](#) **N**

### Exchanging Resources

- [RESTful API \(HTTP\)](#) **N**
  - [Search](#) **N** ([Search Param Registry](#))
  - [Operations](#) **N**
  - [Asynchronous Use](#)
  - [Using GraphQL](#)
- [Documents](#)
- [Messaging](#)
- [Services](#)
- [Persistence/Data bases](#)

### Base Types

- [Data Types \(Base\)](#) **N**
- [Metadata Types](#) **N**

### Adopting & Using FHIR

- [Profiling FHIR](#) **N**
- [FHIR Workflow](#)
- [Downloads - Schemas, Code, Tools](#)
- [Managing Multiple FHIR Versions](#)
- [Validating Resources](#)
- [Best Practices for Implementers](#)
- [Mapping Language \(tutorial\)](#)
- [Testing Implementations](#)

### Safety & Security

- [Security, Security Labels & Signatures](#)
- [Clinical Safety](#)

<http://hl7.org/fhir/index.html>

# FHIR Resources

The screenshot shows the HL7 FHIR Release 4 website. The navigation bar includes links for Home, Getting Started, Documentation, Resources (highlighted with a yellow box), Profiles, Extensions, Operations, and Terminologies. A search icon and the HL7 International logo are in the top right. The main content area has a 'Home' section with a yellow box containing text about the FHIR Specification (v4.0.1: R4 - Mixed Normative and STU) and a link to the Directory of published versions. Below this is a 'Welcome to FHIR®' section with a paragraph about FHIR as a standard for health care data exchange. A yellow box highlights the 'First time here?' section, which provides links to various introductory documents. A red box on the right side of the page lists three characteristics of a resource: known identity, structured data, and identified version. The URL 'http://hl7.org/fhir/index.html' is displayed at the bottom right. The HL7 International logo is in the bottom left corner.

HL7 FHIR® Release 4

Home Getting Started Documentation **Resources** Profiles Extensions Operations Terminologies

Home

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**Technical Corrections:**

**A resource is an entity that:**

- has a **known identity** a URL by which it can be addressed
- contains a **set of structured data** items as described by the definition of the resource type
- has an **identified version** that changes if the contents of the resource change

<http://hl7.org/fhir/index.html>

HL7 International



# FHIR Resources

## 1.2 Resource Index

[FHIR Infrastructure](#)  Work Group

Maturity Level: N/A

Standards Status: Informative

This page is provided to help find resources quickly. There is also a more [detailed classification, ontology, and description](#). For background to the layout on the layers in this page, see the [Architect's Overview](#). See also the abstract Base Resources [Resource](#) and [DomainResource](#).

**Categorized**

Alphabetical

R2 Layout

By Maturity

Security Category

By Standards Status

By Committee

Foundation

### Conformance

- [CapabilityStatement](#) **N**
- [StructureDefinition](#) **N**
- [ImplementationGuide](#) 1
- [SearchParameter](#) 3
- [MessageDefinition](#) 1
- [OperationDefinition](#) **N**
- [CompartmentDefinition](#) 1
- [StructureMap](#) 2
- [GraphDefinition](#) 1
- [ExampleScenario](#) 0

### Terminology

- [CodeSystem](#) **N**
- [ValueSet](#) **N**
- [ConceptMap](#) 3
- [NamingSystem](#) 1
- [TerminologyCapabilities](#) 0

### Security

- [Provenance](#) 3
- [AuditEvent](#) 3
- [Consent](#) 2

### Documents

- [Composition](#) 2
- [DocumentManifest](#) 2
- [DocumentReference](#) 3
- [CatalogEntry](#) 0

### Other

- [Basic](#) 1
- [Binary](#) **N**
- [Bundle](#) **N**
- [Linkage](#) 0
- [MessageHeader](#) 4
- [OperationOutcome](#)
- [Parameters](#) **N**
- [Subscription](#) 3



# FHIR Resources – Alphabetical

## 1.2 Resource Index

FHIR Infrastructure [Work Group](#)

Maturity Level: N/A

Standards Status: Informative

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[Categorized](#)

**[Alphabetical](#)**

[R2 Layout](#)

[By Maturity](#)

[Security Category](#)

[By Standards Status](#)

[By Committee](#)

### Alphabetical

#### A-D:

- [Account](#) 2
- [ActivityDefinition](#) 2
- [AdverseEvent](#) 0
- [AllergyIntolerance](#) 3
- [Appointment](#) 3
- [AppointmentResponse](#) 3
- [AuditEvent](#) 3
- [Basic](#) 1
- [Binary](#) **N**

#### D-L:

- [DeviceMetric](#) 1
- [DeviceRequest](#) 1
- [DeviceUseStatement](#) 0
- [DiagnosticReport](#) 3
- [DocumentManifest](#) 2
- [DocumentReference](#) 3
- [EffectEvidenceSynthesis](#) 0
- [Encounter](#) 2
- [Endpoint](#) 2

#### M-P:

- [Measure](#) 2
- [MeasureReport](#) 2
- [Media](#) 1
- [Medication](#) 3
- [MedicationAdministration](#) 2
- [MedicationDispense](#) 2
- [MedicationKnowledge](#) 0
- [MedicationRequest](#) 3
- [MedicationStatement](#) 3

#### P-Z:

- [PractitionerRole](#) 2
- [Procedure](#) 3
- [Provenance](#) 3
- [Questionnaire](#) 3
- [QuestionnaireResponse](#) 3
- [RelatedPerson](#) 2
- [RequestGroup](#) 2
- [ResearchDefinition](#) 0
- [ResearchElementDefinition](#) 0

# FHIR Maturity Model

## ■ Draft

- FMM0 = the artifact has been published on the current build. This level is synonymous with Draft.

## ■ STU

- FMM1 = FMM0 + the artifact produces no warnings during the build process and the responsible WG has indicated that they consider the artifact substantially complete and ready for implementation. For resources, profiles and implementation guides, the FHIR Management Group has approved the underlying resource/profile/IG proposal.
- FMM2 = FMM1 + the artifact has been tested and successfully supports interoperability among at least three independently developed systems leveraging most of the scope (e.g. at least 80% of the core data elements) using semi-realistic data and scenarios based on at least one of the declared scopes of the artifact (e.g. at a connectathon). These interoperability results must have been reported to and accepted by the FMG
- FMM3 = FMM2 + the artifact has been verified by the work group as meeting the Conformance Resource Quality Guidelines; has been subject to a round of formal balloting; has at least 10 distinct implementer comments recorded in the tracker drawn from at least 3 organizations resulting in at least one substantive change
- FMM4 = FMM3 + the artifact has been tested across its scope (see below), published in a formal publication (e.g. STU), and implemented in multiple prototype projects. As well, the responsible work group agrees the artifact is sufficiently stable to require implementer consultation for subsequent non-backward compatible changes.
- FMM5 = FMM4 + the artifact has been published in two formal publication release cycles at FMM1+ (i.e. STU level) and has been implemented in at least 5 independent production systems in more than one country

## ■ Normative

- FMM6 = FMM5 + the responsible work group and the FMG agree the material is ready to lock down and the artifact has passed HL7 normative ballot

# FHIR Profiles



Home Getting Started Documentation Resources **Profiles** Extensions Operations Terminologies

Home

This page is part of the FHIR Specification (v4.0.1: R4 - Mixed Normative and STU) versions, see the [Directory of published versions](#)

A profile is a set of constraints on a resource represented as a structure definition

available

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### Technical Corrections:

<http://hl7.org/fhir/index.html>

# FHIR Profiles

## 1.3 Profiles defined as part of FHIR

<a href="#">FHIR Infrastructure</a>  Work Group	Maturity Level: N/A	Standards Status: Informative
--	---------------------	-------------------------------

This specification is a common platform standard that must be [adapted to particular use cases](#). Some particular use cases are common or important enough to be described as a part of the specification itself. These are published as groups of [Structure Definitions](#) (profiles or extensions), which are often found in implementation guides, along with [Value Sets](#), newly defined [search parameters](#) and examples that are all defined with a common purpose. Additional profiles and extensions may be registered on the HL7 FHIR registry at <http://registry.fhir.org> 

Name	Description	Kind	FMM
<b>General</b>			
<a href="#">EHRS FM Record Lifecycle Event - Audit Event</a>	Defines the elements to be supported within the AuditEvent resource in order to conform with the Electronic Health Record System Functional Model Record Lifecycle Event standard	profiles	
<a href="#">Clinical Reasoning Extensions</a>	Defines common extensions used by the Clinical Reasoning Module.	extensions	
<a href="#">Common extensions for Coding data type</a>	Defines "common" extensions for use with the DataElement data type	extensions	
<a href="#">Common extensions for ContactPoint data type</a>	Defines "common" extensions for use with the ContactPoint data type	extensions	
<a href="#">Element-definition Extensions for use by FHIR Implementers</a>	A set of extensions that constrain data elements, whether used in DataElements, StructureDefinitions or Questionnaires	extensions	
<a href="#">ISO 11179 Element Definition Profile</a>	A profile showing how to use ElementDefinition to express 11179 Data_Element and Concept_Elements. At present, the profile is a partially complete place holder.	extensions	

# FHIR Extensions



Home Getting Started Documentation Resources Profiles **Extensions** Operations Terminologies

Home

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An extension is the FHIR approach to adding valid data requirements to a resource. Example – US Core race extension on Patient resource

available

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### Technical Corrections:

<http://hl7.org/fhir/index.html>

# FHIR Extensions

## 1.4 FHIR Core-defined Extension Registry

<a href="#">FHIR Infrastructure</a> <a href="#">Work Group</a>	Maturity Level: N/A	Standards Status: Informative
--	---------------------	-------------------------------

All extensions in this list are defined in this specification and have a base URI of <http://hl7.org/fhir/StructureDefinition/>. Additional extensions can be registered on the HL7 FHIR registry at <http://hl7.org/fhir/registry>.

Identity	Conf.	Type	Context	FMM
<a href="#">capabilities</a>	0..*	code	<a href="#">CapabilityStatement.rest.security</a>	1
<a href="#">oauth-uris</a>	0..1	(complex)	<a href="#">CapabilityStatement.rest.security</a>	1
<a href="#">11179-objectClass</a>	0..1	Coding	<a href="#">ElementDefinition.mapping</a>	1
<a href="#">11179-objectClassProperty</a>	0..1	Coding	<a href="#">ElementDefinition.mapping</a>	1
<a href="#">11179-permitted-value-conceptmap</a>	0..1	canonical	<a href="#">StructureDefinition.snapshot.element.binding.valueSet</a> , <a href="#">StructureDefinition.differential.element.binding.valueSet</a> , <a href="#">Questionnaire.item.answerValueSet</a>	1
<a href="#">11179-permitted-value-valueset</a>	0..1	canonical	<a href="#">StructureDefinition.snapshot.element.binding.valueSet</a> , <a href="#">StructureDefinition.differential.element.binding.valueSet</a> , <a href="#">Questionnaire.item.answerValueSet</a>	1
<a href="#">DiagnosticReport-geneticsAnalysis</a>	0..*	(complex)	<a href="#">DiagnosticReport</a>	1
<a href="#">DiagnosticReport-geneticsAssessedCondition</a>	0..*	Reference	<a href="#">DiagnosticReport</a>	1

# US Core Patient Profile

This profile builds on [Patient](#)

Text Summary					Differential View					Full View					All Views				
Name	Flags	Card.	Type	Description & Constraints															
Patient		0..*	Patient	Information about an individual or animal receiving health care services															
us-core-race	S	0..1	(Complex)	US Core Race Extension <b>URL:</b> <a href="http://hl7.org/fhir/us/core/StructureDefinition/us-core-race">http://hl7.org/fhir/us/core/StructureDefinition/us-core-race</a>															
us-core-ethnicity	S	0..1	(Complex)	US Core ethnicity Extension <b>URL:</b> <a href="http://hl7.org/fhir/us/core/StructureDefinition/us-core-ethnicity">http://hl7.org/fhir/us/core/StructureDefinition/us-core-ethnicity</a>															
us-core-birthsex	S	0..1	code	Extension <b>URL:</b> <a href="http://hl7.org/fhir/us/core/StructureDefinition/us-core-birthsex">http://hl7.org/fhir/us/core/StructureDefinition/us-core-birthsex</a> <b>Binding:</b> Birth Sex (required)															
identifier	S	1..*	Identifier	An identifier for this patient															
system	S	1..1	uri	The namespace for the identifier value															
value	S	1..1	string	The value that is unique within the system.															
name	S I	1..*	HumanName	A name associated with the patient <b>us-core-8:</b> Either Patient.name.given and/or Patient.name.family SHALL be present or a Data Absent Reason Extension SHALL be present.															
family	S I	0..1	string	Family name (often called 'Surname')															
given	S I	0..*	string	Given names (not always 'first'). Includes middle names															
telecom	S	0..*	ContactPoint	A contact detail for the individual															



# FHIR Operations



Home Getting Started Documentation Resources Profiles Extensions **Operations** Terminologies

## Home

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The RESTful API defines a set of **common interactions** read, update, search, etc. **performed on a repository of typed resources.**

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# FHIR Operations

## 1.5 Defined RESTful API Operations

FHIR Infrastructure [Work Group](#)

Maturity Level: N/A

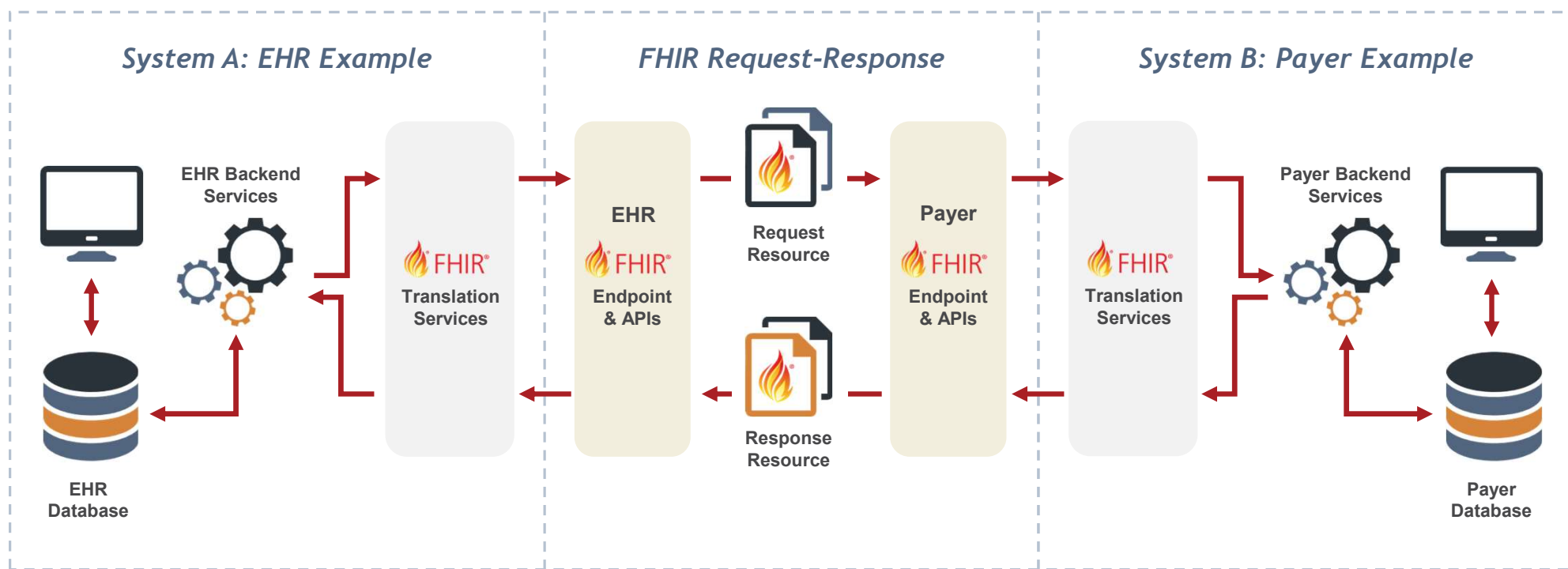
Standards Status: Informative

The [RESTful API](#) defines a set of common interactions (read, update, search, etc.) performed on a repository of typed resources. For further information concerning how operations are defined and invoked, see [Extended Operations on the RESTful API](#).

This is a full list of the operations defined by this specification:

<b>Base Operations (All resource types)</b>	
<a href="#">Validate a resource</a>	[base]/[Resource]/\$validate   [base]/[Resource]/[id]/\$validate
<a href="#">Access a list of profiles, tags, and security labels</a>	[base]/\$meta   [base]/[Resource]/\$meta   [base]/[Resource]/[id]/\$meta
<a href="#">Add profiles, tags, and security labels to a resource</a>	[base]/[Resource]/[id]/\$meta-add
<a href="#">Delete profiles, tags, and security labels for a resource</a>	[base]/[Resource]/[id]/\$meta-delete
<a href="#">Convert from one form to another</a>	[base]/\$convert
<a href="#">Execute a graphql statement</a>	[base]/\$graphql   [base]/[Resource]/[id]/\$graphql
<a href="#">Return a graph of resources</a>	[base]/[Resource]/[id]/\$graph
<b>Operations Defined by Resource Types</b>	
<a href="#">Apply</a>	[base]/ActivityDefinition/\$apply   [base]/ActivityDefinition/[id]/\$apply
<a href="#">Data Requirements</a>	[base]/ActivityDefinition/[id]/\$data-requirements
<a href="#">Fetch a subset of the CapabilityStatement resource</a>	[base]/CapabilityStatement/\$subset   [base]/CapabilityStatement/[id]/\$subset

# Reference/Pilot Implementation RESTful Architecture Model



# FHIR Terminologies



Home Getting Started Documentation Resources Profiles Extensions Operations **Terminologies**

Home

This page is part of the FHIR Specification (v4.0.1: R4 - Mixed Normative and STU) versions, see the [Directory of published versions](#)

Terminologies are the collections of codified concepts used in FHIR.

available

## 0 Welcome to FHIR®

FHIR is a standard for health care data exchange, published by HL7®.

### First time here?

See the [executive summary](#), the [developer's introduction](#), [clinical introduction](#), or [architect's introduction](#), and then the [FHIR overview / roadmap & Timelines](#). See also the [open license](#) (and don't miss the full [Table of Contents](#) and the [Community Credits](#) or you can [search this specification](#)).

### Technical Corrections:

<http://hl7.org/fhir/index.html>

# FHIR Terminologies

## 4.3.0 Code Systems

<a href="#">Vocabulary</a> <a href="#">Work Group</a>	<a href="#">Maturity Level: 3</a>	<a href="#">Standards Status: Trial Use</a>
---	-----------------------------------	---

The following names (URIs) may be used in the *system* element of the [Coding](#) data type. If a URI is defined here, it SHALL be used in preference to any other identifying mechanisms. If a code system is not listed here, the correct URI may be determined by working through the following list, in order:

- the HL7 OID Registry
- the documentation associated with the code system
- consulting the owner of the code system
- asking on the HL7 vocabulary mailing list

See also the [list of known identifier systems](#) that can be used in the *system* element of the [Identifier](#) data type. Additional identifier systems may be registered on the HL7 FHIR registry at <http://hl7.org/fhir/registry>.

### Important Notes:

- This list of names is incomplete and subject to change. Some values may be dropped, and others will likely be added in the coming months as HL7 institutes formal processes around URIs in vocabulary
- Note that some of the URNs in this list follow the URN specification in [RFC 5141](#) for referring to standards published by ISO, such as urn:iso:std:iso:11073:10101. Where ISO standards define codes with meanings, and there is no entry in the list above, and they are not registered in the HL7 OID registry, the default URN for the code system is that defined by the RFC 5141.
- For several of the code systems in this list, multiple systems are given. This means that the variants identified are different code systems, not just

[External](#)[Internal \(FHIR\)](#)[External \(FHIR\)](#)[HL7 v3](#)[HL7 v2](#)

URI	Source	Comment	OID (for non-FHIR systems)
<b>Externally Published code systems</b>			
<a href="http://snomed.info/sct">http://snomed.info/sct</a>	SNOMED CT (IHTSDO <a href="#">↗</a> )	See <a href="#">Using SNOMED CT with FHIR</a>	2.16.840.1.113883.6.96
<a href="http://www.nlm.nih.gov/research/umls/rxnorm">http://www.nlm.nih.gov/research/umls/rxnorm</a>	RxNorm (US NLM <a href="#">↗</a> )	See <a href="#">Using RxNorm with FHIR</a>	2.16.840.1.113883.6.88
<a href="http://loinc.org">http://loinc.org</a>	LOINC (LOINC.org <a href="#">↗</a> )	See <a href="#">Using LOINC with FHIR</a>	2.16.840.1.113883.6.1
<a href="http://unitsofmeasure.org">http://unitsofmeasure.org</a>	UCUM: (UnitsOfMeasure.org <a href="#">↗</a> ) Case Sensitive Codes	See <a href="#">Using UCUM with FHIR</a>	2.16.840.1.113883.6.8
<a href="http://ncimeta.nci.nih.gov">http://ncimeta.nci.nih.gov</a>	NCI Metathesaurus <a href="#">↗</a>	See <a href="#">Using NCI Metathesaurus with FHIR</a>	2.16.840.1.113883.3.26.1.2
<a href="http://www.ama-assn.org/go/cpt">http://www.ama-assn.org/go/cpt</a>	AMA CPT codes <a href="#">↗</a>	See <a href="#">Using CPT with FHIR</a>	2.16.840.1.113883.6.12
<a href="http://hl7.org/fhir/ndfrt">http://hl7.org/fhir/ndfrt</a>	NDF-RT (National Drug File – Reference Terminology) <a href="#">↗</a>	See <a href="#">Using NDF-RT with FHIR</a>	2.16.840.1.113883.6.209
<a href="http://fdasis.nlm.nih.gov">http://fdasis.nlm.nih.gov</a>	Unique Ingredient Identifier (UNII) <a href="#">↗</a>	See <a href="#">Using UNII with FHIR</a>	2.16.840.1.113883.4.9
<a href="http://hl7.org/fhir/sid/ndc">http://hl7.org/fhir/sid/ndc</a>	NDC/NHRIC Codes <a href="#">↗</a>	See <a href="#">Using NDC with FHIR</a>	2.16.840.1.113883.6.69
<a href="http://hl7.org/fhir/sid/cvx">http://hl7.org/fhir/sid/cvx</a>	CVX (Vaccine Administered) <a href="#">↗</a>	See <a href="#">Using CVX with FHIR</a>	2.16.840.1.113883.12.292

# FHIR Modules



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Home

This page is part of the FHIR Specification (v4.0.1: R4 - Mixed [Normative](#) and [STU](#)). This is the current published version. For a full list of available versions, see the [Directory of published versions](#)

## 0 Welcome to FHIR®

FHIR is a standard for health care data exchange, published by HL7®.

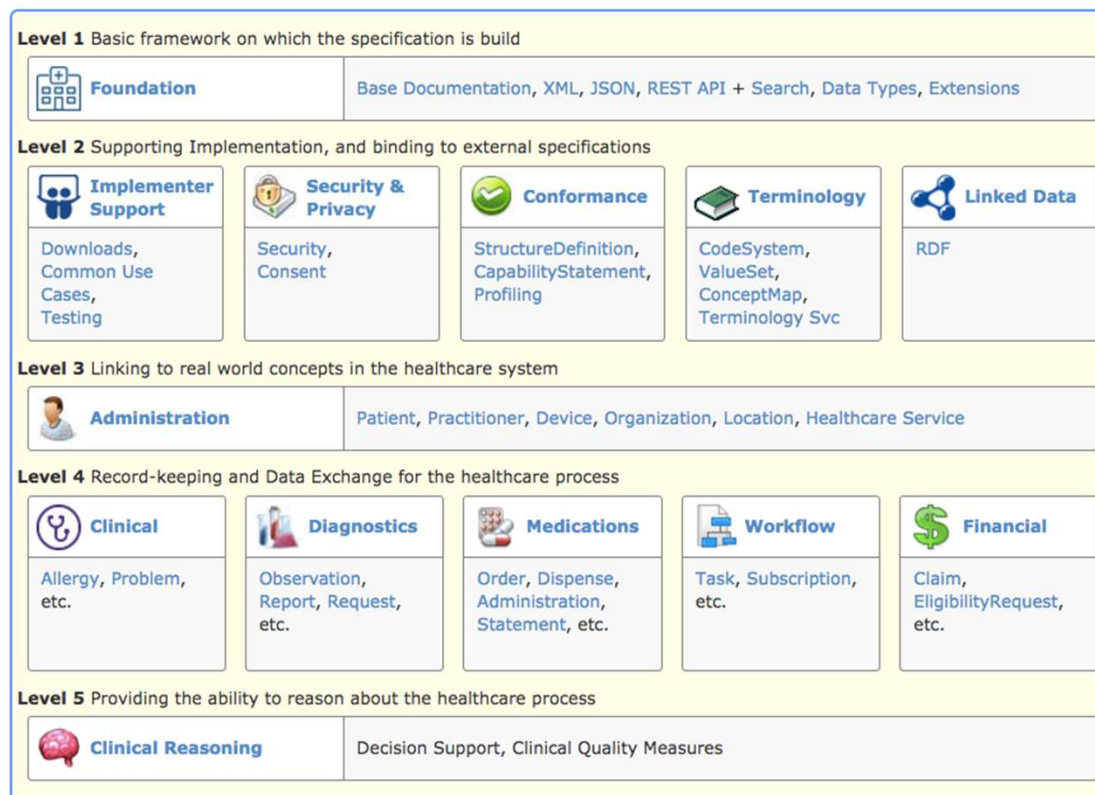
### First time here?

See the [executive summary](#), the [developer's introduction](#), [clinical introduction](#), or [architect's introduction](#), and then the FHIR [overview / roadmap](#) & [Timelines](#). See also the [open license](#) (and don't miss the full [Table of Contents](#) and the [Community Credits](#) or you can [search this specification](#)).

**Technical Corrections:**

<http://hl7.org/fhir/index.html>

# Levels





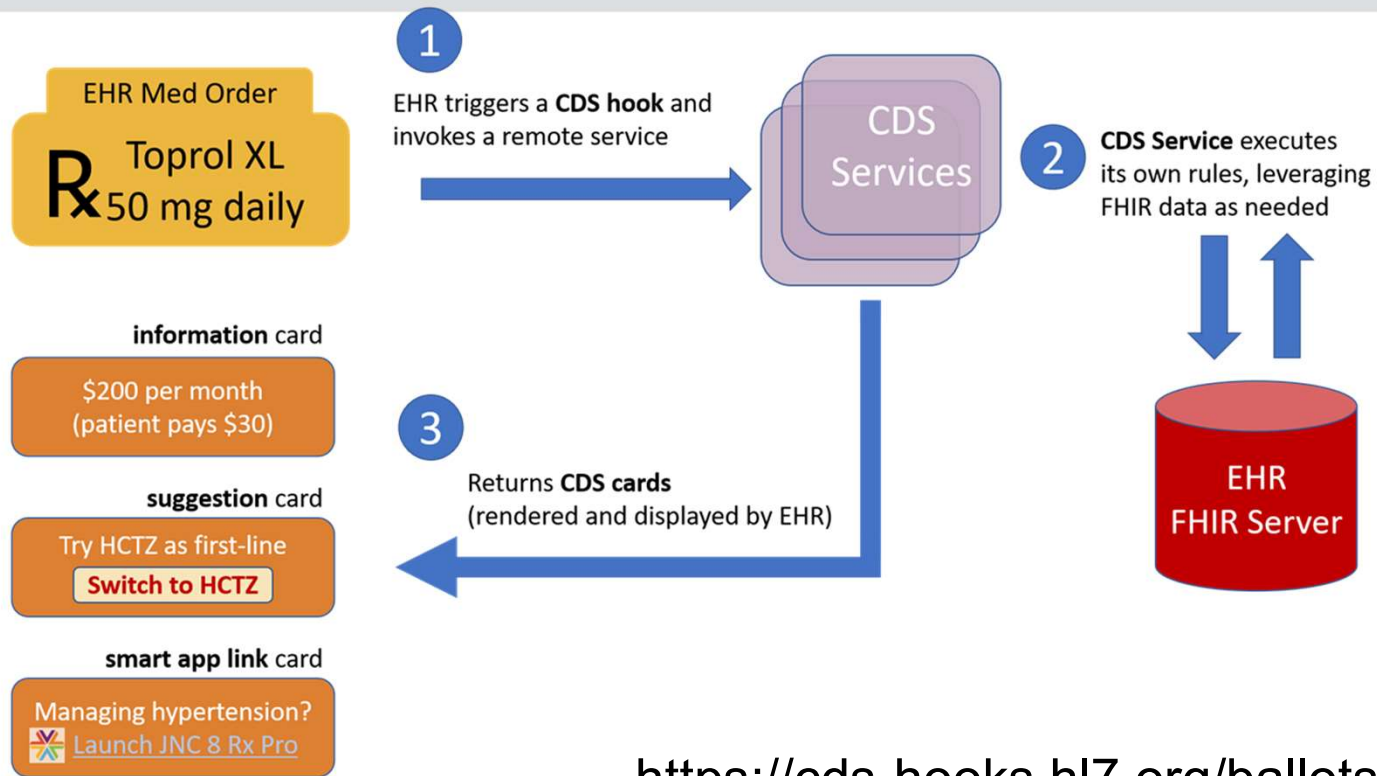
# SMART on FHIR

## SMART on FHIR<sup>®</sup> – Open Platform Architecture





# CDS-Hooks



<https://cds-hooks.hl7.org/ballots/2020Sep/>

# FHIR Bulk Data Access



BulkDataAccess IG: STU1



Press F11 to exit full screen



Overview Export Backend Services Authorization Operations History

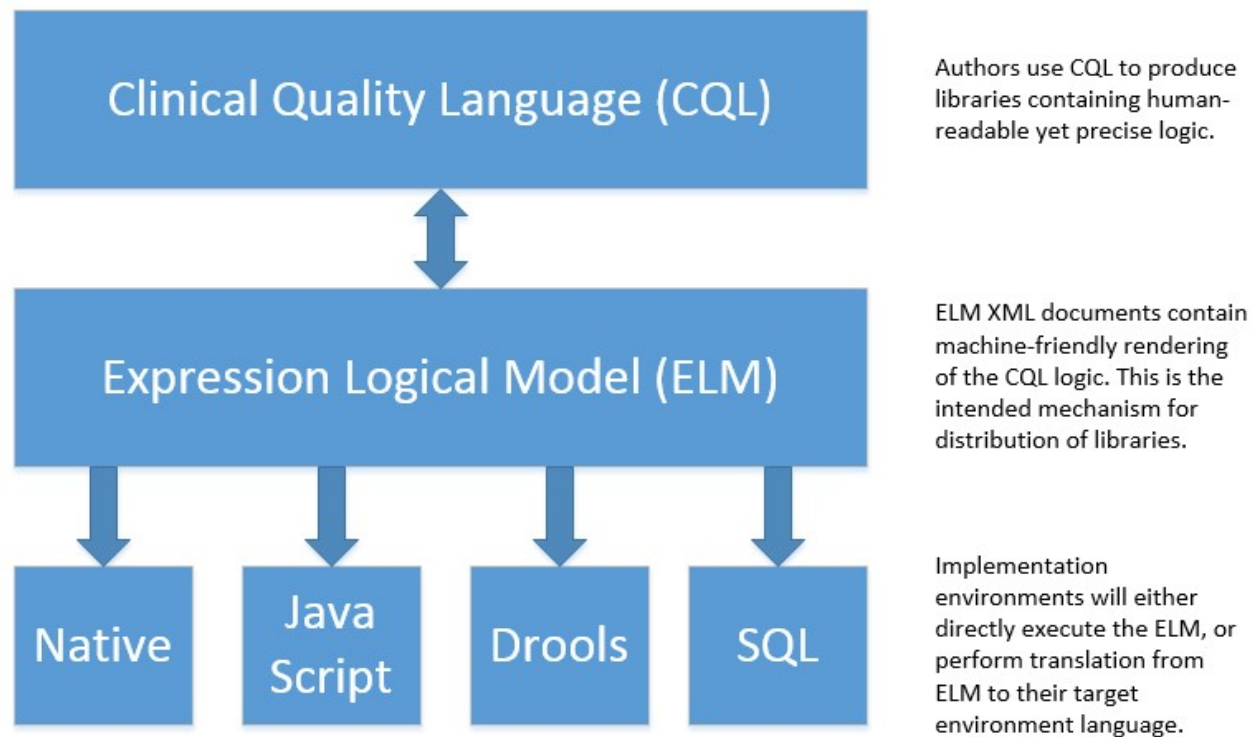
This page is part of the FHIR Bulk Data Access (Flat FHIR) (v1.0.0: [STU 1](#)) based on [FHIR R4](#). This is the current published version in it's permanent home (it will always be available at this URL). For a full list of available versions, see the [Directory of published versions](#)

## FHIR Bulk Data Access (Flat FHIR)

Providers and organizations accountable for managing the health of populations often need to efficiently access large volumes of information on a group of individuals. For example, a health system may want to periodically retrieve updated clinical data from an EHR to a research database, a provider may want to send clinical data on a roster of patients to their ACO to calculate quality measures, or an EHR may want to access claims data to close gaps in care. In most cases, access to these bulk-data exports is pre-authorized between the data holder and the data requester. The data exchange involves extracting a specific subset of fields from the source system, mapping the fields into a structured file format like CSV, and persisting the files in a server from which the requester can then download them into the target system. This multi-step process increases the cost of integration projects and can act as a counter-incentive to data liquidity.

Existing FHIR APIs work well for accessing small amounts of data, but large exports can require hundreds of thousands of requests. This

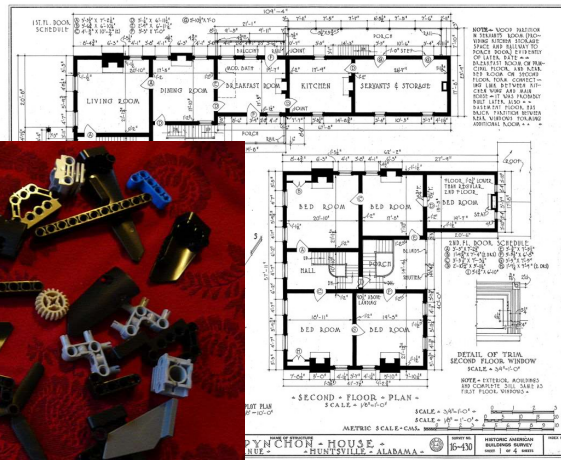
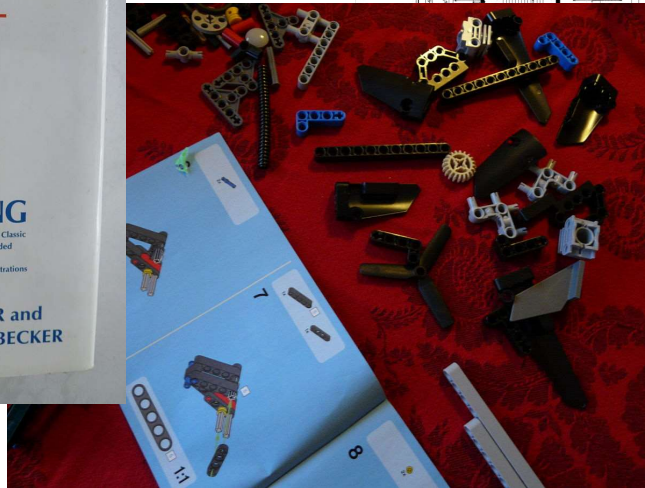
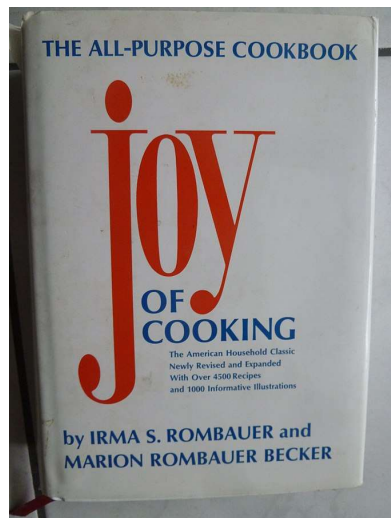
# Clinical Quality Language CQL



<https://cql.hl7.org/index.html>

# Implementation Guides

# Why do we need Implementation Guides?



## What is a FHIR Implementation Guide?

An implementation guide (IG) is a set of rules about how FHIR resources are used (or should be used) to solve a particular problem, with associated documentation to support and clarify the usage. Classically, FHIR implementation guides are published on the web after they are generated using the FHIR Implementation Guide Publisher.

# Major Components of an Implementation Guide

- Framework/Guidance
- Use cases and examples
- FHIR Artifacts – e.g. profiles, operations, terminology
- Conformance language and CompatibilityStatement
- Some variation between guides

# Business → Technical

 HL7 FHIR® US Core Implementation Guide CI Build 

Home Guidance FHIR Artifacts Security Examples Downloads

 HL7 FHIR® QI-Core Implementation Guide: STU 4 (v4.0.0 for FHIR 4.0.1) 

Home QI Core Profiles Patterns Extensions Terminology Examples Downloads QDM to QI Core QUICK Version History

 **CARIN Consumer Directed Payer Data Exchange**   
0.3.1 - STU1

Home Background Use Cases Guidance FHIR Artifacts Security Examples Downloads

 **DA VINCI**  **Da Vinci Unsolicited Notifications**   
1.0.0 - CI Build

Home Framework Admit/Discharge Use Case FHIR Artifacts Security Examples Downloads

 **DA VINCI**  **Data Exchange For Quality Measures STU2 for FHIR R4**   
2.0.0 - CI Build

Home Framework Example Use Cases FHIR Artifacts Examples Downloads Change Notes

 HL7 FHIR® Da Vinci Payer Data exchange Implementation Guide Release 0.1.0 

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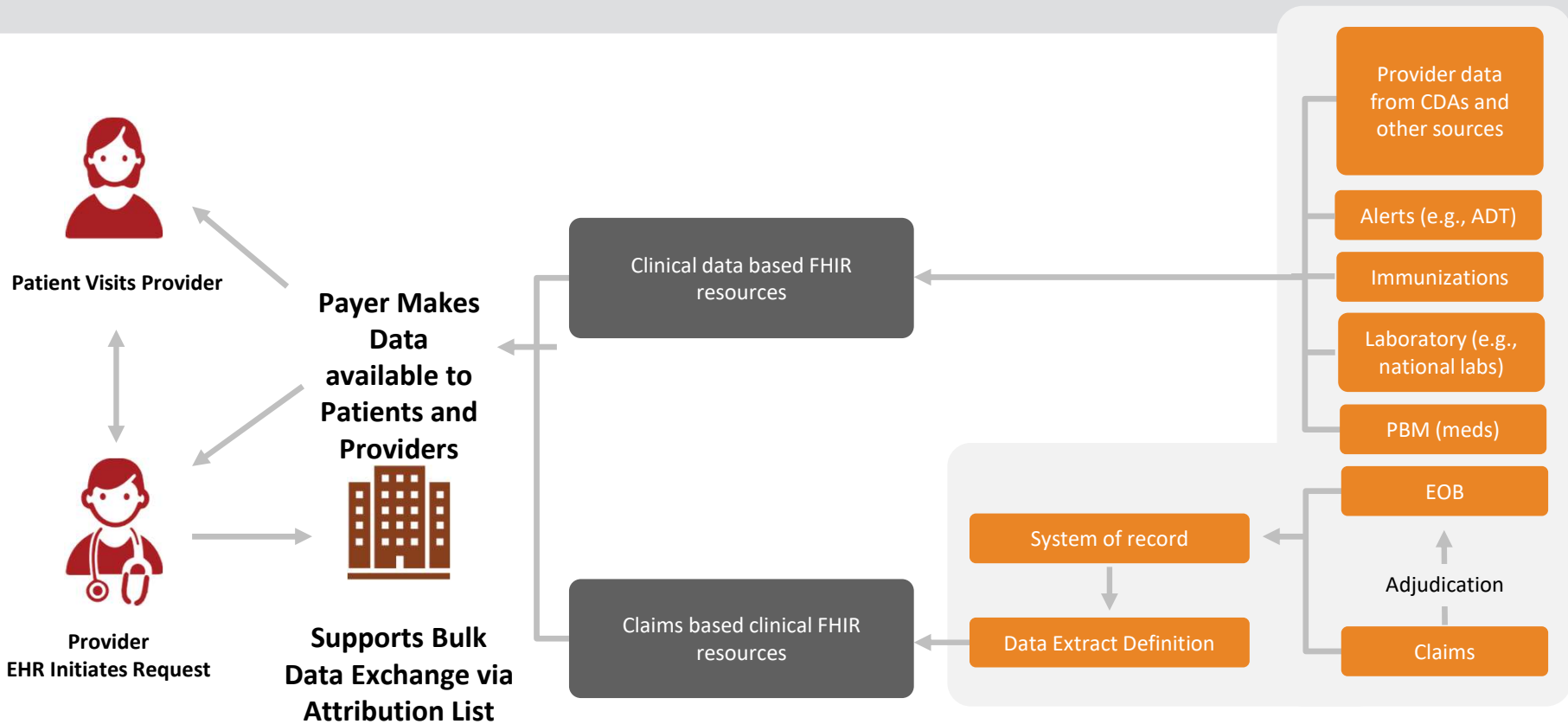


# Reviewing an IG

- Workflow context
- Required resources, profiles, data elements, value sets, etc.
- Technical and exchange interactions
- Additional required technologies
- Dependencies on other IGs
- Conformance and CapabilityStatement

# Example Scenarios

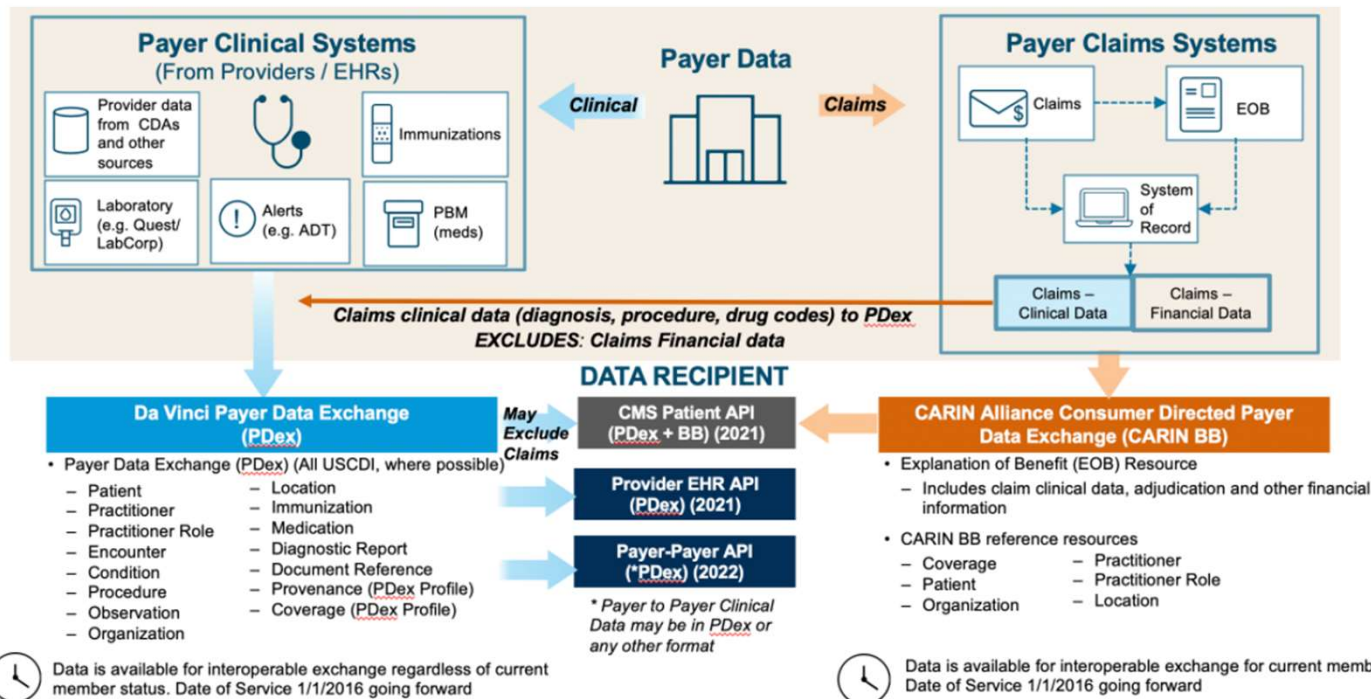
# Patient and Provider Access APIs (PDex)



PDex Information Sources/Flow

# PAYER DATA EXCHANGE (PDex)

## Data Associated With Payers Meeting the Administrative/Financial and Clinical Requirements of the Interoperability Exchange



# Why should the policy community understand FHIR?

# Structured vs Unstructured Data

**Question.** Are impacted payers required to **convert** large unstructured documents like portable document formats (**PDF**) to Fast Healthcare Interoperability Resources (FHIR) to support the clinical data exchange requirements of the Patient Access API? In other words, are impacted payers required to convert documents to FHIR to **identify clinical data elements** that may or may not be present on a PDF or fax?

**Response.** ...Patient Access API must meet the technical standards as finalized by HHS in the ONC 21st Century Cures Act final rule...CMS does not require payers to manually go through large files that cannot be parsed into data elements efficiently for the purposes of this API. The final rule did not require payers to include these large files as data available via the API.

# Authorization

**Question:** Does the final rule allow payers impacted by the payer-to-payer data exchange requirements to accept another payer's requests for a payer-to-payer data exchange on behalf of a member? Can a health plan be considered the enrollee's personal representative for the purpose of payer-to-payer data exchange?

**Response:** ..final rule (CMS-9115-F) imposes a requirement for certain impacted payers to send, at a current or former enrollee's request (or at the request of a personal representative)... Per the ... (HIPAA) privacy regulations at 45 CFR § 164.502(g), a **personal representative** is someone authorized under state or other applicable law to act on behalf of the individual in making health care related decisions (such as a parent, guardian, or person with a medical power of attorney). ... However, a health plan cannot be considered an enrollee's personal representative

# Compliance and Testing

**Question:** Does CMS require certification to determine if a payer's APIs comply with the requirements of the Interoperability and Patient Access final rule?

**Response:** No, CMS does not require that payers certify their APIs as part of the requirements... However, these impacted payers are required to conduct routine testing and monitoring, and update their systems as appropriate, to ensure the API functions properly, including conducting assessments to verify that the API is fully and successfully implementing privacy and security features such as those required to comply with HIPAA requirements...



# Maintained Data

**Question.** What is the requirement for impacted payers to maintain their data? Please clarify the intended meaning of the word “maintain.”

**Response.** The Interoperability and Patient Access final rule (CMS-9115-F) defines “maintain” to mean the impacted payer has access to the data, control over the data, and authority to make the data available through the API (85 FR 25538). Payers are only required to make the data that they maintain in their systems available through the Patient Access API and for exchange with other payers. If a payer does not maintain clinical information for covered patients in its systems, the payer will not have to share clinical information through the Patient Access API or for exchange with other payers.

# How to Participate in the HL7 Community

The screenshot shows the HL7 International website homepage. At the top left is the HL7 International logo. To the right are social media icons for Twitter, Facebook, LinkedIn, and YouTube, followed by a search bar labeled 'ENHANCED BY Google' and a search icon. A navigation menu below the header includes links for About, Standards, Membership, Resources, Events, Training, and Certification. The main content area features a large banner for a 'Working Group Meeting Plus' in New Orleans, LA, from May 8-12, 2023, with a 'REGISTER TODAY' button. To the right of the banner are two sections: 'HL7 Standards' with buttons for V2, CDA, and HL7 FHIR, and 'New to HL7?' with buttons for 'Why Get Involved?' and 'Orientation Station'. Below these are three columns: 'Upcoming Events' (April 17-21, 2023, HIMSS23), 'Upcoming Training' (March 30 - April 27, 2023, HL7 FHIR Fundamentals), and 'About HL7 International' (founded in 1987, ANSI-accredited standards).

# Confluence.HL7.org

The screenshot displays the Confluence.HL7.org website interface. At the top, there is a navigation bar with the Confluence logo, "Spaces", "People", and "Glossaries" menus, a search bar, and a "Log in" button. The main content area is divided into three columns. The left column contains a sidebar with the "HL7" logo, "Pages" section, "SPACE SHORTCUTS" (including "HL7 Essentials", "HL7.org", "HL7 Work Groups & Projects", "HL7 Documentation & Help", "Project Scope Statements", "Project Proposals", "Zoom", and "Joint WGM Scheduler"), and a "PAGE TREE" section listing various policy and project documents. The middle column lists various clinical and operational topics such as "Clinical Genomics", "Clinical Information Modeling Initiative", "Clinical Interoperability Council", "Clinical Quality Information", "Community-Based Care and Privacy", "Conformance", "Cross-Group Projects", "Devices", "Electronic Health Records", "Emergency Care", "FHIR Infrastructure", "Financial Management", "Human and Social Services", "Imaging Integration", "Implementable Technology Specifications", "Infrastructure and Messaging", "Learning Health Systems", "Mobile Health", "Orders & Observations", "Patient Administration", and "Patient Care". The right column features a prominent "HL7 FHIR Accelerator Programs" section with the FHIR Accelerator logo and a list of projects: "Argonaut Project", "CARIN Alliance", "CodeX", "Da Vinci", "FHIR at Scale Taskforce (FAST)", "Gravity Project", "Helios", and "Vulcan". Below this list is a red button labeled "HL7 FHIR Accelerator Program Home". To the right of the main content is a sidebar titled "HL7 Affiliates" with a globe icon and a list of regional entities: "HL7 Australia", "HL7 Brazil", "HL7 Denmark", "HL7 Europe", "HL7 India", "HL7 Italy", "HL7 Korea", "HL7 Netherlands", and "HL7 New Zealand". A "Provide feedback" button is located on the far right edge of the page.

# Chat.fhir.org – FHIR Implementers

The screenshot displays the Chat.fhir.org interface. The main chat window is titled "# Announcements" and shows several messages:

- A message from **Joshua Procius** (Nov 23) stating: "Currently HL7.org logins are not currently working. We are investigating and will update when resolved. Thank you for your patience! Logins are working again. Please close your browser before attempting to login again. If you have any questions, please let me know!"
- A message from **Notification Bot** (Dec 03) stating: "Lisa Nelson created a new stream #CMG CDA Announcements."
- A message from **John Moehrke** (7:35 AM) stating: "IHE released for Public Comment an update to IUA (our OAuth profile), the HIE-Whitepaper (including FHIR profiles), and published the whole ITI Technical Framework in html form. All found at the new site: <https://profiles.ihe.net/> Discussion on the #ihe zulip stream"
- A message from **Notification Bot** (9:46 AM) stating: "Giorgio Cangini created a new stream #FAIR"

The interface also features a sidebar with navigation options (All messages, Private messages, Mentions, Starred messages, Recent topics) and a list of streams (Da Vinci, Da Vinci HIMSS20 Technical...). A user list on the right side includes names like Viet Nguyen, Brendan Keeler, Debi Willis, Elliot Silver, Matthew Nizol, Raheel Sayeed, Sagar Shah, AJ Chen, Ajay Prashar, Alexander Henket, Alexander Kiel, Amit Popat, Andrew, Andrew Statler, Bapi Behera, Becky Angeles, Bob Freimuth, Brian Forbis, Bryn Rhodes, Camila Altman, Chris Connor, Christopher Fougere, Courtney Bland, and an option to "Invite more users".



## The Role of Policy in the Advancement of Healthcare Interoperability Standards Development and Adoption

**Whatever your role is, the WGM+ has content for you!**

- Keynotes from policy leaders
- Accelerator updates and working sessions
- Expanded education and demo sessions
- Implementation Guide deep dives
- Hot topics in the FHIR community
- And more!



**Thank you!**