



**HL7<sup>®</sup>FHIR<sup>®</sup>** 技術概要

HL7技術委員会

平井 正明

2019年3月25日

<http://www.hl7.org/fhir/?ref=learnmore>

<http://www.fhir.org>

## V2系

### CSV

Na,150,K+,4,5,RBC,4.56,...



H,^~¥&,...,OBX,1¥ST,84295^NA,,150,...

### ASTM E1238

H|^~¥&|...|OBX|1¥ST|84295^NA||150|mmol....

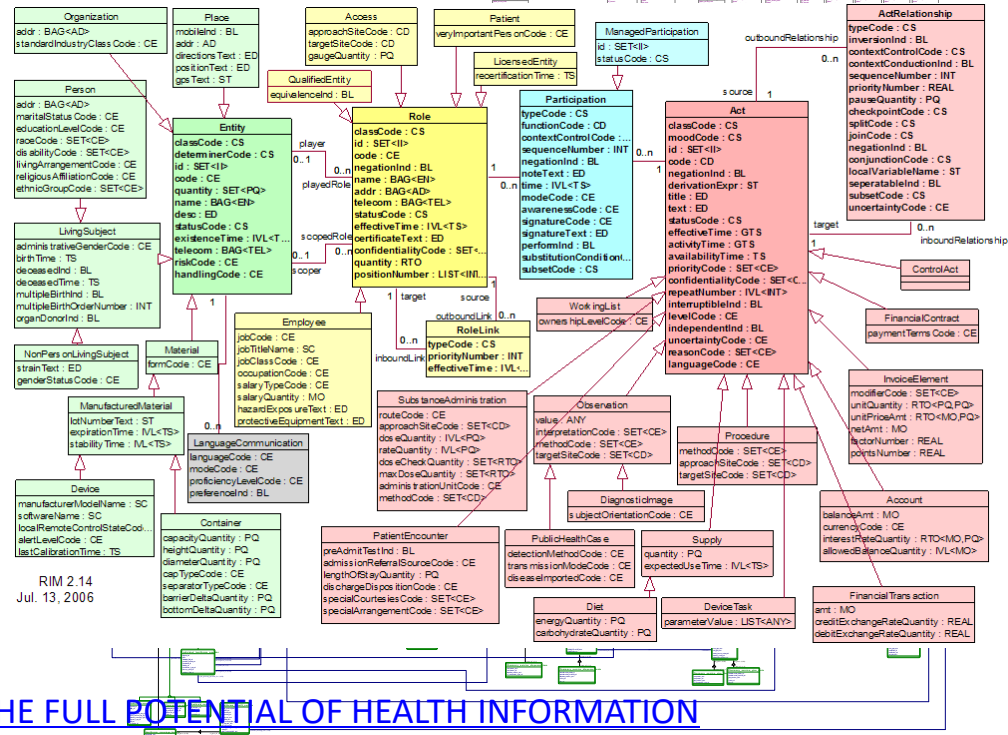


### HL7 V 2.5

MSH|^~¥&|EKG||CDB||198905201201||ORF^R04|X981672|P|...

...  
MSH|^~¥&|EKG||CDB||198905201201||ORF^R04|X981672|P|...

## V3 RIM (+CEN+IEEE1157:Medix)



REPORT TO THE PRESIDENT REALIZING THE FULL POTENTIAL OF HEALTH INFORMATION TECHNOLOGY TO IMPROVE HEALTHCARE FOR AMERICANS: THE PATH FORWARD

2010/12



REPORT TO THE PRESIDENT  
REALIZING THE FULL POTENTIAL OF  
HEALTH INFORMATION TECHNOLOGY  
TO IMPROVE HEALTHCARE  
FOR AMERICANS:  
THE PATH FORWARD

Executive Office of the President  
President's Council of Advisors  
on Science and Technology

December 2010



リーマン・ショック 2008/9/15

ARRA 200億ドル

HITECH act

(→ Meaningful use)

2009/2/17

Eric Schmidt  
(Google)

Douglas Fridsma  
(ONC)

John Halamka  
(Beth Israel)

- 2013年(meaningful use stage2)
- 2015年(meaningful use stage3)  
Meaningful use をどう実現するか
- CDAを採用。、HL7も、ただし、、、
- 汎用技術の採用  
RFHが背景に？
- Tagged metadata, data element
- 80 percent \*\*\*  
many person or things?

2013年3月(JAHIS米国Healthcare Information Systems MMS調査)  
Meaningful use stage2

ブッシュ大統領の施策  
2006/1  
医療情報の電子化 \$1M

実装可能容易性(中小ベンチャーでも容易に実現)、S&I Framework、CCDA、(To be → As is)

Simple, Easy, Modular

第三者(患者を含む)が容易に医療情報にアクセス (Blue button、スマホ)

WEBベース(HTTP) ボタンの成功?

Agile

RFH(2011)  
Resources for  
Healthcare



2013年9月HL7総会

- 「医療情報データの交換に独特のアプローチが必要」の考えを捨てる必要がある
- 細かい事の対応より、より単純で機能が重要である
- HTML+HTTP = FHIR と REST/OAuth2/OpenID



**Keynote Speaker**

**John Halamka, MD, MS**

Director, Chief Information Officer, Beth Israel Deaconess Medical Center; Chief Information Officer & Dean for Technology, Harvard Medical School; Chair of the ONC Standards Committee



- 業務上の処理のソフトウェアをサービスとしてネットワークで連携しシステム全体を構成
- オープンで標準化されたアーキテクチャ、すなわちWEBサービスの、疎結合なコンポーネントの組合せにより実現
- WEBサービス→SOAその基盤がSOAPだったが難解・複雑  
RESTが発達

→RESTful

Resource For Health → FHIR



# WEB標準の復習 : httpメッセージ

## 普段から我々が使用している環境

http://www.hl7.org/fhir



GET /www.hl7.org/fhir HTTP/1.1



```

10 6f 3f dc 59 c7 28 f0 76 45 dd d4 08 00 45 00 .o?.Y.(. vE....E.
01 12 00 00 40 00 40 06 66 0b c0 a8 0b 06 40 09 ....@.@. f.....@.
c8 23 cc b2 00 50 a5 ed 45 6b 0c 34 54 5b 80 18 .#...P.. Ek.4T[.
08 04 04 21 00 00 01 01 08 0a 1f 46 a5 47 00 00 ...!.... ...F.G..
00 00 47 45 54 20 2f 66 68 69 72 20 48 54 54 50 ..GET /f hir HTTP
2f 31 2e 31 0d 0a 63 61 63 68 65 2d 63 6f 6e 74 /1.1..ca che-cont
72 6f 6c 3a 20 6e 6f 2d 63 61 63 68 65 0d 0a 50 rol: no- cache..P
6f 73 74 6d 61 6e 2d 54 6f 6b 65 6e 3a 20 35 64 ostman-T oken: 5d
39 37 62 38 32 34 2d 61 64 64 64 2d 34 34 31 35 97b824-a ddd-4415
2d 38 35 34 38 2d 66 38 61 39 36 31 63 62 65 38 -8548-f8 a961cbe8
62 32 0d 0a 55 73 65 72 2d 41 67 65 6e 74 3a 20 b2..User -Agent:
50 6f 73 74 6d 61 6e 52 75 6e 74 69 6d 65 2f 37 PostmanR untime/7
2e 36 2e 30 0d 0a 41 63 63 65 70 74 3a 20 2a 2f .6.0..Ac cept: */
2a 0d 0a 48 6f 73 74 3a 20 77 77 77 2e 68 6c 37 *.Host: www.hl7
2e 6f 72 67 0d 0a 61 63 63 65 70 74 2d 65 6e 63 .org..ac cept-enc
6f 64 69 6e 67 3a 20 67 7a 69 70 2c 20 64 65 66 oding: g zip, def
6c 61 74 65 0d 0a 43 6f 6e 6e 65 63 74 69 6f 6e late..Co nnection
3a 20 6b 65 65 70 2d 61 6c 69 76 65 0d 0a 0d 0a : keep-a live....
  
```



```

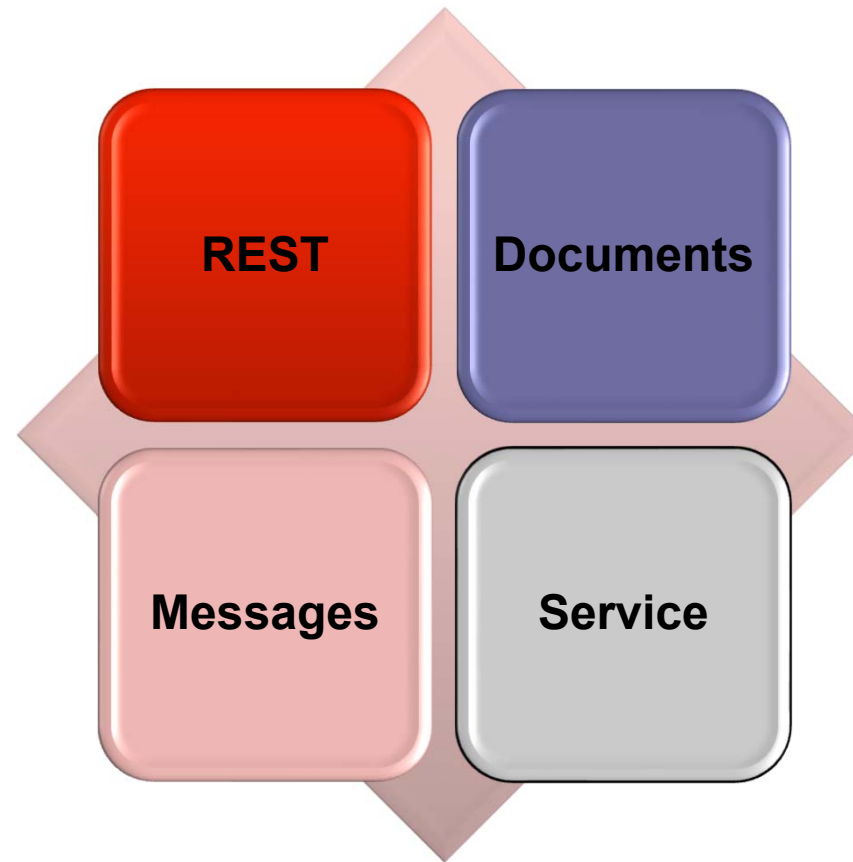
0000 48 54 54 50 2f 31 2e 31 20 32 30 30 20 4f 4b 0d HTTP/1.1 200 OK.
0010 0a 43 6f 6e 74 65 6e 74 2d 4c 65 6e 67 74 68 3a .Content -Length:
0020 20 31 38 38 37 37 0d 0a 43 6f 6e 74 65 6e 74 2d 18877.. Content-
0030 54 79 70 65 3a 20 74 65 78 74 2f 68 74 6d 6c 0d Type: te xt/html.
0040 0a 43 6f 6e 74 65 6e 74 2d 4c 6f 63 61 74 69 6f .Content -Locatio
0050 6e 3a 20 68 74 74 70 3a 2f 2f 77 77 77 2e 68 6c n: http: //www.hl
0060 37 2e 6f 72 67 2f 66 68 69 72 2f 69 6e 64 65 78 7.org/fh ir/index
.....
0140 30 31 39 20 30 36 3a 30 36 3a 34 39 20 47 4d 54 019 06:0 6:49 GMT
0150 0d 0a 0d 0a ef bb bf 3c 21 44 4f 43 54 59 50 45 .....< !DOCTYPE
0160 20 48 54 4d 4c 3e 0d 0a 3c 68 74 6d 6c 20 78 6d HTML>.. <html xm
0170 6c 6e 73 3d 22 68 74 74 70 3a 2f 2f 77 77 77 2e lns="htt p://www.
0180 77 33 2e 6f 72 67 2f 31 39 39 39 2f 78 68 74 6d w3.org/1 999/xhtm
0190 6c 22 20 78 6d 6c 3a 6c 61 6e 67 3d 22 65 6e 22 l" xml:l ang="en"
01a0 20 6c 61 6e 67 3d 22 65 6e 22 3e 0d 0a 3c 68 65 lang="e n">..<he
01b0 61 64 3e 0d 0a 20 20 3c 74 69 74 6c 65 3e 49 6e ad>.. < title>In
01c0 64 65 78 20 2d 20 46 48 49 52 20 76 34 2e 30 2e dex - FH IR v4.0.
  
```

```

<!DOCTYPE HTML>
<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" lang="en">
  <head>
    <title>Index - FHIR v4.0.0</title>
    <meta name="viewport" content="width=device-width, initial-
scale=1.0"/>
    <meta name="author" content="http://hl7.org/fhir"/>
    <link rel="stylesheet" href="fhir.css"/>
    <link rel="Prev" href="http://hl7.org/fhir/index.html"/>
  
```

## FHIRの4つのParadigm

---

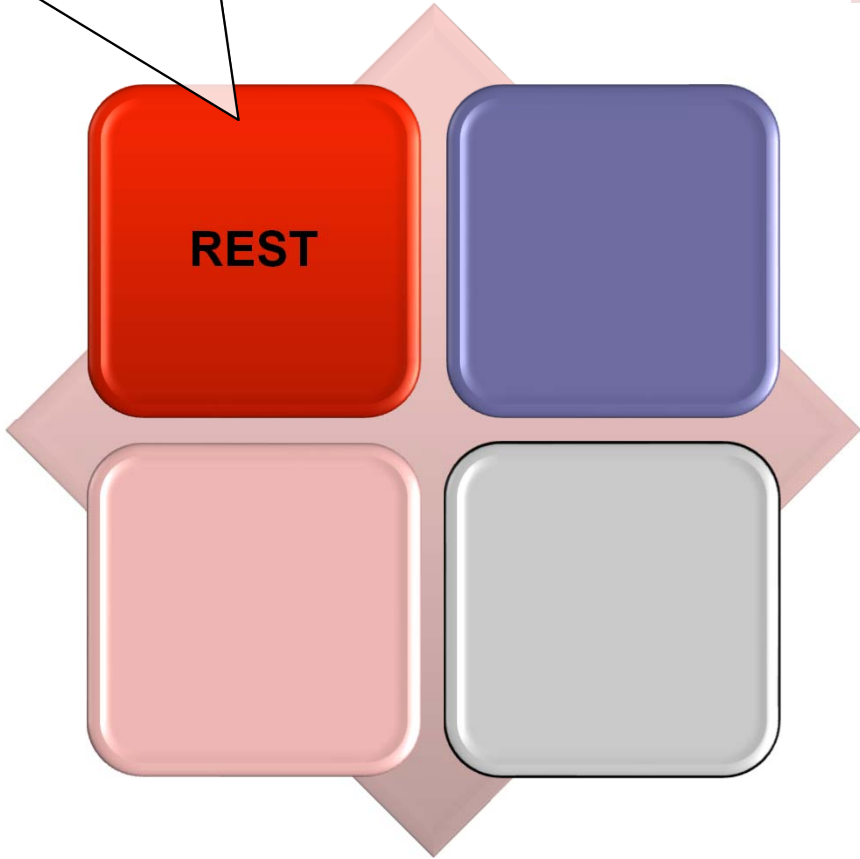


# FHIRの4パラダイムの一つ: REST

(REpresentational State Transfer)

REpresentational State Transfer  
**ROA(Resource Oriented Architecture)**

HL7スタンダードでは  
使わなかった用語



↑

WEBの世界では常  
用されているリソース  
という用語

## リソースとは

### リソース例

FHIRではこの様なものをリソースと呼ぼう  
Whyではなく定義

- 管理上の単位
  - Patient
  - Practitioner
  - Organization
  - Location
  - Coverage
  - Invoice
- 臨床上の概念
  - Allergy
  - Condition
  - Family History
  - Care Plan
- インフラストラクチャ
  - Document
  - Message
  - Profile
  - Conformance

### リソースに該当しない例

- 小さすぎる  
eg. Gender
- 大きすぎる  
eg. Electronic Health Record
- 限定すぎる  
eg. Blood pressure
- 広すぎる  
eg. Intervention

V2:セグメント

V3:CMET

?

## FHIRの仕様書

<http://www.hl7.org/fhir/?ref=learnmore>



Health Level Seven International x Index - FHIR v4.0.0

保護されていない通信 | www.hl7.org/fhir/?ref=learnmore

**FHIR® FHIR R4**

Home Getting Started Documentation Resources Profiles Extensions Operations Terminologies

仕様書 リソース プロファイル

This is the Current officially released version of FHIR, which is R4.  
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](#)).

**Level 1** Basic framework on which the specification is built

**Foundation** Base Documentation, XML, JSON, Data Types, Extensions

**Level 2** Supporting implementation and binding to external specifications

**Implementer Support** Downloads, Version Mgmt, Use Cases, Testing

**Security & Privacy** Security, Consent, Provenance, AuditEvent

**Conformance** StructureDefinition, CapabilityStatement, ImplementationGuide, Profiling

**Terminology** CodeSystem, ValueSet, ConceptMap, Terminology Svc

**Exchange** REST API + Search Documents Messaging Services Databases

**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**

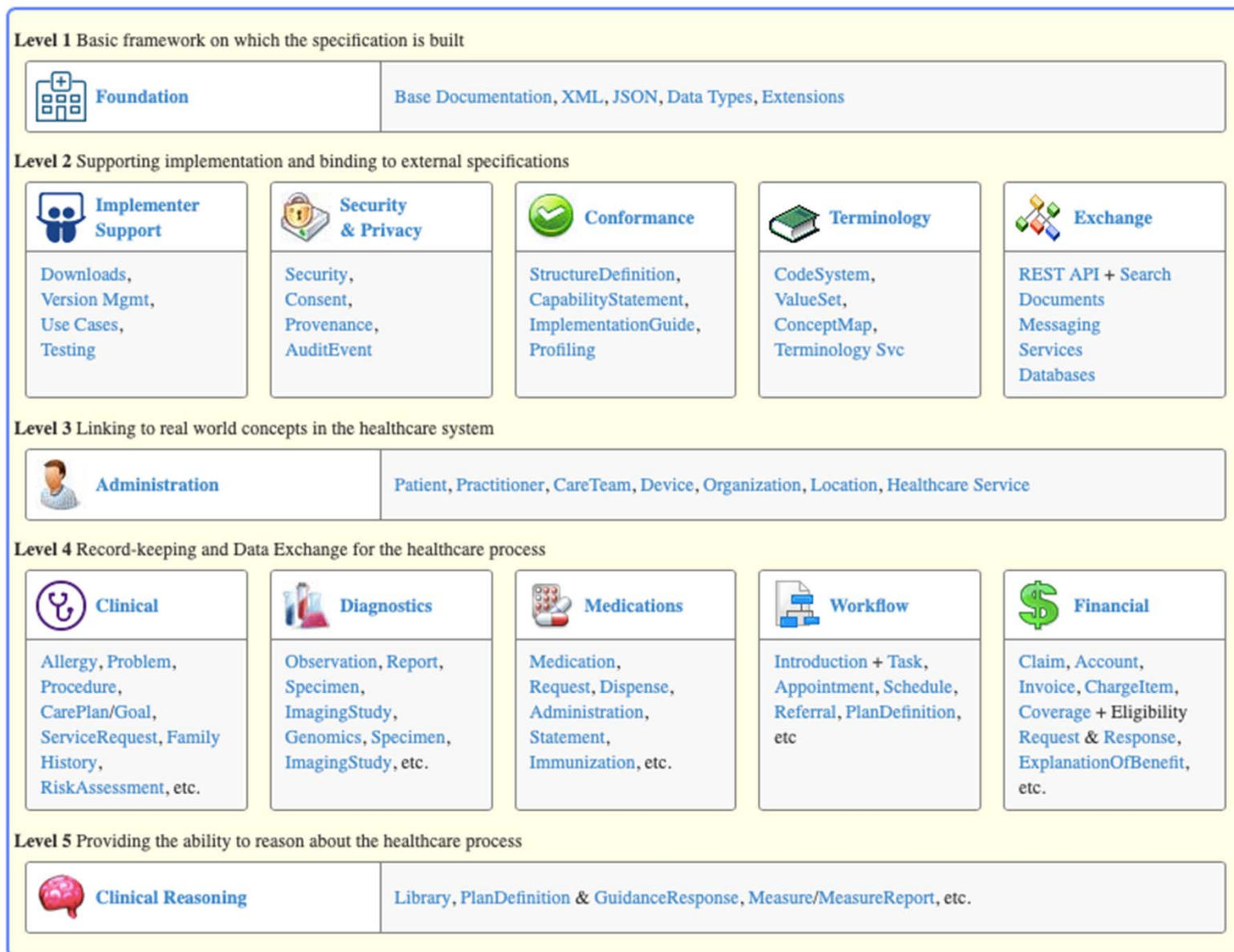
http://www.hl7.org/fhir/?ref=learnmore

FHIRリリース版選択














概要とサマリー

仕様カテゴリー 5つのレベル

# カテゴリー レベル1、2 (成熟度レベルではない)



## TYPE Icon

	リソース基本エレメント(リソース参照)
	同一のリソースの一部またはプロファイルで定義された複数エレメントを有するエレメント
	複数の異なったタイプの一つを持つことができるエレメント(下記参照)
	属性/プロパティ値を有するエレメントを記述するデータタイプのエレメント。これらはプリミティブタイプで小文字で始まる
	その他のエレメントを記述するデータタイプのエレメント。これらはコンプレックスタイプで大文字で始まる
	他のリソースを参照するエレメント(referenceを参照)
	本エレメントは本リソースまたはプロファイル内でその他のエレメントと同一の内容を有する
	スライスのセットの導入(Slicing参照)
	コンプレックス拡張-ネストされた拡張の一つ(拡張性参照)
	値を有する拡張でネストされていない(拡張性参照)
	コンプレックス修飾拡張-ネストされた拡張の一つ(拡張性参照)
	値を有する拡張でネストされていない(拡張性参照)
	論理プロファイルのルート

- ?! : ブール値を持つ修飾子
- S : サポートしなければならない要素
- Σ : 集合の一部の要素
- I : 制約を定義するか制約の影響を受ける要素
- NE: 拡張できない要素(一部のinfrastructural要素のみ)
- TU** : トライアル時のみ使用
- N** : Normative要素
- D** : ドラフト時の要素

**レベル 3: Administration(管理)**

患者、医療従事者、組織、機器、物質などを管理、トレースするための基本規定

**レベル 4: Clinical(臨床情報)**

プロブレム、アレルギー、治療過程(治療計画、紹介)等の主な臨床情報

**レベル 4: Diagnostics(診断情報)**

所見、各種報告書、指示等

**レベル 4: Medication(投薬管理)**

処方、調剤、投薬管理、予防接種等の管理とトレース

**レベル 4: Workflow(ワークフロー)**

ケアプロセス、治療行為の技術的な成果物の管理

**レベル 4: Financial(会計管理)**

会計、保険請求の支援

**レベル 5: Clinical Reasoning(臨床支援)**

意思決定支援、品質管理支援

The screenshot shows the FHIR R4 website's 'Resources' page. The navigation bar includes 'Home', 'Getting Started', 'Documentation', 'Resources', 'Profiles', 'Extensions', 'Operations', and 'Terminologies'. The 'Resources' link is circled with a callout labeled 'リソース'. Below the navigation, the breadcrumb 'Table of Contents > Resources' is shown. The main heading is '1.2 Resource Index'. A metadata bar shows 'FHIR Infrastructure Work Group', 'Maturity Level: N/A', and 'Standards Status: Informative'. A paragraph of text is partially visible, with a callout labeled 'ABC順' pointing to the 'Alphabetical' filter button in the sorting menu. The sorting menu also includes 'Categorized', 'R2 Layout', 'By Maturity', 'Security Category', 'By Standards Status', and 'By Committee'. The main content area is a table with five columns: 'Conformance', 'Terminology', 'Security', 'Documents', and 'Other'. Each column contains a list of resource types with their counts and a small 'N' icon.

	Conformance	Terminology	Security	Documents	Other
Foundation	<ul style="list-style-type: none"> <li>CapabilityStatement <b>N</b></li> <li>StructureDefinition <b>N</b></li> <li>ImplementationGuide 1</li> <li>SearchParameter 3</li> <li>MessageDefinition 1</li> <li>OperationDefinition <b>N</b></li> <li>CompartmentDefinition 1</li> <li>StructureMap 2</li> <li>GraphDefinition 1</li> <li>ExampleScenario 0</li> </ul>	<ul style="list-style-type: none"> <li>CodeSystem <b>N</b></li> <li>ValueSet <b>N</b></li> <li>ConceptMap 3</li> <li>NamingSystem 1</li> <li>TerminologyCapabilities 0</li> </ul>	<ul style="list-style-type: none"> <li>Provenance 3</li> <li>AuditEvent 3</li> <li>Consent 2</li> </ul>	<ul style="list-style-type: none"> <li>Composition 2</li> <li>DocumentManifest 2</li> <li>DocumentReference 3</li> <li>CatalogEntry 0</li> </ul>	<ul style="list-style-type: none"> <li>Basic 1</li> <li>Binary <b>N</b></li> <li>Bundle <b>N</b></li> <li>Linkage 0</li> <li>MessageHeader 4</li> <li>OperationOutcome <b>N</b></li> <li>Parameters <b>N</b></li> <li>Subscription 3</li> </ul>



# Foundation

Conformance	Terminology	Security	Documents	Other
CapabilityStatement	CodeSystem	Provenance	Composition	Basic
StructureDefinition	ValueSet	AuditEvent	DocumentManifest	Binary
ImplementationGuide	ConceptMap	Consent	DocumentReference	Bundle
SearchParameter	NamingSystem		CatalogEntry	Linkage
MessageDefinition	TerminologyCapabilities			MessageHeader
OperationDefinition				OperationOutcome
CompartmentDefinition				Parameters
StructureMap				Subscription
GraphDefinition				
ExampleScenario				

# Base

Individuals	Entities #1	Entities #2	Workflow	Management
Patient	Organization	Substance	Task	Encounter
Practitioner	OrganizationAffiliation	BiologicallyDerivedProduct	Appointment	EpisodeOfCare
PractitionerRole	HealthcareService	Device	AppointmentResponse	Flag
RelatedPerson	Endpoint	DeviceMetric	Schedule	List
Person	Location		Slot	Library
Group			VerificationResult	

# Clinical

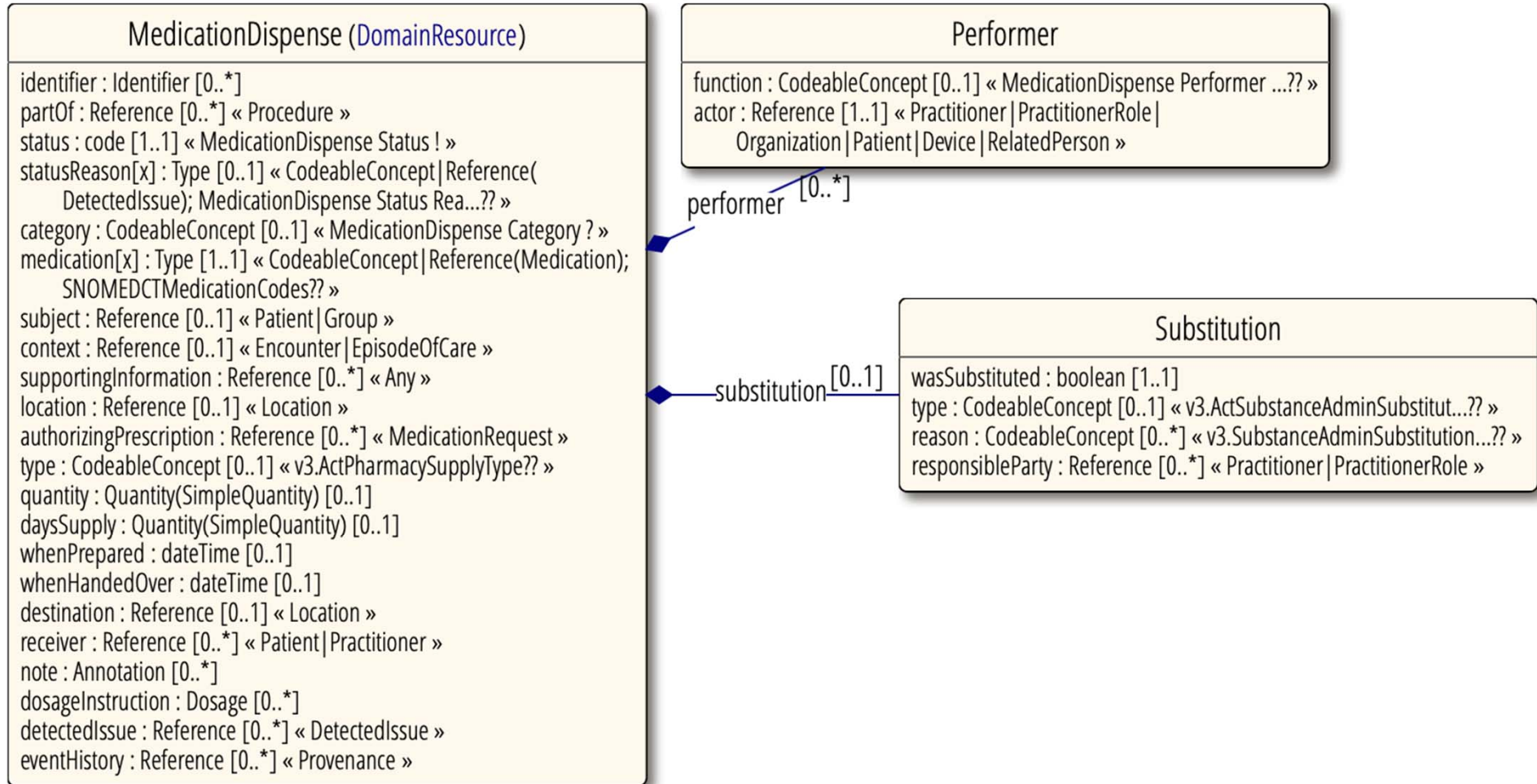
Summary	Diagnostics	Medications	Care Provision	Request & Response
AllergyIntolerance	Observation	MedicationRequest	CarePlan	Communication
AdverseEvent	Media	MedicationAdministration	CareTeam	CommunicationRequest
Condition (Problem)	DiagnosticReport	MedicationDispense	Goal	DeviceRequest
Procedure	Specimen	MedicationStatement	ServiceRequest	DeviceUseStatement
FamilyMemberHistory	BodyStructure	Medication	NutritionOrder	GuidanceResponse
ClinicalImpression	ImagingStudy	MedicationKnowledge	VisionPrescription	SupplyRequest
DetectedIssue	QuestionnaireResponse	Immunization	RiskAssessment	SupplyDelivery
	MolecularSequence	ImmunizationEvaluation	RequestGroup	
		ImmunizationRecommendation		

# Financial

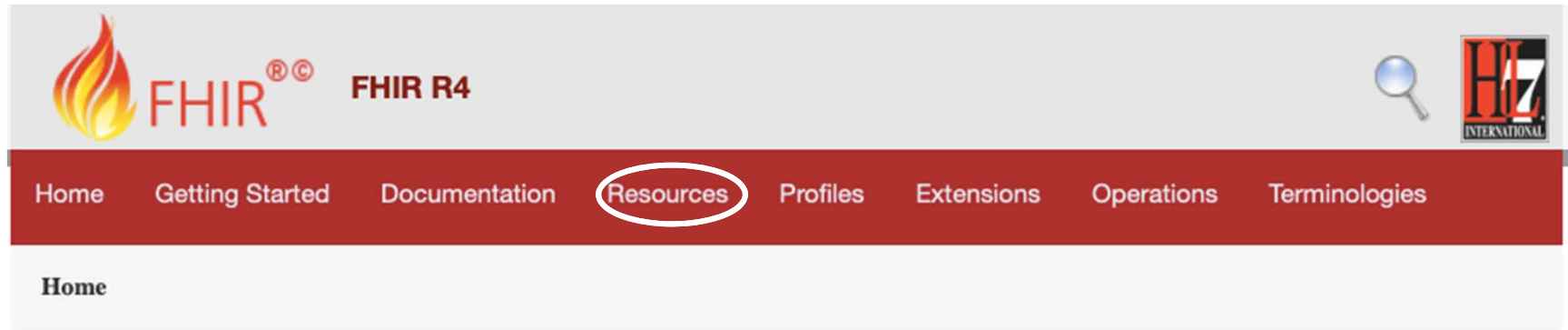
Support	Billing	Payment	General
Coverage	Claim	PaymentNotice	Account
CoverageEligibilityRequest	ClaimResponse	PaymentReconciliation	ChargeItem
CoverageEligibilityResponse	Invoice		ChargeItemDefinition
EnrollmentRequest			Contract
EnrollmentResponse			ExplanationOfBenefit
			InsurancePlan

# Specialized

Public Health & Research	Definitional Artifacts	Evidence-Based Medicine	Quality Reporting & Testing	Medication Definition
ResearchStudy	ActivityDefinition	ResearchDefinition	Measure	MedicinalProduct
ResearchSubject	DeviceDefinition	ResearchElementDefinition	MeasureReport	MedicinalProductAuthorization
	EventDefinition	Evidence	TestScript	MedicinalProductContraindication
	ObservationDefinition	EvidenceVariable	TestReport	MedicinalProductIndication
	PlanDefinition	EffectEvidenceSynthesis		MedicinalProductIngredient
	Questionnaire	RiskEvidenceSynthesis		MedicinalProductInteraction
	SpecimenDefinition			MedicinalProductManufactured
				MedicinalProductPackaged
				MedicinalProductPharmaceutical
				MedicinalProductUndesirableEffect
				SubstancePolymer
				SubstanceReferenceInformation
				SubstanceSpecification







The screenshot shows the top navigation bar of the FHIR R4 website. On the left, there is the FHIR logo (a flame) and the text 'FHIR R4'. On the right, there is a magnifying glass icon and the HL7 International logo. Below the logo area is a dark red navigation bar with white text links: 'Home', 'Getting Started', 'Documentation', 'Resources' (circled in white), 'Profiles', 'Extensions', 'Operations', and 'Terminologies'. Below the navigation bar, the word 'Home' is displayed in a light gray box.

This is the Current officially released version of FHIR, which is [R4](#).  
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®.

# 仕様書の操作と見方例

## 1.2 Resource Index

FHIR Infrastructure <a href="#">Work Group</a>	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	<b>Conformance</b> <ul style="list-style-type: none"> <li>CapabilityStatement <b>N</b></li> <li>StructureDefinition <b>N</b></li> <li>ImplementationGuide 1</li> <li>SearchParameter 3</li> <li>MessageDefinition 1</li> <li>OperationDefinition <b>N</b></li> <li>CompartmentDefinition 1</li> <li>StructureMap 2</li> <li>GraphDefinition 1</li> <li>ExampleScenario 0</li> </ul>	<b>Terminology</b> <ul style="list-style-type: none"> <li>CodeSystem <b>N</b></li> <li>ValueSet <b>N</b></li> <li>ConceptMap 3</li> <li>NamingSystem 1</li> <li>TerminologyCapabilities 0</li> </ul>	<b>Security</b> <ul style="list-style-type: none"> <li>Provenance 3</li> <li>AuditEvent 3</li> <li>Consent 2</li> </ul>	<b>Documents</b> <ul style="list-style-type: none"> <li>Composition 2</li> <li>DocumentManifest 2</li> <li>DocumentReference 3</li> <li>CatalogEntry 0</li> </ul>	<b>Other</b> <ul style="list-style-type: none"> <li>Basic 1</li> <li>Binary <b>N</b></li> <li>Bundle <b>N</b></li> <li>Linkage 0</li> <li>MessageHeader 4</li> <li>OperationOutcome <b>N</b></li> <li>Parameters <b>N</b></li> <li>Subscription 3</li> </ul>
	ase	<b>Individuals</b> <ul style="list-style-type: none"> <li>Patient <b>N</b></li> <li>Practitioner 3</li> <li>PractitionerRole 2</li> </ul>	<b>Entities #1</b> <ul style="list-style-type: none"> <li>Organization 3</li> <li>OrganizationAffiliation 0</li> <li>HealthcareService 2</li> </ul>	<b>Entities #2</b> <ul style="list-style-type: none"> <li>Substance 2</li> <li>BiologicallyDerivedProduct 0</li> <li>Device 0</li> </ul>	<b>Workflow</b> <ul style="list-style-type: none"> <li>Task 2</li> <li>Appointment 3</li> <li>AppointmentResponse 3</li> </ul>

Patientリソース

# Patientリソース仕様書の構造

The screenshot displays the 'Structure' view of the Patient resource in the HL7 FHIR specification. The table below summarizes the elements shown in the image:

Name	Flags	Card.	Type	Description & Constraints
Patient	<b>N</b>	0..*	DomainResource	Information about an individual or animal receiving health care services Elements defined in Ancestors: id, meta, implicitRules, language, text, contactPoint An identifier for this patient
active	?! Σ	0..1	boolean	Whether this patient's record is in active use
name	Σ	0..*	HumanName	A name for the individual
telecom	Σ	0..*	ContactPoint	A contact point for the individual
gender	Σ	0..1	code	male   female   other   unknown AdministrativeGender (Required)
birthDate	Σ	0..1	date	The date of birth for the individual
deceased[x]	?! Σ	0..1		Indicates if the individual is deceased or not
deceasedBoolean			boolean	
deceasedDateTime			dateTime	
address	Σ	0..*	Address	An address for the individual
maritalStatus		0..1	CodeableConcept	Marital (civil) status of a patient MaritalStatus (Extensible)
multipleBirth[x]		0..1		Whether patient is part of a multiple birth
multipleBirthBoolean			boolean	
multipleBirthInteger			integer	
photo		0..*	Attachment	Image of the patient

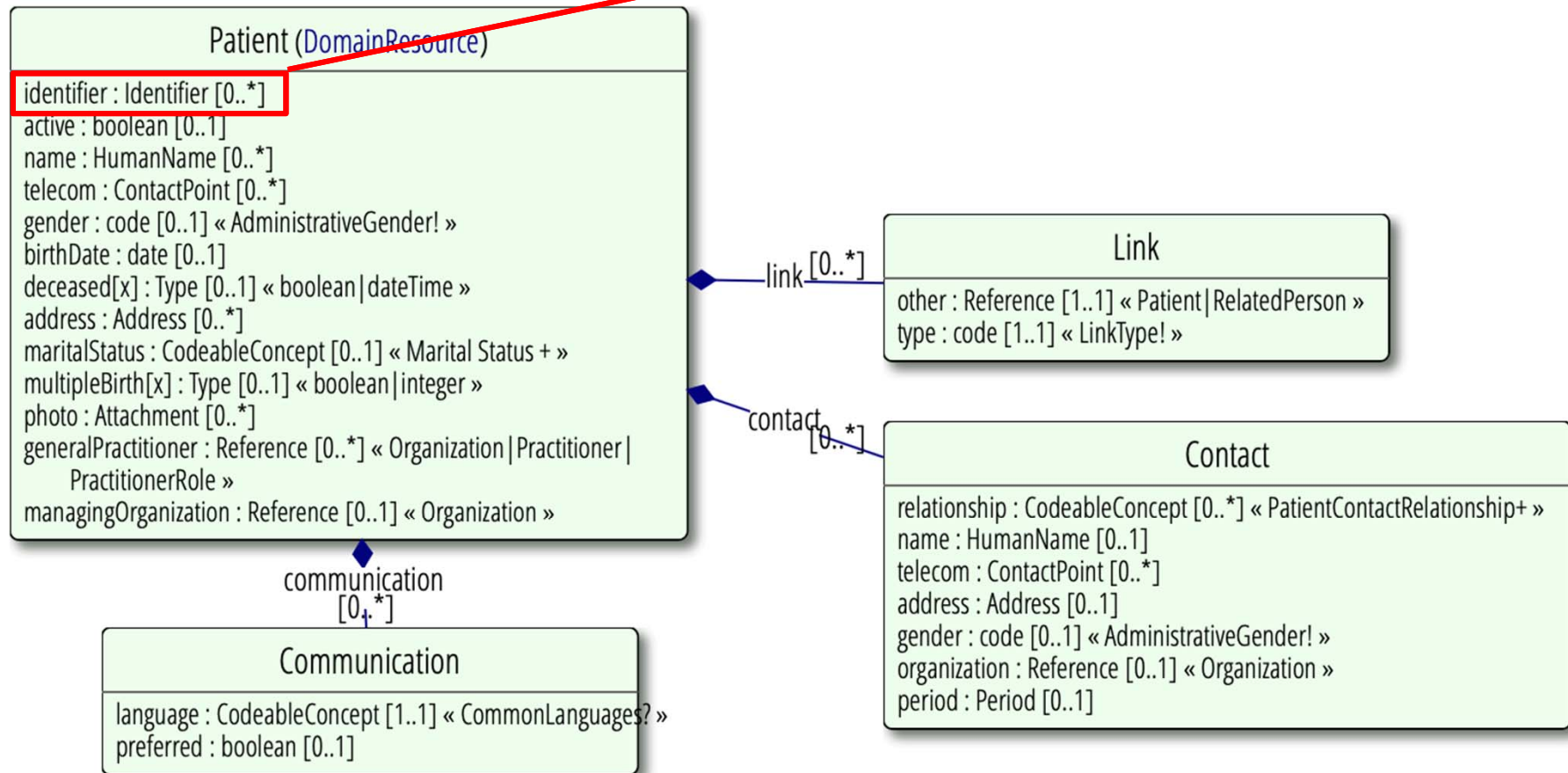
Callouts in the image explain the following:

- XMLでの表記**: Points to the 'XML' tab in the navigation bar.
- Turtle(RDF)での表記**: Points to the 'Turtle' tab in the navigation bar.
- JSONでの表記**: Points to the 'JSON' tab in the navigation bar.
- UMLでの表記**: Points to the 'Structure' view of the Patient resource.
- Flagの意味**: Points to the 'N' flag in the 'Flags' column for the Patient resource.

# リソース定義(例: Patient Resource)

UML Diagram (Legend)

リソース機能識別子(例: 患者ID)  
(Tagged data element)



```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<Patient xmlns="http://hl7.org/fhir">
```

```
<id value="glossy"/>  
<meta>  
  <lastUpdated value="2014-11-13T11:41:00+11:00"/>  
</meta>
```

Resource, Identity, Metadata

```
<text>  
  <status value="generated"/>  
  <div xmlns="http://www.w3.org/1999/xhtml">  
    <p> Henry Levin the 7th</p>  
    <p> MRN: 123456. Male, 24-Sept 1932</p>  
  </div>  
</text>
```

Human Readable Summary  
安全確保のための Fallback

```
<extension url="http://example.org/StructureDefinition/trials">  
  <valueCode value="renal"/>  
</extension>
```

Extension with reference(URL)  
to definition

```
<identifier>  
  <use value="usual"/>  
  <type>  
    <coding>  
      <system value="http://terminology.hl7.org/CodeSystem/v2-0203"/>  
      <code value="MR"/>  
    </coding>  
  </type>  
  <system value="http://www.goodhealth.org/identifiers/mrn"/>  
  <value value="123456"/>  
</identifier>  
<active value="true"/>  
<name>  
  <family value="Levin"/>  
  <given value="Henry"/>  
  <suffix value="The 7th"/>  
</name>  
<gender value="male"/>  
<birthDate value="1932-09-24"/>  
<generalPractitioner>  
  <reference value="Practitioner/example"/>  
  <display value="Dr Adam Careful"/>  
</generalPractitioner>  
<managingOrganization>  
  <reference value="Organization/2"/>  
  <display value="Good Health Clinic"/>  
</managingOrganization>
```

Standard Data

- MR(v2 0203 Medical Record Number)
- Name
- Gender
- Date of Birth
- Provider

```
</Patient>
```

- FHIRにはExtensionの標準的なフレームワークがある
- 全てのFHIRエレメント(データタイプも含めて)は拡張できる
- 全てのextensionはURLと値を持つ
- 全てのシステムはルールに従ったextensionはread, write, store, exchangeできる
- 全てのextensionはスキーマ等で検証される

```
<Patient xmlns="http://hl7.org/fhir">  
#   >$/#000000#/@#  
    <multipleBirthBoolean value="true">  
        <extension url="http://hl7.org/fhir/Profile/us-core#birthoeder">  
            <valueDecimal value="2"/>  
        </extension>  
    </multipleBirthBoolean>  
#   #   >$/#000000#/@#  
</Patient>
```



Extensionは80%ルールの適用から外れたもので例外ではなく、どこにでもExtensionは規定される

- システムは認識できないとして、Extension拒否してはならない
  - Extensionを捨てることは受け手側への有用な情報を無くす可能性があることであり、出来るだけExtensionを確保できる様にする
  - 認識できないExtensionを、一つの塊としてタグづけしUnknown Extensionとしてとらえる
  - Legacyなシステムではそれができないかもしれないし、データが更新されてしまえば、いくつかのExtensionは消失することも
  - ExtensionはURLで識別できるので、そのURLにより調べることができるようにする
  - Extensionは価値がないわけではなく、重要なものもあり、問い合わせができるなら、Extensionをキャッシングして表示しても良い方法である
- Extensionの公開について
  - データを異なった粒度、コード、タイプでextensionとして送信しても良い
  - ただ、独自の定義をする前に既存のExtensionを調べて欲しい
  - Extensionはあくまで<extension> or "extension"の要素内で記載すること
- Extensionの登録場所
  - スcopeは何か、ローカルExtensionか、ローカルレジストリが理にかなっているか、
  - 制約事項はあるか
  - 広範囲に考えるため 登録し→より発見し易く→より理解し易く→より広い認知が得られる

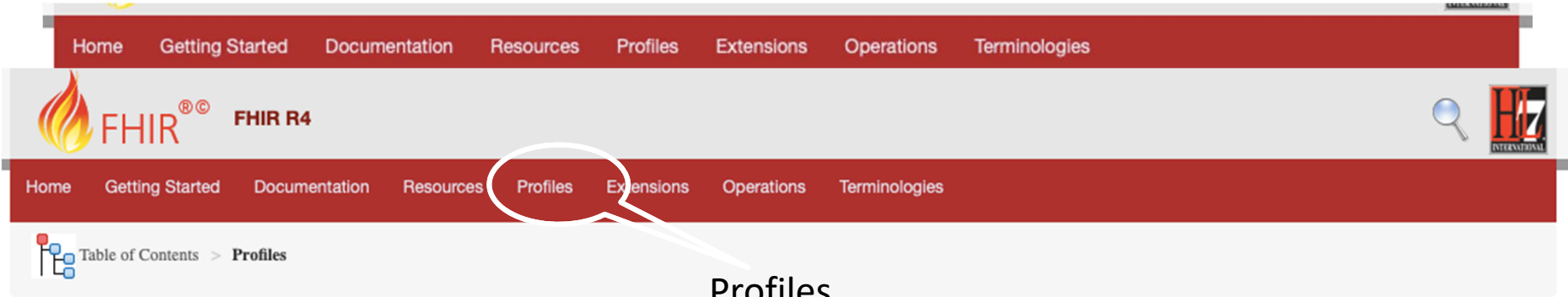
### 要素の意味の変更(修飾、否定等)

- いくつかExtensionは安全のため無視できない。必要であり無視するのは危険
- 認識できない修飾子の拡張を含むエレメントは
  - インスタンスの拒否
  - 認識できない修飾子(拡張を含む)エレメントの削除
  - Narrative部のみの表示
  - 人がその定義を検索して確認する
- いつ公開するか
  - 修飾子拡張が相互運用性を確保するため
  - 既存のものが無く、目的を達成する
    - 新しいリソースか否か基本に立ち返って考える
    - 他のエレメントの解釈で要素を変更せず要求が満たせないか
    - 既存の部分はよく使われるが、コアを正当化するにはあまりにも狭い

## Human Name extension (80%ルール)

---

```
<name>
  <extension url="http://hl7.org/fhir/StructureDefinition/iso21090-EN-representation">
    <valueCode value="IDE" />
  </extension>
  <family value="東京" />
  <given value="太郎" />
</name>
<name>
  <extension url="http://hl7.org/fhir/StructureDefinition/iso21090-EN-representation">
    <valueCode value="SYL" />
  </extension>
  <family value="とうきょう" />
  <given value="たろう" />
</name>
<name>
  <extension url="http://hl7.org/fhir/StructureDefinition/iso21090-EN-representation">
    <valueCode value="ABC" />
  </extension>
  <family value="Tokyo" />
  <given value="Tarou" />
</name>
```



### 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>

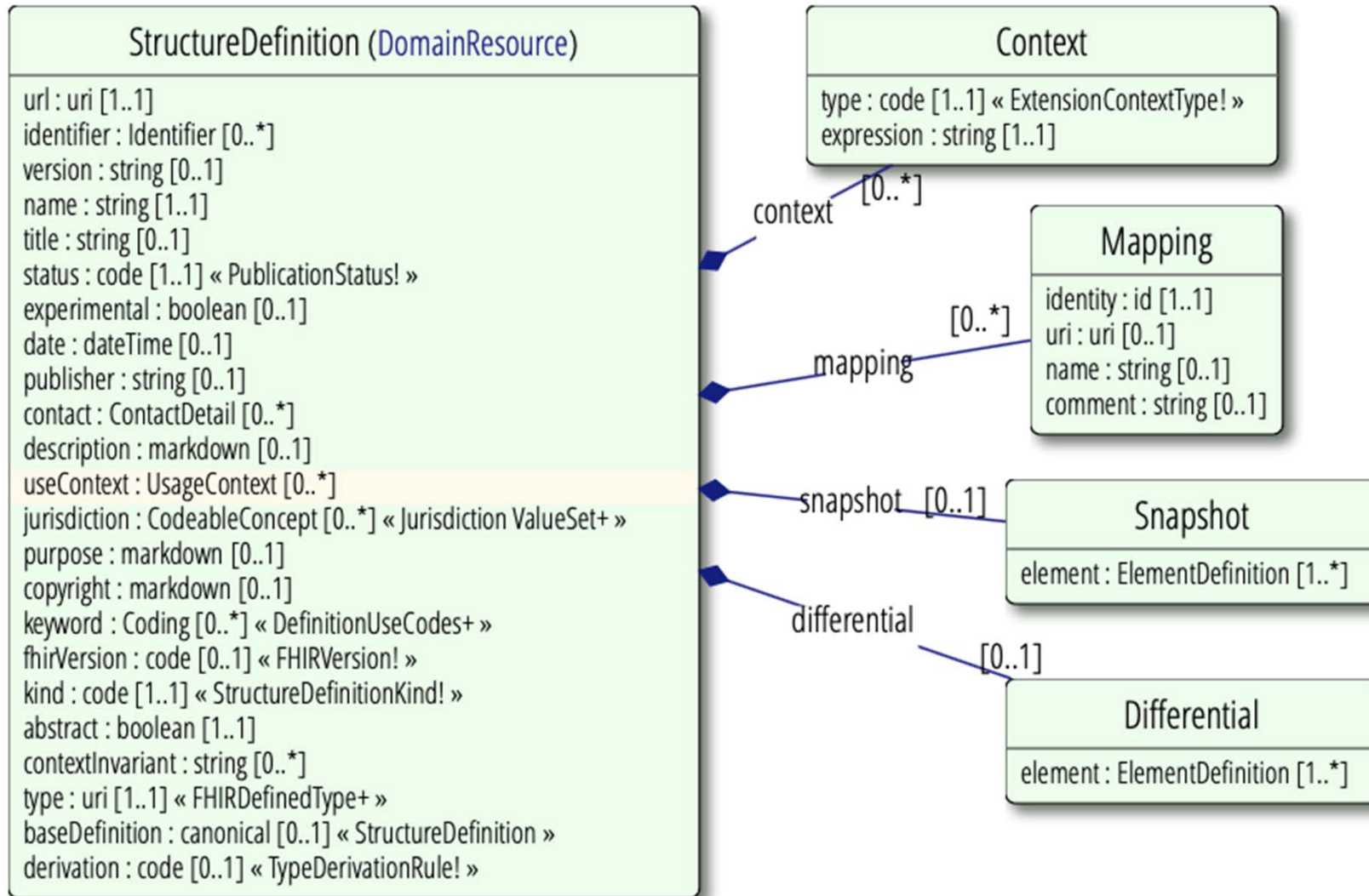
Name	Description	Kind	FMM
<b>General</b>			
<a href="#">EHRS FM Record Lifecycle Event - Audit Event</a>	Defines the elements to be supported within the AuditEvent resource in order to conform with the Electronic Health Record System Functional Model Record Lifecycle Event standard	profiles	
<a href="#">Clinical 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	

- 完全な実装ガイドや適合リソースにより適用プロセスを記述するものである
- Document, Messageの区切りおよびExtensionを定義する
- 特殊な状況の相互運用性の設定、国家規格、ケアの種類、ビジネスパターン、診療ガイドライン・詳細モデル等の定義

### 例

- 動的に構成が変わるシステムの振る舞いの規定
- データ入力、表示ガイド
- 医療支援(腫瘍学の紹介、アレルギー・過敏症、ケアプラン等)
- 複数のプロフィールを同時に適用
- 異なったデータセットに対する異なったコーディングの適応
- すべての必要なエレメントの集める
- プロファイルの最大出現数を制約無くする場合
- 宣言を支援するプロフィール
- その他

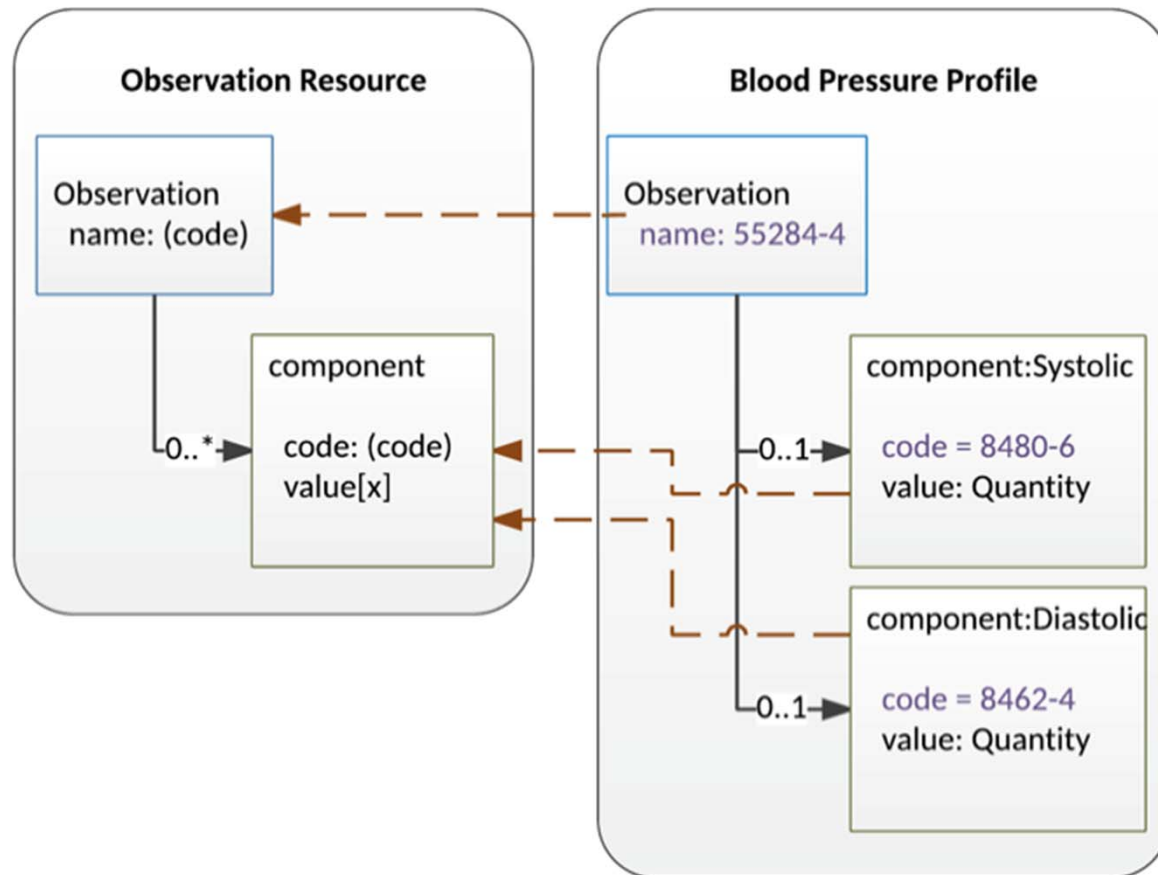
# Profile(構造定義)



## 【例】Slicingによる血圧の規定

### スライシング

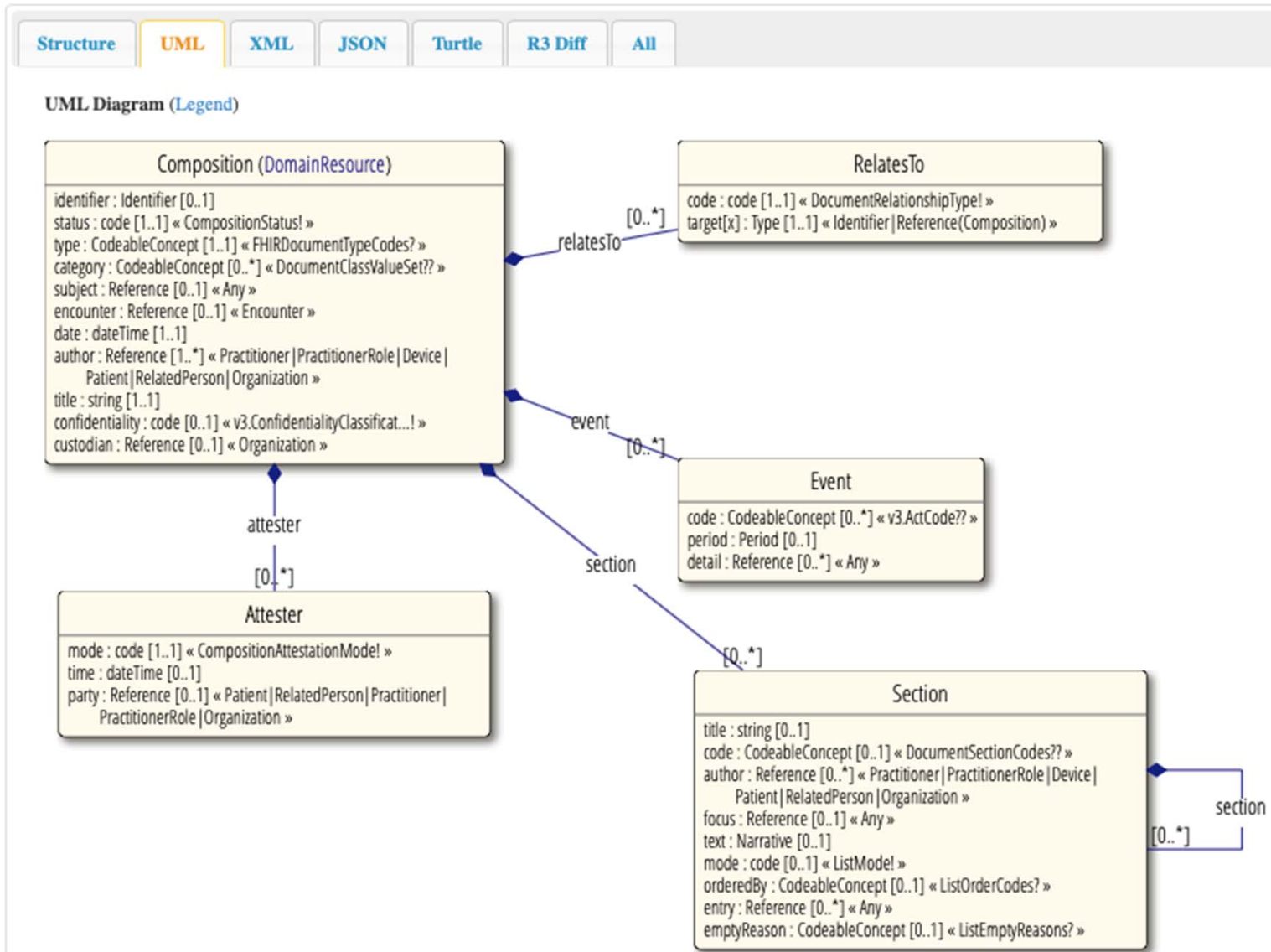
Structure定義に従い、血圧のようにそれぞれが意味を持つサブリストとして分割させて記述するよう規定する

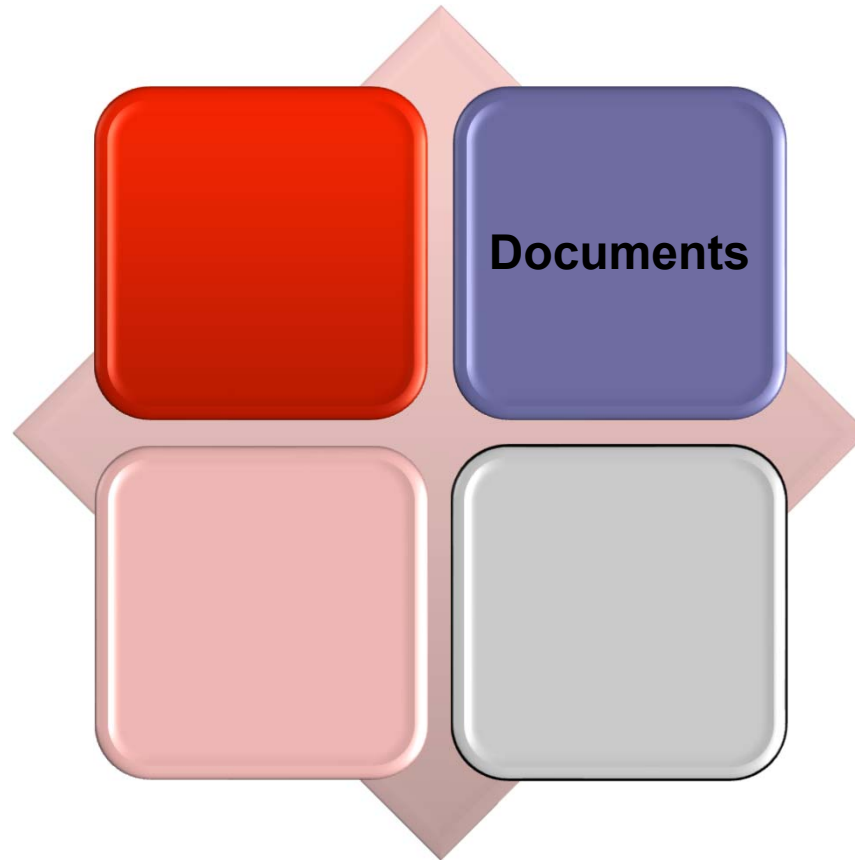


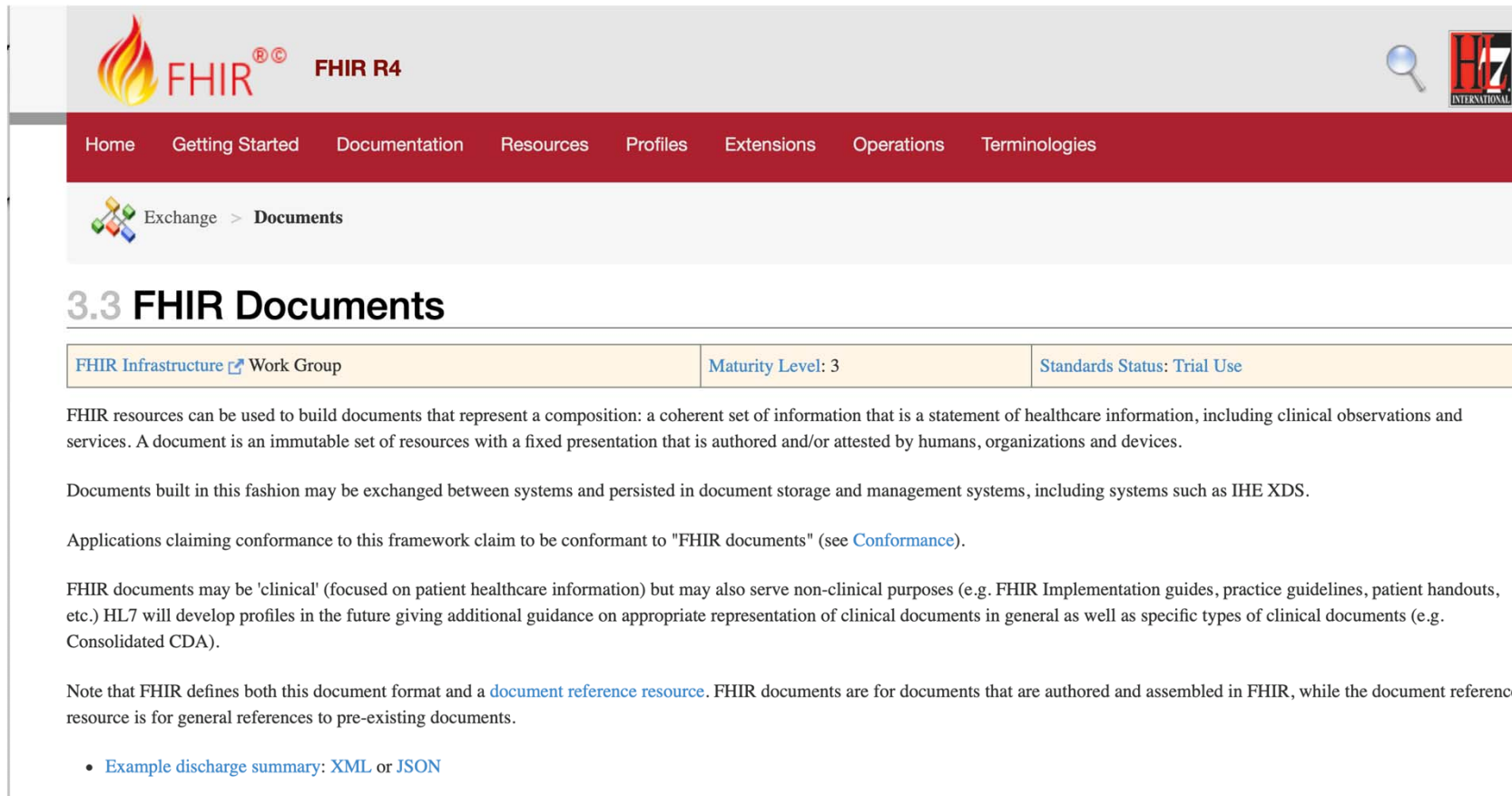
FHIRのCompositionは、永続性と説明を容易にするために4つのグループ化されたリソースの構造がある

- **List**リソース:フラットなリソースの列挙型の集合。時間経過とともに、項目が付け加えられたり削除されることがある
- **Group**リソース:人、動物、機器などの集合を定義する。Groupリソースは、暗黙的に他のリソースを参照する。例:治療行為、リスク説明、治験など
- **Bundle**リソース:リソースのグループ化のためのインフラ・コンテナ。通信、ドキュメント、トランザクション、問合せ応答などを定義し、Narrative部は持たない
- **Composition**リソース:種々のリソースを単一に意味を持たせた集合でBundleリソースを用いて表現する









The screenshot shows the HL7 FHIR R4 website interface. At the top left is the HL7 FHIR R4 logo. To the right are a search icon and the HL7 International logo. Below the logo is a navigation menu with items: Home, Getting Started, Documentation, Resources, Profiles, Extensions, Operations, and Terminologies. Underneath the menu is a breadcrumb trail: Exchange > Documents. The main heading is '3.3 FHIR Documents'. Below this is a table with three columns: 'FHIR Infrastructure Work Group', 'Maturity Level: 3', and 'Standards Status: Trial Use'. The text below the table explains that FHIR resources can be used to build documents representing a coherent set of information, including clinical observations and services. It notes that documents are immutable and authored/attested by humans, organizations, and devices. It also states that documents can be exchanged between systems and persisted in storage and management systems like IHE XDS. Applications claiming conformance to this framework claim to be conformant to "FHIR documents" (see Conformance). FHIR documents can be 'clinical' (focused on patient healthcare information) but may also serve non-clinical purposes (e.g. FHIR Implementation guides, practice guidelines, patient handouts, etc.). HL7 will develop profiles in the future giving additional guidance on appropriate representation of clinical documents in general as well as specific types of clinical documents (e.g. Consolidated CDA). A note states that FHIR defines both this document format and a document reference resource. FHIR documents are for documents that are authored and assembled in FHIR, while the document reference resource is for general references to pre-existing documents. A bullet point provides an example: 'Example discharge summary: XML or JSON'.

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

FHIR resources can be used to build documents that represent a composition: a coherent set of information that is a statement of healthcare information, including clinical observations and services. A document is an immutable set of resources with a fixed presentation that is authored and/or attested by humans, organizations and devices.

Documents built in this fashion may be exchanged between systems and persisted in document storage and management systems, including systems such as IHE XDS.

Applications claiming conformance to this framework claim to be conformant to "FHIR documents" (see [Conformance](#)).

FHIR documents may be 'clinical' (focused on patient healthcare information) but may also serve non-clinical purposes (e.g. FHIR Implementation guides, practice guidelines, patient handouts, etc.) HL7 will develop profiles in the future giving additional guidance on appropriate representation of clinical documents in general as well as specific types of clinical documents (e.g. Consolidated CDA).

Note that FHIR defines both this document format and a [document reference resource](#). FHIR documents are for documents that are authored and assembled in FHIR, while the document reference resource is for general references to pre-existing documents.

- [Example discharge summary: XML or JSON](#)

```
{
  "resourceType": "Bundle",
  "id": "father",
  "meta": {
    "lastUpdated": "2013-05-28T22:12:21Z"
  },
  "identifier": {
    "system": "urn:ietf:rhc:3986",
    "value": "urn:uuid:0c3151bd-1cbf-4d64-b04d-cd9187a4c6e0"
  },
  "type": "document",
  "entry": [
    {
      "fullUrl": "http://fhir.healthintersections.com.au/open/Composition/180f219f-97a8-486d-99d9-ed631fe4fc57",
      "resource": {
```

```
http://fhir.healthintersections.com.au/open/Composition/180f219f-97a8-486d-99d9-ed631fe4fc57
Qddg7+JBEADoDx+Pcj/wAcNRS+ip4wXri/IgwMe
VBqLTsHqaTSQhY726BRH9zAf1/jA6xADfGLyp/1
DdqnQXVWozfMvng3rUGAwfEp/B/fChhtLpS4BU6
8TB2p/rDV6DE+pqI3qorPEU+T8gfgJMqpE7Ipuk
GiKjw01Iibf3UD/P6VrDkgKntpyt7w0h4kK+V6P
fhPvi9cfVf+/Xi0PVD9/P0uft6ffj9en7Kff5Ln
gmliel0cIh45OL0Hinj9c+L9c+P9c+H9c+L9c+L
i/XPi/XPi/XFPH64+1+uHt/rj7P658b64D4/XH2
vgbXhSJgdQNEdlKDPfi+6kztQRTYSP43jrBIBGE
qmoeSAen//2Q=="
  }
}
```



Chuck Jones

# Documents (文書) はCompositionバンドル リソース

The screenshot shows the FHIR R4 website's Resources page. The 'Resources' menu item is circled with a callout labeled 'リソース'. Below, the '1.2 Resource Index' section shows a table of resources categorized by 'Conformance', 'Terminology', 'Security', 'Documents', and 'Other'. The 'Documents' category is circled with a callout labeled 'バンドル リソース'. The resources listed under 'Documents' are Composition 2, DocumentManifest 2, DocumentReference 3, and CatalogEntry 0.

Category	Resources
Conformance	<ul style="list-style-type: none"> <li>CapabilityStatement <b>N</b></li> <li>StructureDefinition <b>N</b></li> <li>ImplementationGuide 1</li> <li>SearchParameter 3</li> <li>MessageDefinition 1</li> <li>OperationDefinition <b>N</b></li> <li>CompartmentDefinition 1</li> <li>StructureMap 2</li> <li>GraphDefinition 1</li> <li>ExampleScenario 0</li> </ul>
Terminology	<ul style="list-style-type: none"> <li>CodeSystem <b>N</b></li> <li>ValueSet <b>N</b></li> <li>ConceptMap 3</li> <li>NamingSystem 1</li> <li>TerminologyCapabilities 0</li> </ul>
Security	<ul style="list-style-type: none"> <li>Provenance 3</li> <li>AuditEvent 3</li> <li>Consent 2</li> </ul>
Documents	<ul style="list-style-type: none"> <li>Composition 2</li> <li>DocumentManifest 2</li> <li>DocumentReference 3</li> <li>CatalogEntry 0</li> </ul>
Other	<ul style="list-style-type: none"> <li>1</li> <li>Bundle <b>N</b></li> <li>Linkage 0</li> <li>MessageHeader 4</li> <li>OperationOutcome <b>N</b></li> <li>Parameters <b>N</b></li> <li>Subscription 3</li> </ul>

**FHIR R4**

Home Getting Started Documentation Resources Profiles Extensions Operations Terminologies

Foundation > Bundle

Content Examples Detailed Descriptions Mappings Profiles & Extensions R3 Conversions

## 2.36 Resource Bundle - Content

FHIR Infrastructure <a href="#">Work Group</a>	Maturity Level: N	Normative (from v4.0.0)	Security Category: Not Classified	Compartments: Not linked to any defined compartments
--	-------------------	-------------------------	-----------------------------------	--

### 2.36.3 Resource Content

Structure **UML** XML JSON Turtle R3 Diff All

UML Diagram (Legend)

```

classDiagram
    class Request {
        method : code [1..1] « HTTPVerb! »
        uri : uri [1..1]
        ifNoneMatch : string [0..1]
        ifModifiedSince : instant [0..1]
        ifMatch : string [0..1]
        ifNoneExist : string [0..1]
    }
    class Entry {
        fullUri : uri [0..1]
        resource : Resource [0..1]
    }
    class Bundle_Resource["Bundle (Resource)"] {
        identifier : Identifier [0..1]
        type : code [1..1] « BundleType! »
        timestamp : instant [0..1]
        total : unsignedInt [0..1]
        signature : Signature [0..1]
    }
    class Link {
        relation : string [1..1]
        url : uri [1..1]
    }
    class Search {
        mode : code [0..1] « SearchEntryMode! »
        score : decimal [0..1]
    }
    Request "0..1" --> "0..*" Entry : request
    Entry "0..*" --> Bundle_Resource : entry
    Entry "0..*" --> Link : link
    Entry "0..1" --> Search : search
    Bundle_Resource "0..*" --> Link : link
  
```

# Documents (文書)

1.2 Resource

FHIR Infrastructure Work Group      Maturity Level: N/A      Standards Status: Informative

This page is provided to help find resources. There is also a more detailed classification, ontology, and description. For background to the layout on the layers in the abstract Base Resources Resource and Domain.

Categorized   Alphabetical   R2 Layout   By Maturity   Security Category   By Standards Status   By Committee

Foundation	<ul style="list-style-type: none"> <li>CapabilityStatement 2</li> <li>StructureDefinition <b>N</b></li> <li>ImplementationGuide 1</li> <li>SearchParameter 1</li> <li>MessageDefinition 1</li> <li>OperationDefinition <b>N</b></li> <li>CompartmentDefinition 1</li> <li>StructureMap 2</li> <li>GraphDefinition 1</li> <li>ExampleScenario 0</li> </ul>	<b>Terminology</b> <ul style="list-style-type: none"> <li>CodeSystem <b>N</b></li> </ul>	<b>Security</b> <ul style="list-style-type: none"> <li>Provenance 3</li> <li>AuditEvent 3</li> </ul>	<b>Documents</b> <ul style="list-style-type: none"> <li>Composition 2</li> <li>DocumentManifest 2</li> <li>DocumentReference 3</li> <li>CatalogEntry 0</li> </ul>	<b>Other</b> <ul style="list-style-type: none"> <li>Basic 1</li> <li>Binary <b>N</b></li> <li>Bundle <b>N</b></li> <li>Linkage 0</li> <li>MessageHeader 4</li> <li>OperationOutcome <b>N</b></li> <li>Parameters <b>N</b></li> <li>Subscription 3</li> </ul>
	<b>Individuals</b> <ul style="list-style-type: none"> <li>Patient <b>N</b></li> <li>Practitioner 3</li> <li>PractitionerRole 2</li> <li>RelatedPerson 2</li> <li>Person 2</li> <li>Group 1</li> </ul>	<b>Entities #1</b> <ul style="list-style-type: none"> <li>Organization 3</li> <li>OrganizationAffiliation 0</li> <li>HealthcareService 2</li> <li>Endpoint 2</li> <li>Location 3</li> </ul>	<b>Entities #2</b> <ul style="list-style-type: none"> <li>Substance 2</li> <li>BiologicallyDerivedProduct 0</li> <li>Device 0</li> <li>DeviceMetric 1</li> </ul>	<b>Workflow</b> <ul style="list-style-type: none"> <li>Task 2</li> <li>Appointment 3</li> <li>AppointmentResponse 3</li> <li>Schedule 3</li> <li>Slot 3</li> <li>VerificationResult 0</li> </ul>	<b>Management</b> <ul style="list-style-type: none"> <li>Encounter 2</li> <li>EpisodeOfCare 2</li> <li>Flag 1</li> <li>List 1</li> <li>Library 2</li> </ul>
	<b>Summary</b> <ul style="list-style-type: none"> <li>AllergyIntolerance 3</li> <li>AdverseEvent 0</li> </ul>	<b>Diagnostics</b> <ul style="list-style-type: none"> <li>Observation <b>N</b></li> <li>Media 1</li> </ul>	<b>Medications</b> <ul style="list-style-type: none"> <li>MedicationRequest 3</li> <li>MedicationAdministration 2</li> </ul>	<b>Care Provision</b> <ul style="list-style-type: none"> <li>CarePlan 2</li> <li>CareTeam 2</li> </ul>	<b>Request &amp; Response</b> <ul style="list-style-type: none"> <li>Communication 2</li> <li>CommunicationRequest 2</li> </ul>

アルファベット順

Documents  
Composition Resource

カテゴリー分け



## 2.36.6 Resource Bundle - Examples

<a href="#">FHIR Infrastructure</a> <a href="#">Work Group</a>	<a href="#">Maturity Level: N/A</a>	<a href="#">Standards Status: Informative</a>	<a href="#">Security Category: Not Classified</a>	<a href="#">Compartments: Not linked to any defined compartments</a>
--	-------------------------------------	---	---	--

In addition to the examples below, there are other examples of Bundles through the specification:

- [Document](#)
- [Message Request](#)

### Document-example-dischargesummary

<a href="#">Structured Documents</a> <a href="#">Work Group</a>	<a href="#">Maturity Level: N/A</a>	<a href="#">Standards Status: Informative</a>	<a href="#">Compartments: Not linked to any defined compartments</a>
---	-------------------------------------	---	--

This is the narrative for the resource. See also the [XML](#), [JSON](#) or [Turtle](#) format. This example conforms to the [profile Composition](#).

#### Generated Narrative with Details

**id:** 180f219f-97a8-486d-99d9-ed631fe4fc57

**meta:**

**status:** final

**type:** Discharge Summary from Responsible Clinician (Details : {LOINC code '28655-9' = 'Physician attending Discharge summary'})

**encounter:** <http://fhir.healthintersections.com.au/open/Encounter/doc-example>

**date:** 01/02/2013 12:30:02 PM

**author:** [Doctor Dave](#)

**title:** Discharge Summary

**confidentiality:** N



## 2.36.6 Resource Bundle - Examples

<a href="#">FHIR Infrastructure</a> <a href="#">Work Group</a>	Maturity Level: N/A	Standards Status: Informative	Security Category: Not Classified	Compartments: Not linked to any defined compartments
--	---------------------	-------------------------------	-----------------------------------	--

In addition to the examples below, there are other examples of Bundles through the specification:

- [Document](#)
- [Message Request](#)

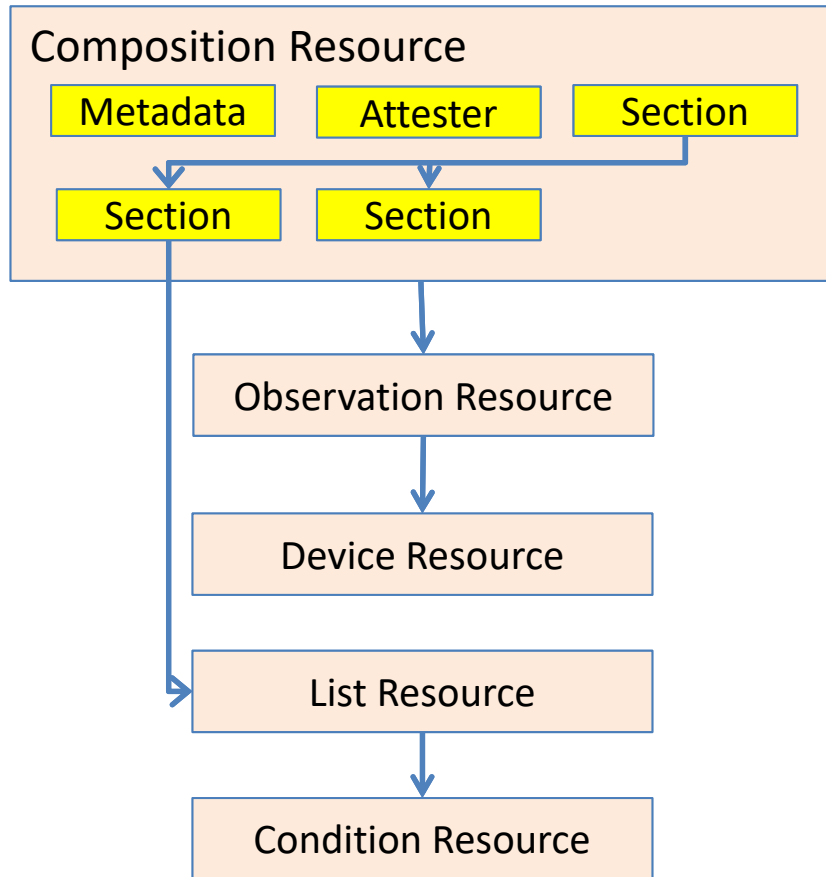
### Document-example-dischargesummary.xml

<a href="#">Structured Documents</a> <a href="#">Work Group</a>	Maturity Level: N/A	Standards Status: Informative	Compartments: Device, E
---	---------------------	-------------------------------	-------------------------

Raw XML (canonical form + also see [XML Format Specification](#))

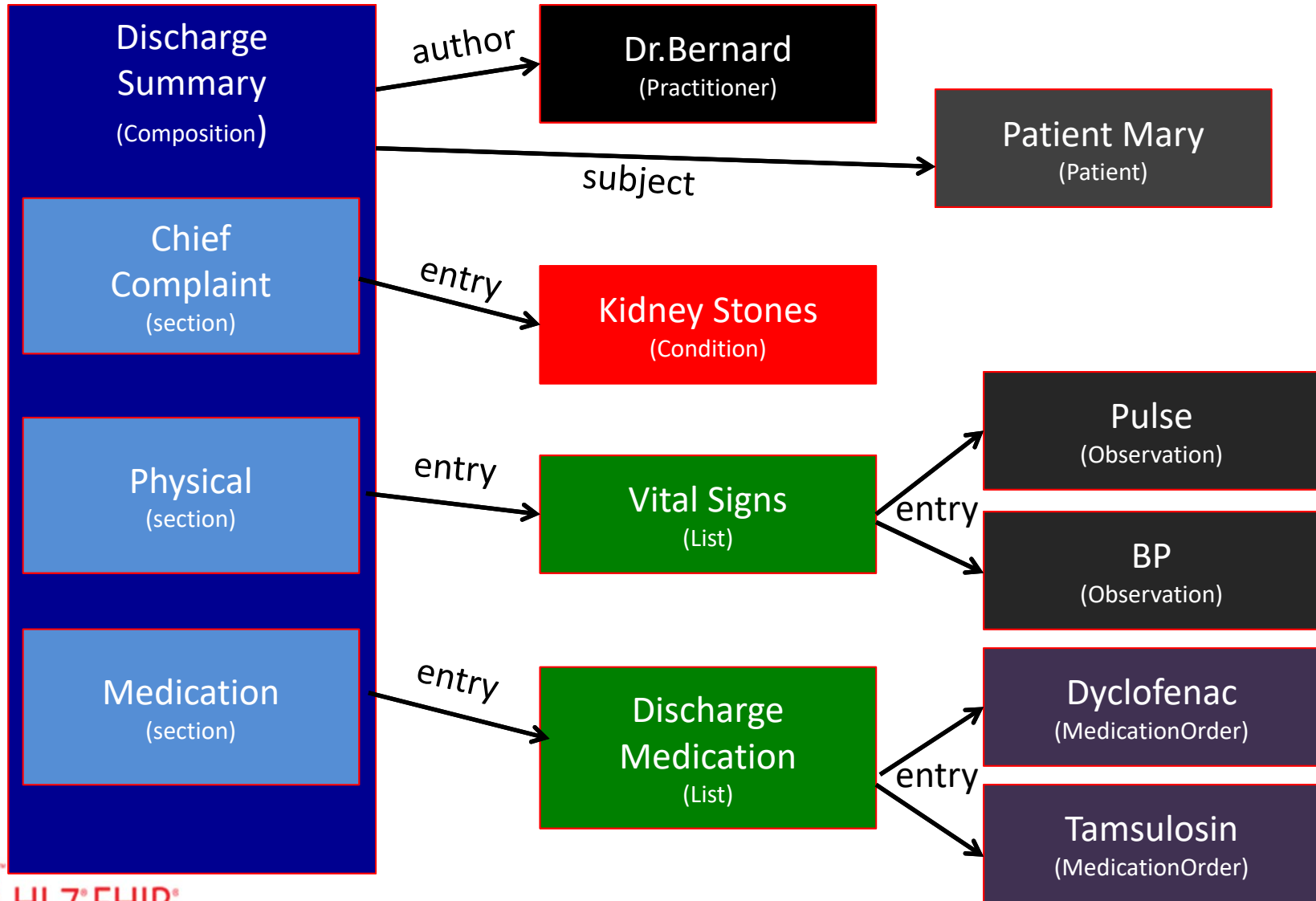
Example of a discharge summary (id = "father")

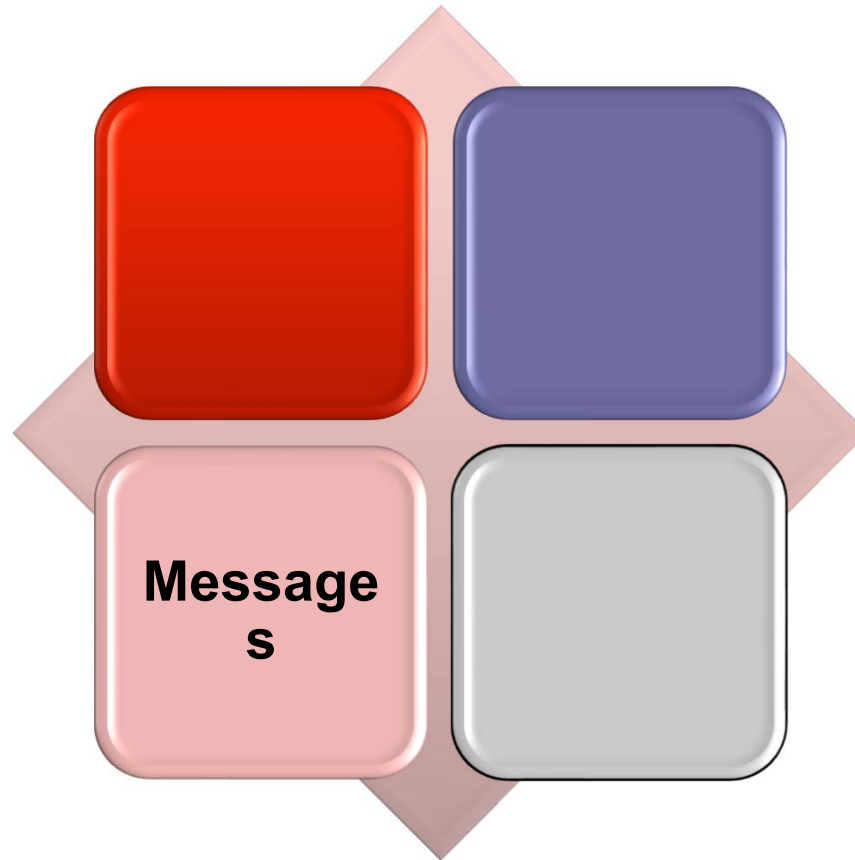
```
<?xml version="1.0" encoding="UTF-8"?>
<Bundle xmlns="http://hl7.org/fhir">
  <id value="father"/>
  <meta>
    <lastUpdated value="2013-05-28T22:12:21Z"/>
  </meta>
  <identifier>
    <system value="urn:ietf:rfc:3986"/>
    <value value="urn:uuid:0c3151bd-1cbf-4d64-b04d-cd9187a4c6e0"/>
  </identifier>
  <type value="document"/>
  <!-- The Composition resource -->
  <entry>
    <fullUrl value="http://fhir.healthintersections.com.au/open/Composition/180f219f-97a8-4
```



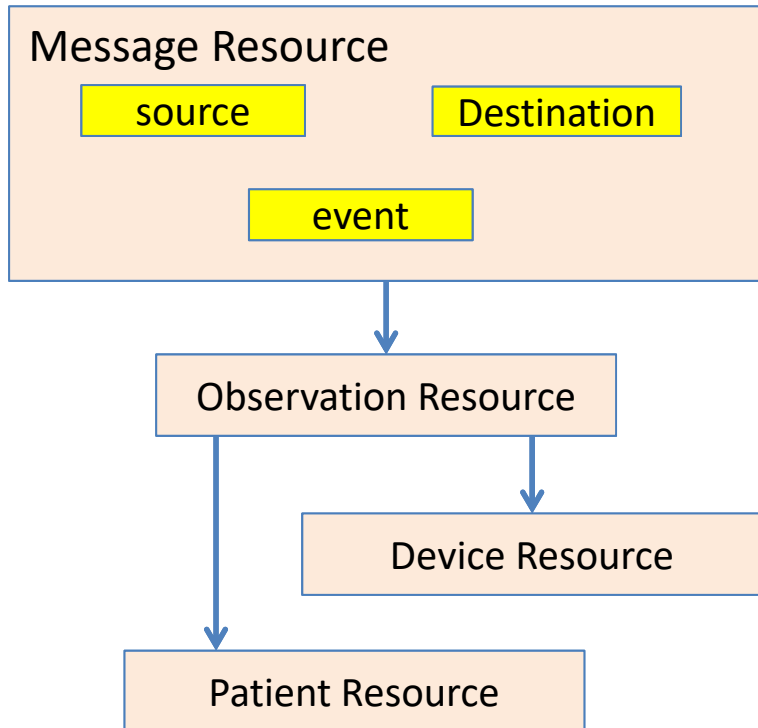
```
<Bundle>
  <type
value="document"/>
  <entry>
    <Composition/>
  </entry>
  <entry>
    <Observation/>
  </entry>
  <entry>
    <List/>
  </entry>
  <entry>
    <Condition/>
  </entry>
</Bundle>
```

# 【例】退院時サマリー



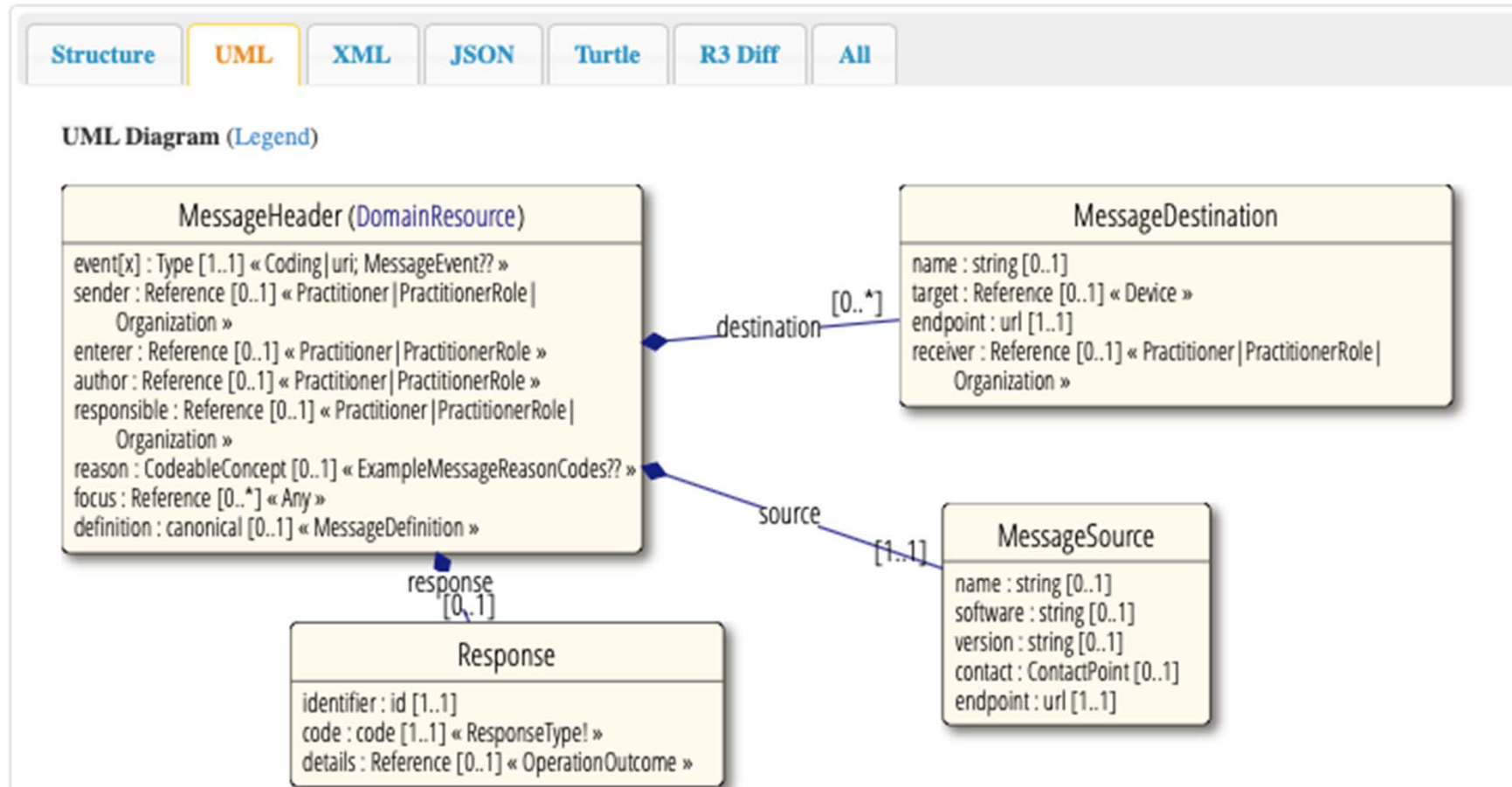


# Message

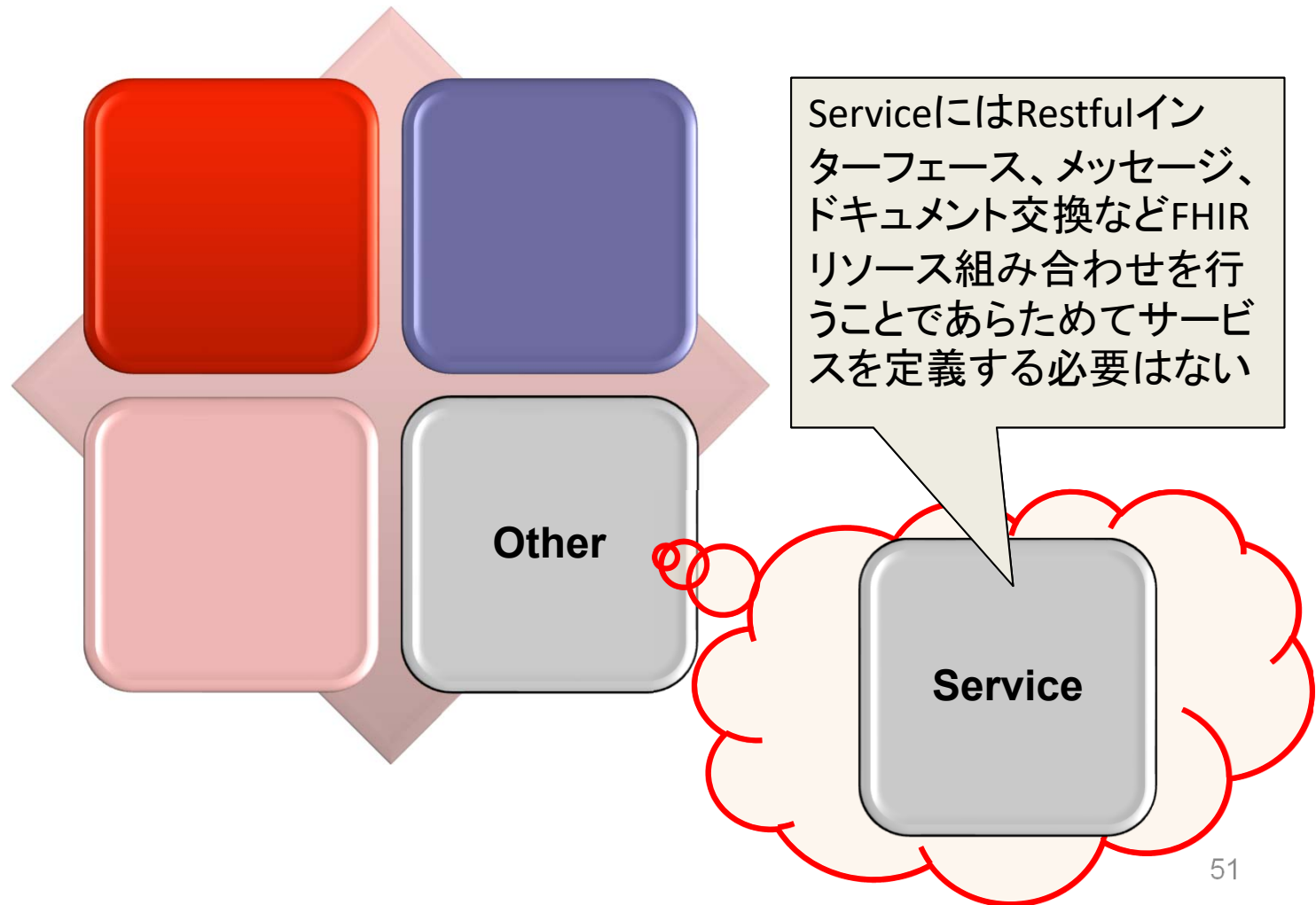


```
<Bundle>
  <type
value="message"/>
  <entry>
    <MessageHeader/>
  </entry>
  <entry>
    <Observation/>
  </entry>
  <entry>
    <Patient/>
  </entry>
  <entry>
    <Device/>
  </entry>
</Bundle>
```

# MessageHeader リソース



# FHIRのService Paradigm



# オーダーリソースは無くなった？

## Release 2 DSTU

- Observation 3
- OperationDefinition 1
- OperationOutcome 2
- Order 0
- OrderResponse 0
- Organization 1
- Parameters 1

## Release 3 DSTU

- Observation 3
- OperationDefinition 1
- OperationOutcome 2
- Order 0
- OrderResponse 0
- OrderSet 0
- Organization 1

## Release 3 STU

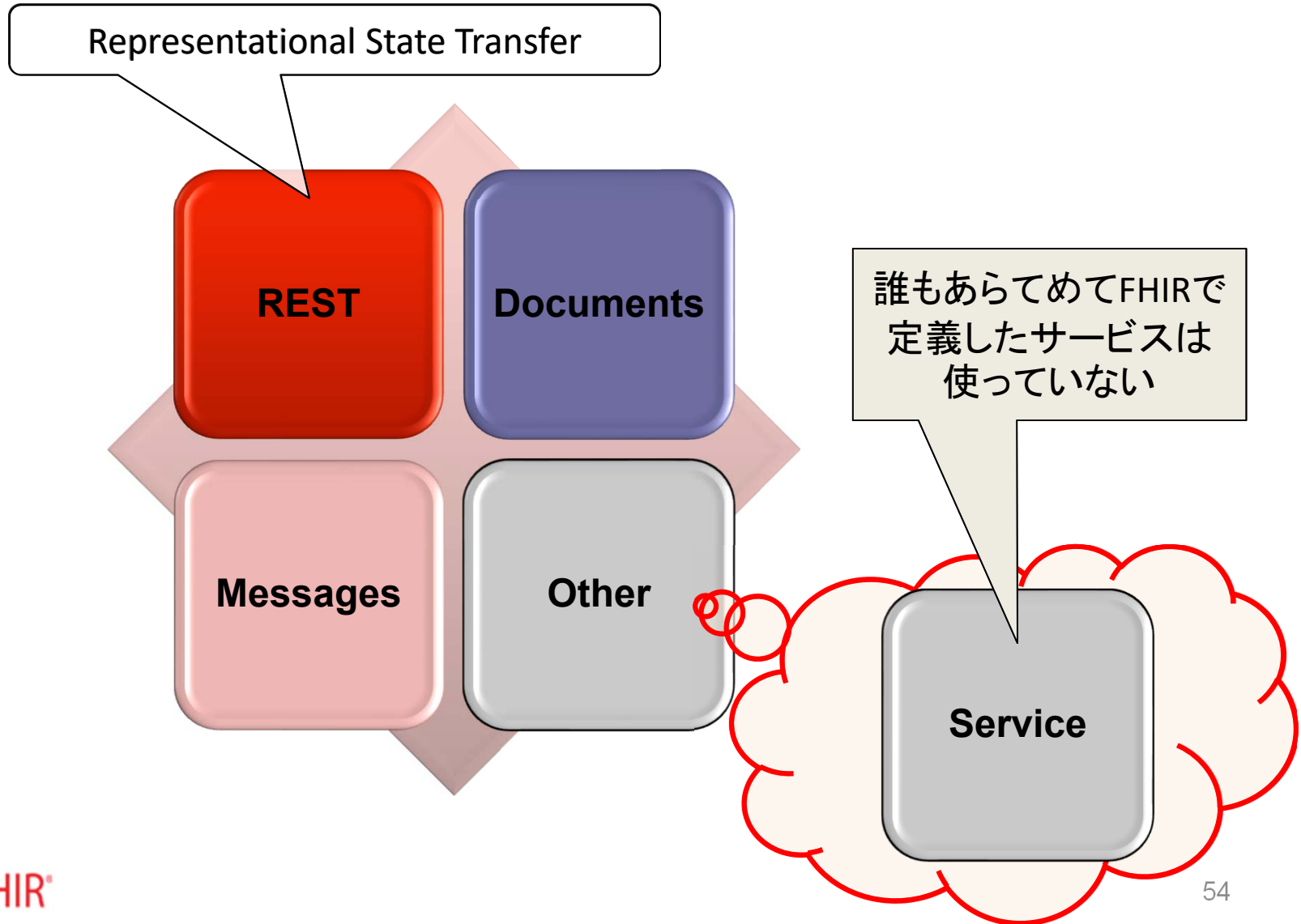
- Observation 5
- OperationDefinition 4
- OperationOutcome 5
- Organization 3
- Parameters 5



FHIRのいくつかのリソースにより要求(Request/Order)する。要求に対しては4つのステージ(要求作成、要求送信、承諾、拒否)がある。

- proposed:アクター(例 CDSS)が要求を提案
- draft: 要求前の書式
- requested: 要求発行
- rejected: 受信側が要求を拒否
- accepted: 受信側が要求を受諾
- in-progress: 要求された作業を開始
- on-hold (suspended): 要求された作業を中断
- stopped (aborted): 要求された作業を中止(再開予定なし)
- completed:要求作業完了
- cancelled: 要求取り下げ

# FHIRの4つのParadigm



### Draftレベル

- 実装の安全性に関して、十分満足することは考慮されていないレベル
- ドラフトレベルは自己責任で有志、チャレンジャーのみ実装されるべきである
- 投票の後、一度レビューと改正が完了した時にTrial Useに昇格する

### Trial Useレベル

- 公式なスタンダードとして承認される
  - 製品として使用する準備ができたことをレビューし公式な投票をパスした場合
- 警告
  - 広範囲に使用されていると、見られない
  - 適切な解決策を実装するために必要な既知の問題が文書化されている可能性がある
- 注意: 作業中
  - 将来のバージョンにおいて、以前に発行されたTrial Useの内容と互換性がない重要な変更があるかもしれない
- FHIR STU3はtrial use – Release 3 を示す
- FHIR Change Tracker (gForge tracker)を使って変更要求を行うことができる

### Normativeレベル

- 公式なスタンダードとして承認されたもの
  - 十分吟味され公式な投票をパスしたもの
  - 広範囲で多種の製品実装が行われているもの
  - 内容が安定であると考えられるもの
- 内容がロックされる
  - Normativeスタンダードに対する変更の可能性はあるが、厳しく制約されていて滅多に起こらないもの
  - FHIRの互換性ルールは、下位互換性、上位互換性が考慮され適用される
- FHIRの公式な最初のリリースはNormative Release 4である
  - しかし、いくつかの部分は、未だドラフトかトライアルである
  - 規格書の成熟度はスタンダードレベルを参考にして欲しい

- FHIRは成熟度7段階のレベルを決めている

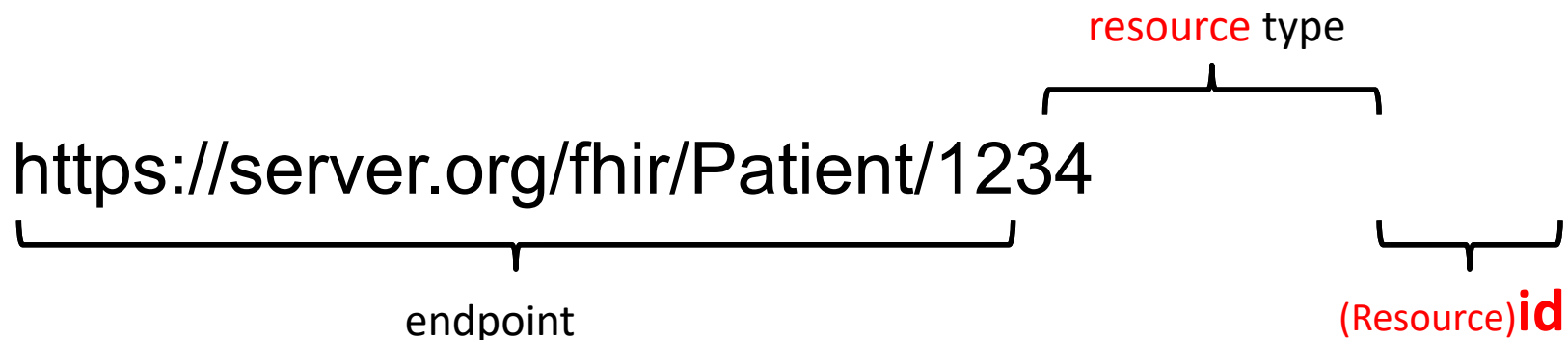
- Level 0
  - 現時点でビルドしたものを発行 – ドラフトと同義
- Level 1
  - ビルドプロセスでwarningがない
  - 担当WGが実質、実装の準備が完全であると考えていること
- Level 2
  - その項目が、80%以上現実的なデータとシナリオに基づいたリソースの一つ(例えばコネクタソン)について、独立して開発された3システム間でテスト、データ交換ができたもの
  - これら相互運用性結果が報告されFMG(FHIR Management Group)が受け付けたもの

- Level 3
  - その項目がTrial Use Quality Guidelines の会議において審議され公式な投票の対象になっていること
  - Trackerで少なくとも少なくとも1つ以上、実質的な変更の結果があること
  - 3組織から10実装者の記録があること
- Level 4
  - その項目が公式な資料(例 FHIRリリース)で発行され、そのスコープを通してテストされていること。
  - 担当WGが実質的に下位互換の変更が無いという実質的に安定していると合意されていること



- Level 5
  - その項目が2つの公式なFMM(FHIR Maturity Model)+(すなわち Trial Use Level)のリリースサイクルで発行されていること
  - 1つ以上の少なくとも5つの独立した製品で実装されていること
- Level 6: Normative
  - :その項目が現時点で安定していると考えられること

## FHIR demo



### FHIRリソースは

- データ交換の小さな論理的に独立したユニット
- 振る舞いと意味が定義されている
- 身元と所在が明確
- トランザクションの最小単位
- 医療に関連すること



- データをリソースとして表現する
- リソースをURI(URL)でアドレス可能にする
- HTTPにより**CRUD**操作を行う
- リソースを異なった記述で交換しても良い

例えばこんな感じにリソースidが1234患者のデータを読み込むには

```
GET /server.org/fhir/Patient/1234 HTTP/1.1
```

# FHIR readコマンド [HTTP(GET)]

Wireshark · Packet 5 · wireshark\_pcapng\_en0\_20190308081003\_ZR9N8x

- ▶ Internet Protocol Version 4, Src: 192.168.11.5, Dst: 35.229.94.143
- ▶ Transmission Control Protocol, Src Port: 51218 (51218), Dst Port: 80 (80)
- ▼ Hypertext Transfer Protocol
  - ▼ GET /baseDstu3/Patient?name=%E6%9D%B1%E4%BA%AC HTTP/1.1\r\n
    - ▶ [Expert Info (Chat/Sequence): GET /baseDstu3/Patient?name=%E6%9D%B1%E4%BA%AC
    - Request Method: GET
    - Request URI: /baseDstu3/Patient?name=%E6%9D%B1%E4%BA%AC
    - Request Version: HTTP/1.1
    - Host: hapi.fhir.org\r\n
    - Content-Type: application/x-www-form-urlencoded\r\n
    - Accept: \*/\*\r\n
    - User-Agent: CocoaRestClient/20 CFNetwork/976 Darwin/18.2.0 (x86\_64)\r\n
    - Accept-Language: ja-jp\r\n
    - Accept-Encoding: gzip, deflate\r\n
    - Connection: keep-alive\r\n

0000	10 6f 3f dc 59 c7 9c f3	87 a9 7f c6 08 00 45 00	.o?.Y... ..E.
0010	01 57 00 00 00 00 40 06	2b 80 c0 a8 0b 05 23 e5	.W....@. +.....#.
0020	5e 8f c8 12 00 50 eb db	75 0b 28 04 08 72 80 18	^....P.. u.(.r..
0030	08 14 7d 4f 00 00 01 01	08 0a 25 08 28 9a 26 e8	..}0.... ..%.(&.
0040	e6 e7 47 45 54 20 2f 62	61 73 65 44 73 74 75 33	..GET /b aseDstu3
0050	2f 50 61 74 69 65 6e 74	3f 6e 61 6d 65 3d 25 45	/Patient ?name=%E
0060	36 25 39 44 25 42 31 25	45 34 25 42 41 25 41 43	6%9D%B1% E4%BA%AC
0070	20 48 54 54 50 2f 31 2e	31 0d 0a 48 6f 73 74 3a	HTTP/1. 1..Host:
0080	20 68 61 70 69 2e 66 68	69 72 2e 6f 72 67 0d 0a	hapi.fh ir.org..
0090	43 6f 6e 74 65 6e 74 2d	54 79 70 65 3a 20 61 70	Content- Type: ap
00a0	70 6c 69 63 61 74 69 6f	6e 2f 78 2d 77 77 77 2d	plicatio n/x-www-
00b0	66 6f 72 6d 2d 75 72 6c	65 6e 63 6f 64 65 64 0d	form-url encoded.
00c0	0a 41 63 63 65 70 74 3a	20 2a 2f 2a 0d 0a 55 73	.Accept: */*..Us
00d0	65 72 2d 41 67 65 6e 74	3a 20 43 6f 63 6f 61 52	er-Agent : CocoaR
00e0	65 73 74 43 6c 69 65 6e	74 2f 32 30 20 43 46 4e	estClie nt/20 CFN
00f0	65 74 77 6f 72 6b 2f 39	37 36 20 44 61 72 77 69	etwork/9 76 Darwi
0100	6e 2f 31 38 2e 32 2e 30	20 28 78 38 36 5f 36 34	n/18.2.0 (x86_64
0110	29 0d 0a 41 63 63 65 70	74 2d 4c 61 6e 67 75 61	)..Accep t-Langua
0120	67 65 3a 20 6a 61 2d 6a	70 0d 0a 41 63 63 65 70	ge: ja-j p..Accep

TCP/IP  
第5層

## XML

```
<XXX xmlns="urn:foo">
  <B a="c" />
  <C>One</C>
  <C>Two</C>
  <D>One</D>
  <div>Not <b>so</b>
  easy</div>
</XXX>
```

## JSON

```
{ "B": { "a" : "c" },
  "C": [ "One", "Two" ],
  "D" : [ "One" ],
  "div" : {
    "text-before": "Not ",
    "b": "so",
    "text-after": "easy" }
}
```

- { ... } の中にダブルクォーテーション “で囲み名前と値をコロン: で区切り記述する  
 {“name”:”Hirai”}
- コンマ, で区切り複数の名前: 値を連結記述できる  
 {“name”:”Hirai”,”Sex”:”male”}
- 階層構造を持ったオブジェクトとして記述できる  
 {“user”:{“name”:”Hirai”,”sex”:”male”}}
- 配列として[...]として記述できる  
 {“color”:[“red”,”green”,”blue”]}
- 文字列(“ABC”),数値(123,12.3,1.23e4),ヌル値(null),真偽値(true,false),エスケープシーケンス(¥n)が使用できる
- UTF-8(BOM無し)で記述する

```

I#
"user" : {#
  "name" : "Hirai",#
  "age" : 69.#
  "organisation" : [#
    "HL7",#
    "Nihon Kohden",#
    "JAHIS"#
  ]##
}##
J#

```



```

"{¥"resourceType¥":¥"Patient¥",¥"identifier¥":[{¥"system¥":¥"http://acme.org/MRNs¥",¥"value¥":¥"7000135¥"}],¥"name¥":[{¥"family¥":[¥"Simpson¥"],¥"given¥":[¥"Homer¥",¥"J¥"]}]}";#

```

## JSON

```
{  
  [  
    {"id":"06eb35fc-09c6-48... "given":["Lucille"],"family":"Bluth"}],  
    {"id":"cf53f382-6eb6-4f... "given":["George","Oscar"],"family":"Bluth","suffix":["Senior":]}],  
    {"id":"06eb35fc-09c6-48... "given":["Lucille"],"family":"Bluth"}],  
  ]  
}
```

## NDJSON例

```
{"id":"06eb35fc-09c6-48... "given":["Lucille"],"family":"Bluth"}},  
{"id":"cf53f382-6eb6-4f... "given":["George","Oscar"],"family":"Bluth","suffix":["Senior":]}},  
{"id":"06eb35fc-09c6-48... "given":["Lucille"],"family":"Bluth"}},
```



## JSONとXML

```
{
  "resourceType": "Patient",
  "id": "ihe-pcd",
  "text": {
    "status": "generated",
    "div": "<div xmlns='http://www.w3.org/1999/xhtml'>Albert
Brooks, Id: AB60001</div>"
  },
  "identifier": [
    {
      "type": {
        "text": "Internal Identifier"
      },
      "value": "AB60001"
    }
  ],
  "active": true,
  "name": [
    {
      "family": "BROOKS",
      "given": [
        "ALBERT"
      ]
    }
  ]
}
```

```
<?xml version="1.0" encoding="UTF-8"?>
<Patient xmlns="http://hl7.org/fhir">
  <id value="ihe-pcd"/>
  <text>
    <status value="generated"/>
    <div xmlns="http://www.w3.org/1999/xhtml">Albert Brooks, Id:
AB60001</div>
  </text>
</identifier>
  <type>
    <text value="Internal Identifier"/>
  </type>
  <value value="AB60001"/>
</identifier>
  <active value="true"/>
<name>
  <family value="BROOKS"/>
  <given value="ALBERT"/>
</name>
</Patient>
```

## 逆変換例 1対1に変換されるわけではない

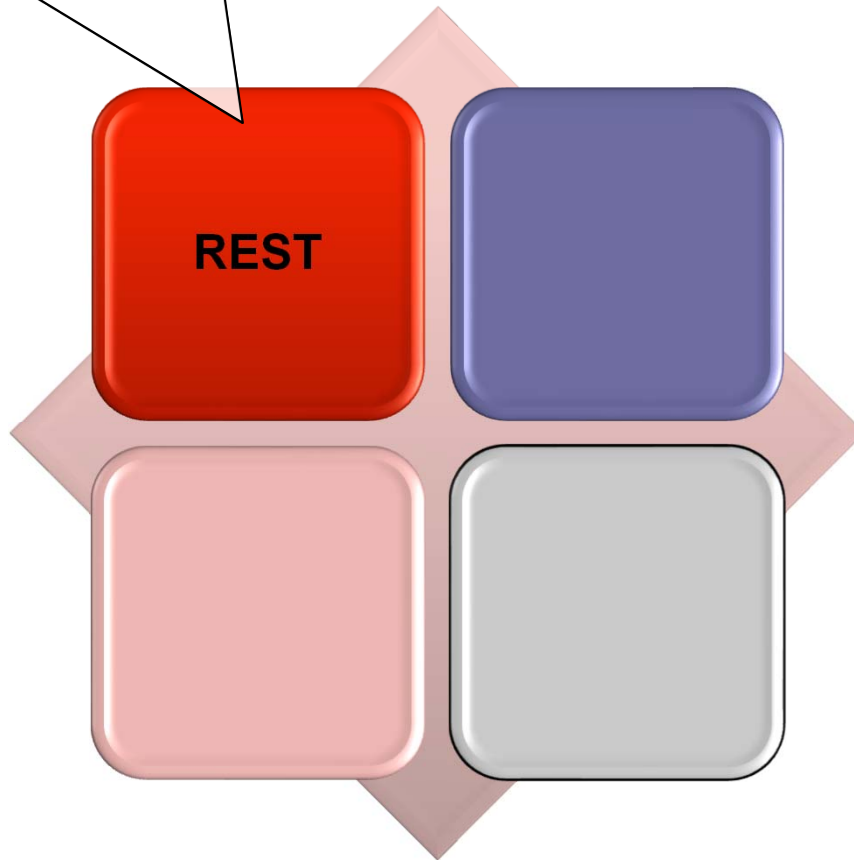
```
{
  "XML": {
    "version": 1.0,
    "encoding": "UTF-8"
  },
  "Patient": {
    "xmlns": "http://hl7.org/fhir",
    "id": {
      "value": "ihe-pcd"
    },
    "text": {
      "status": {
        "value": "generated"
      },
      "div": {
        "xmlns": "http://www.w3.org/1999/xhtml",
        "Text": "Albert Brooks, Id: AB60001"
      }
    }
  },
  "identifier": {
    "type": {
      "text": {
        "value": "Internal Identifier"
      }
    }
  }
}
```

```
<json>
  <resourceType>Patient</resourceType>
  <id>ihe-pcd</id>
  <text>
    <status>generated</status>
    <div>&lt;div
xmlns="http://www.w3.org/1999/xhtml">Albert Brooks, Id:
AB60001&lt;/div></div>
  </text>
  <identifier>
    <type>
      <text>Internal Identifier</text>
    </type>
    <value>AB60001</value>
  </identifier>
  <active>true</active>
  <name>
    <family>BROOKS</family>
    <given>ALBERT</given>
  </name>
</json>
```

# HL7<sup>®</sup> FHIRとREST(REpresentational State Transfer)

International

REpresentational State Transfer  
ROA(Resource Oriented Architecture)



**HTML:** 静的ページ

文字画像等の情報表示が目的

**Servlet:** 動的ページ

表示を要求に応じて変化

**RESTful:** WEBサービス

(SOAP:使用頻度が低い)

(表示が目的ではなく)要求に応じた処理結果を提供する

## CRUD

**C**reate – データの新規インスタンス生成

**POST**

**R**ead – データのインスタンスのコンテンツの取得

**GET**

**U**ppdate – データのインスタンスのコンテンツの更新

**PUT**

**D**elete – データのインスタンスの削除

**DELETE**

## Instance Level Interactions

- **Read** : リソースの現在の状態の読み込む
  - **GET** [base]/Patient/100
- **Update** : id指定の既存のリソースの更新。但しなければリソースを作成する
  - **PUT** [base]/Patient/100
- **Delete** : リソースを削除する
  - **DELETE** [base]/Patient/100
- **History** : 特定のリソースの変更履歴を参照する
  - **GET** [base]/Patient/100/\_history
- **Vread** : リソースの特定バージョンの状態の読み込む
  - **GET** [base]/Patient/100/\_history/{vid}
- **Patch** : 既存のリソースの位置指定した所を書き換える
  - **PATCH** [base]/[type]/[id] {?\_format=[mime-type]}

## Type Level Interactions

- **Create** : サーバが特定したidで新しいリソースを作成する
  - **POST** [base]/Patient
- **Search** : いくつかののフィルター基準でリソースを検索する
  - **GET** [base]/Observation?code=3141-9
- **History** : 特定のリソースタイプの変更履歴を参照する
  - **GET** [base]/Patient/\_history

## Whole System Interactions

- **Capabilities** : システムの機能宣言を取得する(mode: full, normative, terminology)
  - **GET** [base]/metadata{?mode=[mode]} {&\_format=[mime-type]}
- **Batch/Transaction** : 単一のインターラクションでリソースのセットを更新、作成、削除する
  - **POST** [base] {?\_format=[mime-type]}History
- **History** : 全てのリソースの変更履歴を参照する
  - **GET** [base]/\_history{?[parameters]&\_format=[mime-type]}
- **Search** : いくつかののフィルター基準に基づいた全てのリソースタイプにまたがって検索する
  - **GET** [base]/Patient?name=eve

実機デモができれば HAPIとPostmanで

- サンプルプログラム  
<https://github.com/FirelyTeam/fhirstarters>
- RESTクライアント(Postman)  
<https://github.com/FirelyTeam/fhirstarters/tree/master/postman/crud>
- FHIR Hapiサーバ  
http://hapi.fhir.org/baseDstu3/Patient  
Header name → Key: Content-Type  
Header value → Value: application/fhir+json
- JAVAクラス仕様 (R4 注:1月末STU3)  
<http://hapifhir.io/apidocs-dstu3/index.html>

### 2種類の異なった識別子がある

- (REST)サーバ上のリソースid
  - Metadata識別子 (*metadata tag*の一つ)
  - 異なったサーバ間では同一ではない
    - 論理IDに基づいたURLにより識別される場所で、コピー、移動などにより変更される識別子。サーバで“Create”により割り当てられる
- Identifier
  - 機能識別子
  - リソースのelement(要素)識別子 (*tagged data element*の一つ)
    - 公式なURLによって参照される識別子で、コピー、移動により変化しないリソース固有の識別子

```
<Patient xmlns="http://hl7.org/fhir">  
  <id value="1234"/>  
  <meta>  
    <versionId value="1"/>  
  </meta>  
  <identifier>  
    <system value="http://hl7.org/fhir/sid/us-ssn"/>  
    <value value="999-99-9999"/>  
  </identifier>  
</Patient>
```

https://server.org/fhir/Patient/1234

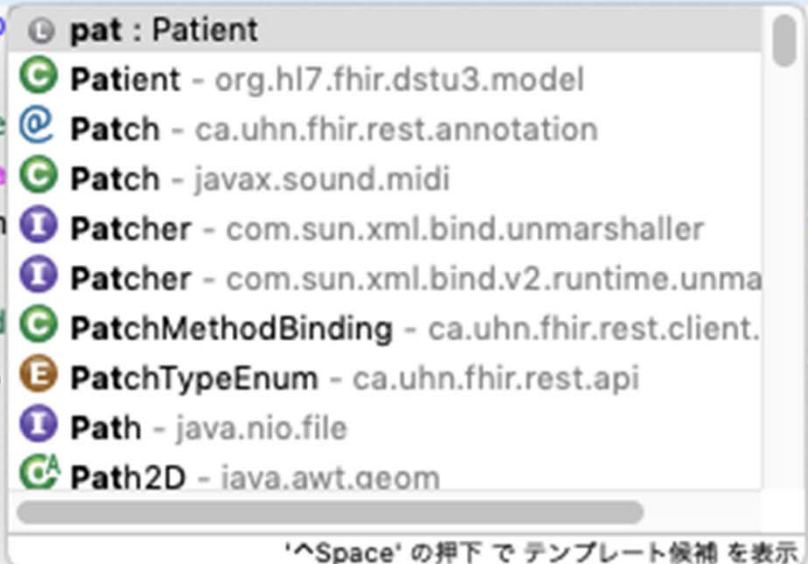
https://server.org/fhir/Patient?identifier=999-99-9999



```
public class Example01_CreateAPatient {  
    public static void main(String[] theArgs) {  
  
        // Create a resource instance  
        Patient pat = new Patient();  
  
        // Add a "name" element  
        HumanName name = pat.addName();  
        name.setFamily("Simpson").addGiven("Homer").addGiven("J");  
  
        // Add an "identifier" element  
        Identifier identifier = pat.addIdentifier();  
        identifier.setSystem("http://acme.org/MRNs").setValue("7000135");  
  
        // Model is designed to be chained  
        pat.addIdentifier().setSystem("http://acme.org/MRNs").setValue("12345");  
    }  
}
```



```
public class Example01_CreateAPatient {  
    public static void main(String[] theArgs) {  
  
        // Create a resource instance  
        Patient pat = new Patient();  
  
        // Add a "name" element  
        HumanName name = pat.addName();  
        name.setFamily("Simpson");  
  
        // Add an "identifier" element  
        Identifier identifier = pat.addIdentifier();  
        identifier.setSystem("http://hl7.org/fhir/");  
  
        // Model is designed to be used with HAPI FHIR  
        pat.addIdentifier(identifier);  
    }  
}
```



pat : Patient

- Patient - org.hl7.fhir.dstu3.model
- @ Patch - ca.uhn.fhir.rest.annotation
- Patch - javax.sound.midi
- Patcher - com.sun.xml.bind.unmarshaller
- Patcher - com.sun.xml.bind.v2.runtime.unmarshaller
- PatchMethodBinding - ca.uhn.fhir.rest.client.impl
- PatchTypeEnum - ca.uhn.fhir.rest.api
- Path - java.nio.file
- Path2D - java.awt.geom

'^Space' の押下でテンプレート候補を表示

# EclipseでのPatientリソース作成

The screenshot shows the Eclipse IDE interface. On the left, the Package Explorer displays the project structure, with `Example04_EncodeResource.java` selected. The main editor shows the following Java code:

```
1 package ca.uhn.fhir.example;
2
3 import org.hl7.fhir.dstu3.model.ContactPoint.ContactPoint
10
11 public class Example04_EncodeResource {
12     public static void main(String[] theArgs) {
13
14         // Create a Patient:
15         Patient pat = new Patient();
16         pat.addName().setFamily("Simpson").addGiven("Home");
17         pat.addIdentifier().setSystem("http://acme.org/MR");
18         pat.addTelecom().setUse(ContactPointUse.HOME).set
19         pat.setGender(AdministrativeGender.MALE);
20
21         // Create a context:
22         FhirContext ctx = FhirContext.forDstu3();
23
24         // Create a JSON parser:
25         IParser parser = ctx.newJsonParser();
26         parser.setPrettyPrint(true);
27
28         String encode = parser.encodeResourceToString(pat);
29         System.out.println(encode);
30
31     }
32 }
33
```

Annotations in the image:

- A yellow callout box labeled "Jsonとして" points to the `parser.setPrettyPrint(true);` line (line 26).
- A yellow callout box labeled "Patientのコンソール出力" points to the `System.out.println(encode);` line (line 28).

- Hapi サーバに患者を登録

The screenshot shows the Postman interface with a REST client configuration for a FHIR server. The URL is `http://hapi.fhir.org/baseDstu3/Patient`. The method is `POST`. The `Content-Type` header is set to `application/fhir+json`. Callouts highlight the method, URL, and header configuration.

REST サーバURL (`http://hapi.fhir.org/baseDstu3/Patient`)

Content-Type

application/fhir+json

## Create: POST リソース(Patient) 作成 (Example04)

---

```
public class Example04_EncodeResource {  
    public static void main(String[] theArgs) {  
  
        // Create a Patient  
        Patient pat = new Patient();  
        pat.addName().setFamily("東京").addGiven("太郎").addGiven("J");  
        pat.addIdentifier().setSystem("http://acme.org/MRNs").setValue("HL7001234");  
        pat.addTelecom().setUse(ContactPointUse.HOME).setSystem(ContactPointSystem.PHONE).setValue("1  
(416) 340-4800");  
        pat.setGender(AdministrativeGender.MALE);  
  
        // Create a context  
        FhirContext ctx = FhirContext.forDstu3();  
  
        // Create a JSON parser  
        IParser parser = ctx.newJsonParser();  
        parser.setPrettyPrint(true);  
  
        String encode = parser.encodeResourceToString(pat);  
        System.out.println(encode);  
  
    }  
}
```

## Create Patient resource

---

```
public class Example06_ClientCreate {  
    public static void main(String[] theArgs) {  
  
        Patient pat = new Patient();  
        pat.addName().setFamily("Tokyo").addGiven("Taro").addGiven("J");  
        pat.addIdentifier().setSystem("http://acme.org/MRNs").setValue("HL7000138");  
        pat.setGender(AdministrativeGender.MALE);  
  
        // Create a context  
        FhirContext ctx = FhirContext.forDstu3();  
  
        // Create a client  
        String serverBaseUrl = "http://fhirtest.uhn.ca/baseDstu3";  
        IGenericClient client = ctx.newRestfulGenericClient(serverBaseUrl);  
  
        // Use the client to store a new resource instance  
        MethodOutcome outcome = client  
            .create()  
            .resource(pat)  
            .execute();  
  
        // Print the ID of the newly created resource  
        System.out.println(outcome.getId());  
    }  
}
```

[http://hapi.fhir.org/baseDstu3/Patient/1521938/\\_history/1](http://hapi.fhir.org/baseDstu3/Patient/1521938/_history/1)

## Example 04で作成した Patientリソース

```
{
  "resourceType": "Patient",
  "identifier": [
    {
      "system": "http://acme.org/MRNs",
      "value": "7000135"
    }
  ],
  "name": [
    {
      "family": "Simpson",
      "given": [
        "Homer",
        "J"
      ]
    }
  ],
  "telecom": [
    {
      "system": "phone",
      "value": "1 (416) 340-4800",
      "use": "home"
    }
  ],
  "gender": "male"
}
```

患者id

`parser.setPrettyPrint(true);` JSON Non Format

```
{"resourceType":"Patient","identifier":[{"system":"http://acme.org/MRNs","value":"7000135"}],
"name":[{"family":"Simpson","given":["Homer","J"]},"telecom":[{"system":"phone","value":"1
(416) 340-4800","use":"home"}],"gender":"male"}
```

# Create: POST

## Patient リソース 要求

Annotations:

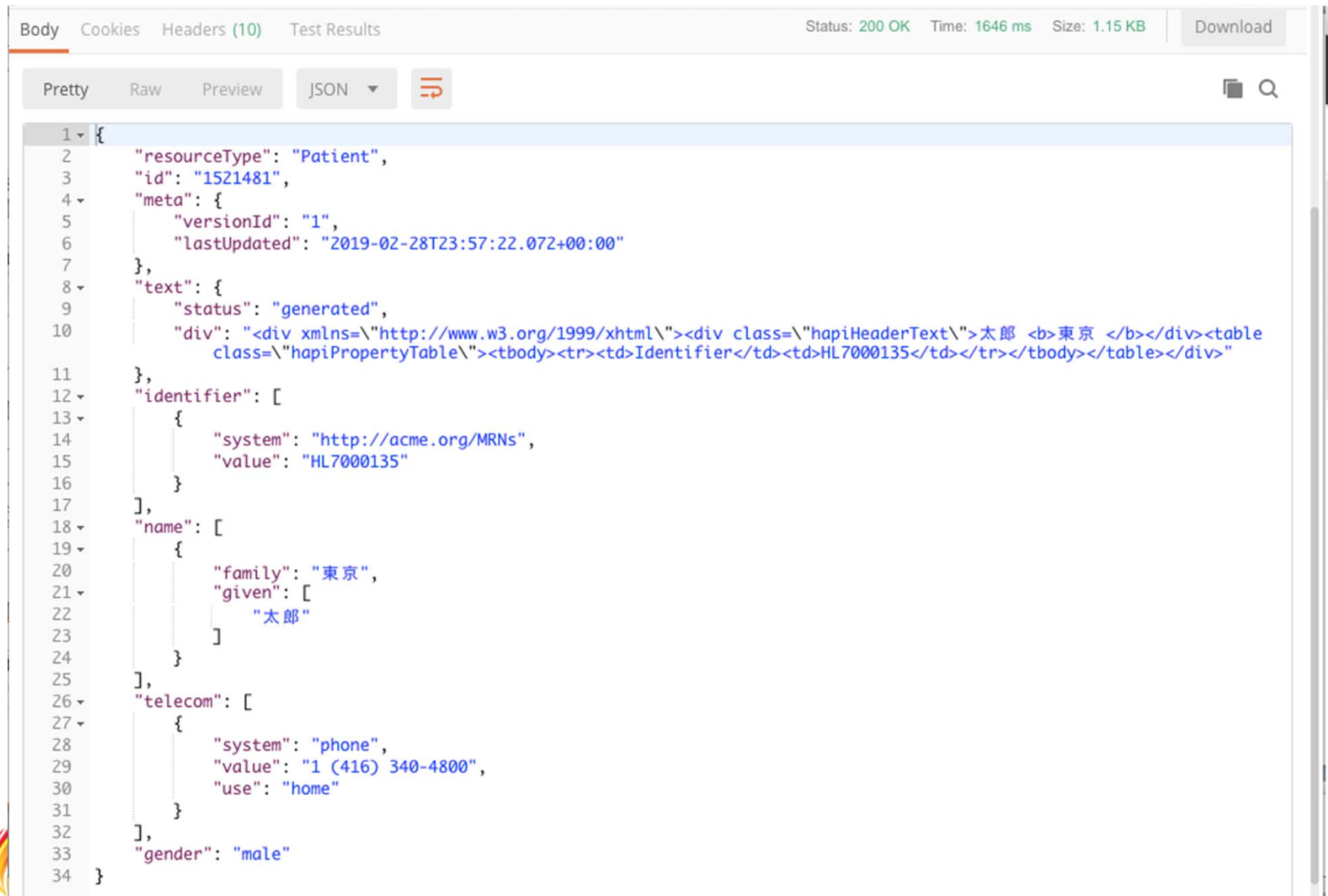
- Create (POST)
- Rest サーバURL+Content他
- 要求
- Body(患者情報)

```
1 {
2   "resourceType": "Patient",
3   "identifier": [
4     {
5       "system": "http://acme.org/MRNs",
6       "value": "HL7000135"
7     }
8   ],
9   "name": [
10    {
11      "family": "東京",
12      "given": [
13        "太郎"
14      ]
15    }
16  ],
17  "telecom": [
18    {
19      "system": "phone",
20      "value": "1 (416) 340-4800",
21      "use": "home"
22    }
23  ],
24  "gender": "male"
25 }
26
```





## Create "Patient" 応答



The screenshot shows a web browser's developer tools interface. The 'Body' tab is active, displaying a JSON response. The response is a FHIR Patient resource with the following details:

- resourceType:** "Patient"
- id:** "1521481"
- meta:** {"versionId": "1", "lastUpdated": "2019-02-28T23:57:22.072+00:00"}
- text:** {"status": "generated", "div": "<div xmlns='http://www.w3.org/1999/xhtml'><div class='hapiHeaderText'>太郎 <b>東京 </b></div><table class='hapiPropertyTable'><tbody><tr><td>Identifier</td><td>HL7000135</td></tr></tbody></table></div>"}
- identifier:** [{"system": "http://acme.org/MRNs", "value": "HL7000135"}]
- name:** [{"family": "東京", "given": ["太郎"]}]
- telecom:** [{"system": "phone", "value": "1 (416) 340-4800", "use": "home"}]
- gender:** "male"

```
1 {
2   "resourceType": "Patient",
3   "id": "1521481",
4   "meta": {
5     "versionId": "1",
6     "lastUpdated": "2019-02-28T23:57:22.072+00:00"
7   },
8   "text": {
9     "status": "generated",
10    "div": "<div xmlns='http://www.w3.org/1999/xhtml'><div class='hapiHeaderText'>太郎 <b>東京 </b></div><table
11          class='hapiPropertyTable'><tbody><tr><td>Identifier</td><td>HL7000135</td></tr></tbody></table></div>"
12  },
13  "identifier": [
14    {
15      "system": "http://acme.org/MRNs",
16      "value": "HL7000135"
17    }
18  ],
19  "name": [
20    {
21      "family": "東京",
22      "given": [
23        "太郎"
24      ]
25    }
26  ],
27  "telecom": [
28    {
29      "system": "phone",
30      "value": "1 (416) 340-4800",
31      "use": "home"
32    }
33  ],
34  "gender": "male"
35 }
```



## Create “Patient” 応答

```
{
  "resourceType": "Patient",
  "id": "1521481",
  "meta": {
    "versionId": "1",
    "lastUpdated": "2019-02-28T23:57:22.072+00:00"
  },
  "text": {
    "status": "generated",
    "div": "<div xmlns=¥\"http://www.w3.org/1999/xhtml¥\"><div class=¥\"hapiHeaderText¥\">太郎 <b>東京</b></div><table class=¥\"hapiPropertyTable¥\"><tbody><tr><td>Identifier</td><td>HL7000135</td></tr></tbody></table></div>"
  },
  "identifier": [
    {
      "system": "http://acme.org/MRNs",
      "value": "HL7000135"
    }
  ],
  "name": [
    {
      "family": "東京",
      "given": [
        "太郎"
      ]
    }
  ],
  "telecom": [
    {
      "system": "phone",
      "value": "1 (416) 340-4800",
      "use": "home"
    }
  ],
  "gender": "male"
}
```

Unique ID(Resource id)が附加

患者id

# Read: GET

## Patient リソース要求

The screenshot shows a REST client interface with a request bar. The request method is 'GET' and the URL is 'http://hapi.fhir.org/baseDstu3/Patient/1447779'. Two blue arrows point from labels to the request components: 'Get' points to the 'GET' method, and 'リソースid' points to the resource ID '1447779' in the URL. The interface also includes a 'Send' button and a 'Save' dropdown menu.

```
{
  "resourceType": "Patient",
  "id": "1447779",
  "meta": {
    "versionId": "1",
    "lastUpdated": "2019-02-25T05:39:16.626+00:00"
  },
  "text": {
    "status": "generated",
    "div": "<div xmlns=¥'http://www.w3.org/1999/xhtml¥'><div class=¥'hapiHeaderText¥'>Homer J <b>SIMPSON</b></div><table class=¥'hapiPropertyTable¥'><tbody><tr><td>Identifier</td><td>7000135</td></tr></tbody></table></div>"
  },
  "identifier": [
    {
      "system": "http://acme.org/MRNs",
      "value": "7000135"
    }
  ],
  "name": [
    {
      "family": "Simpson",
      "given": [
        "Homer",
        "J"
      ]
    }
  ],
  "telecom": [
    {
      "system": "phone",
      "value": "1 (416) 340-4800",
      "use": "home"
    }
  ],
  "gender": "male"
}
```

# Update(Put)要求

Put

PUT http://hapi.fhir.org/baseDstu3/Patient/1447779

Send Save

none form-data x-www-form-urlencoded raw binary Text

```
1 {
2   "resourceType": "Patient",
3   "id": "1447779",
4   "identifier": [
5     {
6       "system": "http://acme.org/MRNs",
7       "value": "7000135"
8     }
9   ],
10  "name": [
11    {
12      "family": "東京",
13      "given": "太郎"
14    }
15  ]
16 }
17
```

リソースid

変更情報

● none ● form-data ● x-www-form-urlencoded ● raw ● binary **Text** ▼

```
1 {
2   "resourceType": "Patient",
3   "identifier": [
4     {
5       "system": "http://acme.org/MRNs",
6       "value": "HL7000135"
7     }
8   ],
9   "name": [
10    {
11      "family": "東京",
12      "given": [
13        "花子"
14      ]
15    }
16  ],
17  "telecom": [
18    {
19      "system": "phone",
20      "value": "1 (416) 340-4800",
21      "use": "home"
22    }
23  ],
24  "gender": "female"
25 }
26
```

```

public class Example07_ClientReadAndUpdate {
    public static void main(String[] theArgs) {
// Create a client
        String serverBaseUrl = "http://fhirtest.uhn.ca/baseDstu3";
        FhirContext ctx = FhirContext.forDstu3();
        IGenericClient client = ctx.newRestfulGenericClient(serverBaseUrl);
// Use the client to read back the new instance using the
// ID we retrieved from the read
        Patient patient = client
            .read()
            .resource(Patient.class)
            .withId("1521938")
            .execute();
// Print the ID of the newly created resource
        System.out.println("Found ID: " + patient.getId());
// Change the gender
        patient.setGender(patient.getGender() == AdministrativeGender.MALE ?
            AdministrativeGender.FEMALE : AdministrativeGender.MALE);
// Update the patient
        MethodOutcome outcome = client
            .update()
            .resource(patient)
            .execute();
        System.out.println("Now have ID: " + outcome.getId());
    }
}

```

```

Found ID: http://hapi.fhir.org/baseDstu3/Patient/1521938/_history/1
Now have ID: http://hapi.fhir.org/baseDstu3/Patient/1521938/_history/2

```

## 患者情報変更(update)応答

```
{
  "resourceType": "Patient",
  "id": "1521481",
  "meta": {
    "versionId": "2",
    "lastUpdated": "2019-03-01T01:25:47.033+00:00"
  },
  "text": {
    "status": "generated",
    "div": "<div
xmlns=¥\"http://www.w3.org/1999/xhtml¥\"><div
class=¥\"hapiHeaderText¥\">花子 <b>東京
</b></div><table
class=¥\"hapiPropertyTable¥\"><tbody><tr><td>Identi
fier</td><td>HL7000135</td></tr></tbody></table><
/div>"
  },

```

```
"identifier": [
  {
    "system": "http://acme.org/MRNs",
    "value": "HL7000135"
  }
],
"name": [
  {
    "family": "東京",
    "given": [
      "花子"
    ]
  }
],
"telecom": [
  {
    "system": "phone",
    "value": "1 (416) 340-4800",
    "use": "home"
  }
],
"gender": "female"
}
```

# Update(PUTの) 応答

```
{  
  "resourceType": "Patient",  
  "id": "1447779",  
  "meta": {  
    "versionId": "4",  
    "lastUpdated": "2019-02-25T06:48:11.073+00:00"  
  },  
  "text": {  
    "status": "generated",  
    "div": "<div xmlns=¥\"http://www.w3.org/1999/xhtml¥\"><div class=¥\"hapiHeaderText¥\">太郎 <b>東京</b></div><table class=¥\"hapiPropertyTable¥\"><tbody><tr><td>Identifier</td><td>7000135</td></tr></tbody></table></div>"  
  },  
  "identifier": [  
    {  
      "system": "http://acme.org/MRNs",  
      "value": "7000135"  
    }  
  ],  
  "name": [  
    {  
      "family": "東京",  
      "given": [  
        "太郎"  
      ]  
    }  
  ]  
}
```

HTML snippet from the text field: `<div class="hapiHeaderText">太郎 <b>東京</b></div><table class="hapiPropertyTable"><tbody><tr><td>Identifier</td><td>7000135</td></tr></tbody></table></div>`

Narrative section



太郎 東京  
Identifier 7000135

変更結果



# History要求(Get)

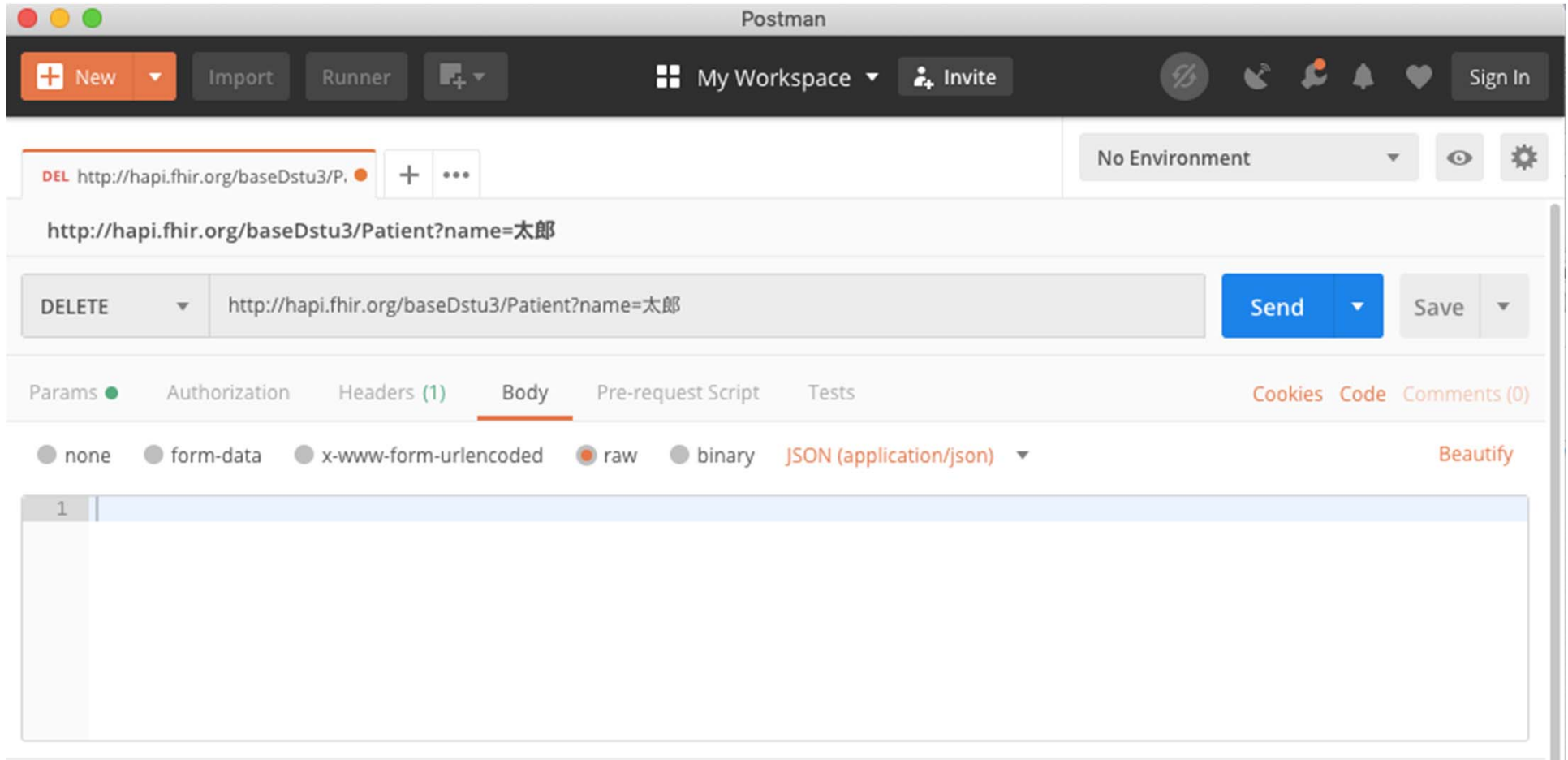
The screenshot shows the Postman interface with a GET request to `http://hapi.fhir.org/baseDstu3/Patient/1521481/_history`. The request body is empty. The response is a JSON object with the following structure:

```
1 {
2   "resourceType": "Bundle",
3   "id": "a38059b6-9bad-4311-b78b-ce6b38989513",
4   "meta": {
5     "lastUpdated": "2019-03-01T01:33:10.113+00:00"
6   },
7   "type": "history",
8   "total": 1
9 }
```

# PatientリソースのHistory(GETの)応答

<pre>{   "resourceType": "Bundle",   "id": "36b09b55-2350-4ef1-97cf-2e0fd633609b",   "meta": {     "lastUpdated": "2019-03-01T01:31:29.793+00:00"   },   "type": "history",   "total": 2,   "link": [     {       "relation": "self",       "url": "http://hapi.fhir.org/baseDstu3/Patient/1521481/_history"     }   ],   "entry": [     {       "fullUrl": "http://hapi.fhir.org/baseDstu3/Patient/1521481",       "resource": {         "resourceType": "Patient",         "id": "1521481",         "meta": {           "versionId": "2",           "lastUpdated": "2019-03-01T01:25:47.033+00:00"         },         "text": {           "status": "generated",</pre>	<pre>"div": "&lt;div xmlns=¥http://www.w3.org/1999/xhtml¥&gt;&lt;div class=¥hapiHeaderText¥&gt;花子 &lt;b&gt;東京 &lt;/b&gt;&lt;/div&gt;&lt;table class=¥hapiPropertyTable¥&gt;&lt;tbody&gt;&lt;tr&gt;&lt;td&gt;Identifier&lt;/td&gt;&lt;td&gt;HL7000135&lt;/td&gt;&lt;/tr&gt;&lt;/tbody&gt;&lt;/table&gt;&lt;/div&gt;"     },     "identifier": [       {         "system": "http://acme.org/MRNs",         "value": "HL7000135"       }     ],     "name": [       {         "family": "東京",         "given": "花子"       }     ],     "telecom": [       {         "system": "phone",         "value": "1 (416) 340-4800",         "use": "home"       }     ],     "gender": "female"   ],   "request": {</pre>	<pre>"method": "PUT",   "url": "http://hapi.fhir.org/baseDstu3/Patient/1521481/_history/2"   },   "fullUrl": "http://hapi.fhir.org/baseDstu3/Patient/1521481",   "resource": {     "resourceType": "Patient",     "id": "1521481",     "meta": {       "versionId": "1",       "lastUpdated": "2019-02-28T23:57:22.072+00:00"     },     "text": {       "status": "generated",       "div": "&lt;div xmlns=¥http://www.w3.org/1999/xhtml¥&gt;&lt;div class=¥hapiHeaderText¥&gt;太郎 &lt;b&gt;東京 &lt;/b&gt;&lt;/div&gt;&lt;table class=¥hapiPropertyTable¥&gt;&lt;tbody&gt;&lt;tr&gt;&lt;td&gt;Identifier&lt;/td&gt;&lt;td&gt;HL700135&lt;/td&gt;&lt;/tr&gt;&lt;/tbody&gt;&lt;/table&gt;&lt;/div&gt;"     },     "identifier": [       {         "system": "http://acme.org/MRNs",</pre>	<pre>"value": "HL7000135"   }   ],   "name": [     {       "family": "東京",       "given": "太郎"     }   ],   "telecom": [     {       "system": "phone",       "value": "1 (416) 340-4800",       "use": "home"     }   ],   "gender": "male"   },   "request": {     "method": "POST",     "url": "http://hapi.fhir.org/baseDstu3/Patient/1521481/_history/1"   } }</pre>
--	--	--	---

## 削除要求: Delete



## 削除された結果

```
{
  "fullUrl": "http://hapi.fhir.org/baseDstu3/Patient/1521481",
  "resource": {
    "resourceType": "Patient",
    "id": "1521481",
    "meta": {
      "versionId": "3",
      "lastUpdated": "2019-03-01T02:26:10.453+00:00"
    },
    "text": {
      "status": "generated",
      "div": "<div xmlns=¥\"http://www.w3.org/1999/xhtml¥\"><table
class=¥\"hapiPropertyTable¥\"><tbody></tbody></table></div>"
    }
  },
  "request": {
    "method": "DELETE",
    "url": "http://hapi.fhir.org/baseDstu3/Patient/1521481/_history/3"
  }
}
```

# 患者情報のXMLでの取得

Read(GET)

GET http://hapi.fhir.org/baseDstu3/Patient/1376667

Send

Save

Params Authorization Headers (1) Body ● Pre-request Script

Cookies Code Comments (0)

KEY	VALUE	DESCRIPTION
<input checked="" type="checkbox"/> Content-Type	application/xml	
Key	Value	Description

患者ID

XMLでの取得

Body Cookies Headers (10) Test Results

Size: 1.37 KB



Download

Pretty Raw Preview XML



```
1 <Patient xmlns="http://hl7.org/fhir">
2   <id value="1376667"/>
3   <meta>
4     <versionId value="1"/>
5     <lastUpdated value="2019-02-17T05:33:27.515+00:00"/>
6   </meta>
7   <text>
8     <status value="generated"/>
9     <div xmlns="http://www.w3.org/1999/xhtml">
10      <div class="hapiHeaderText">Homer J
11
12        <b>SIMPSON </b>
13      </div>
14      <table class="hapiPropertyTable">
15        <tbody>
16          <tr>
17            <td>Identifier</td>
```

患者情報(XML)

```
Pretty Raw Preview XML  
```

```
1 <Patient xmlns="http://hl7.org/fhir">
2   <id value="1447779"/>
3   <meta>
4     <versionId value="4"/>
5     <lastUpdated value="2019-02-25T06:48:11.073+00:00"/>
6   </meta>
7   <text>
8     <status value="generated"/>
9     <div xmlns="http://www.w3.org/1999/xhtml">
10      <div class="hapiHeaderText">太郎
11
12        <b>東京 </b>
13      </div>
14      <table class="hapiPropertyTable">
15        <tbody>
16          <tr>
17            <td>Identifier</td>
18            <td>7000135</td>
19          </tr>
20        </tbody>
21      </table>
22    </div>
23  </text>
24  <identifier>
25    <system value="http://acme.org/MRNs"/>
26    <value value="7000135"/>
27  </identifier>
28  <name>
29    <family value="東京"/>
30    <given value="太郎"/>
31  </name>
32 </Patient>
```

This result is being rendered in HTML for easy viewing. You may access this content as [Raw JSON](#) or [Raw XML](#), or view this content in [HTML JSON](#) or [HTML XML](#).  
Response generated in 4ms.

## HTTP 200 OK

### Response Headers

```
X-Powered-By: HAPI FHIR 3.8.0-SNAPSHOT REST Server (FHIR Server; FHIR 3.0.1/DSTU3)
Content-Type: application/fhir+xml;charset=utf-8
```

### Response Body

```
1  {
2    "resourceType": "Patient",
3    "id": "1375744",
4    "meta": {
5      "versionId": "1",
6      "lastUpdated": "2019-02-15T03:30:30.805+00:00"
7    },
8    "text": {
9      "status": "generated",
10     "div": "<div xmlns=\\"http://www.w3.org/1999/xhtml\\"><div class=\\"hapiHeaderText\\">Peter James <b>CHALMERS </b></div><table class=\\"hapiProper
11     },
12     "identifier": [
13       {
14         "system": "http://fhirtutorial.example/patient",
15         "value": "12345"
16       }
17     ],
18     "name": [
19       {
20         "family": "Chalmers",
21         "given": [
22           "Peter",
23           "James"
24         ]
25       }
26     ],
27     "telecom": [
28       {
29         "system": "phone",
30         "value": "(03) 5555 6473",
31         "use": "work"
32       }
33     ]
34   }
```

Wrote 0.7 KB (14.1 KB total including HTML) in estimated 0ms

The screenshot shows the HAPI-FHIR web interface. The browser address bar displays `fhirtest.uhn.ca`. The page header includes navigation links for Home, Source Code, and About This Server. The main content area features the HAPI-FHIR logo and a warning message: "You are accessing the public FHIR server UHN/HAPI Server (STU3 FHIR). This server is hosted elsewhere on the internet but is being accessed using the HAPI client implementation. ⚠ This is not a production server! Do not store any information here that contains personal health information or any other confidential information. This server will be regularly purged and reloaded with fixed test data." Below this is a table with server details:

Server	UHN Test Server (STU3 Resources)
Software	HAPI FHIR Server - 3.8.0-SNAPSHOT
FHIR Base	<a href="http://hapi.fhir.org/baseDstu3">http://hapi.fhir.org/baseDstu3</a>

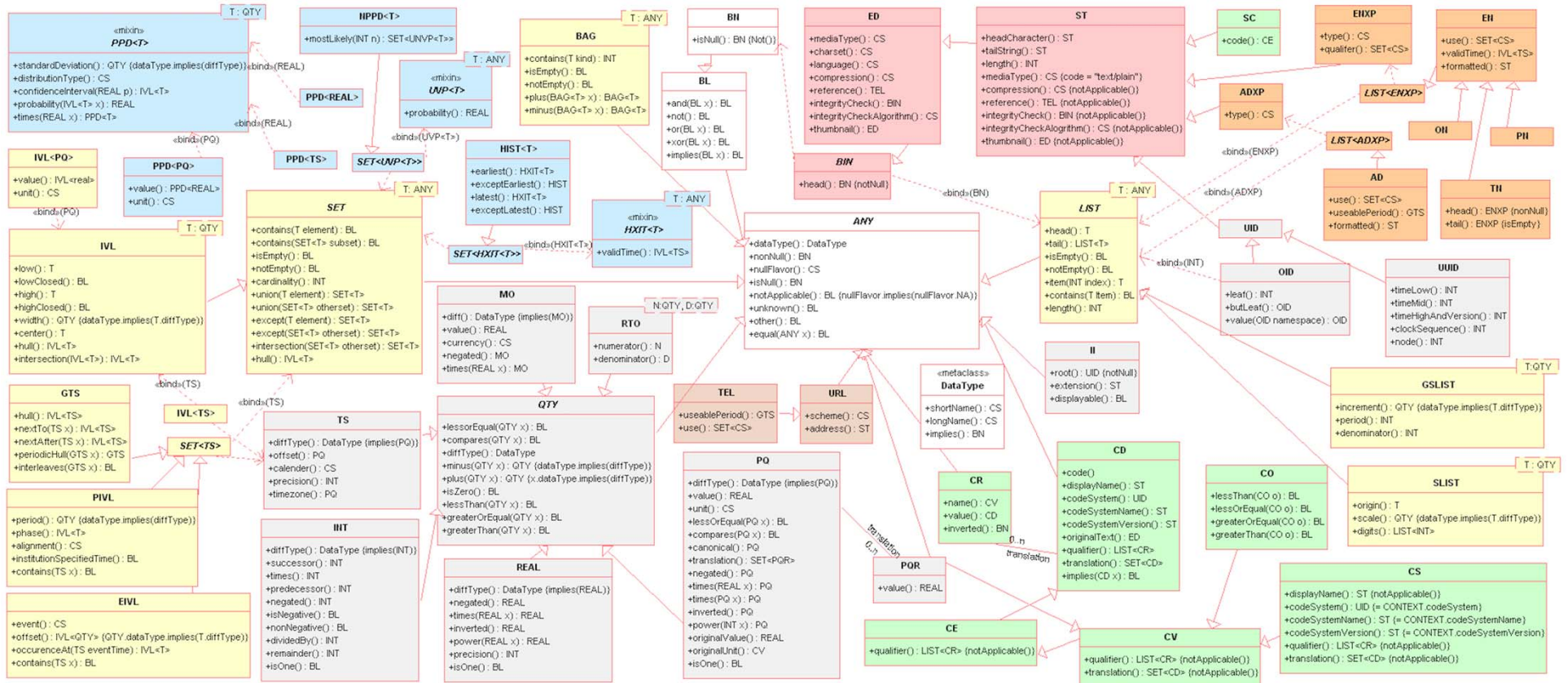
The "Server Actions" section includes:

- Retrieve the server's **conformance** statement. (Conformance button)
- Retrieve the update **history** across all resource types on the server. (History button, Since field, Limit # (opt) field)
- Post a bundle containing multiple resources to the server and store all resources within a single atomic transaction. (Transaction button, Bundle \* field with placeholder text)

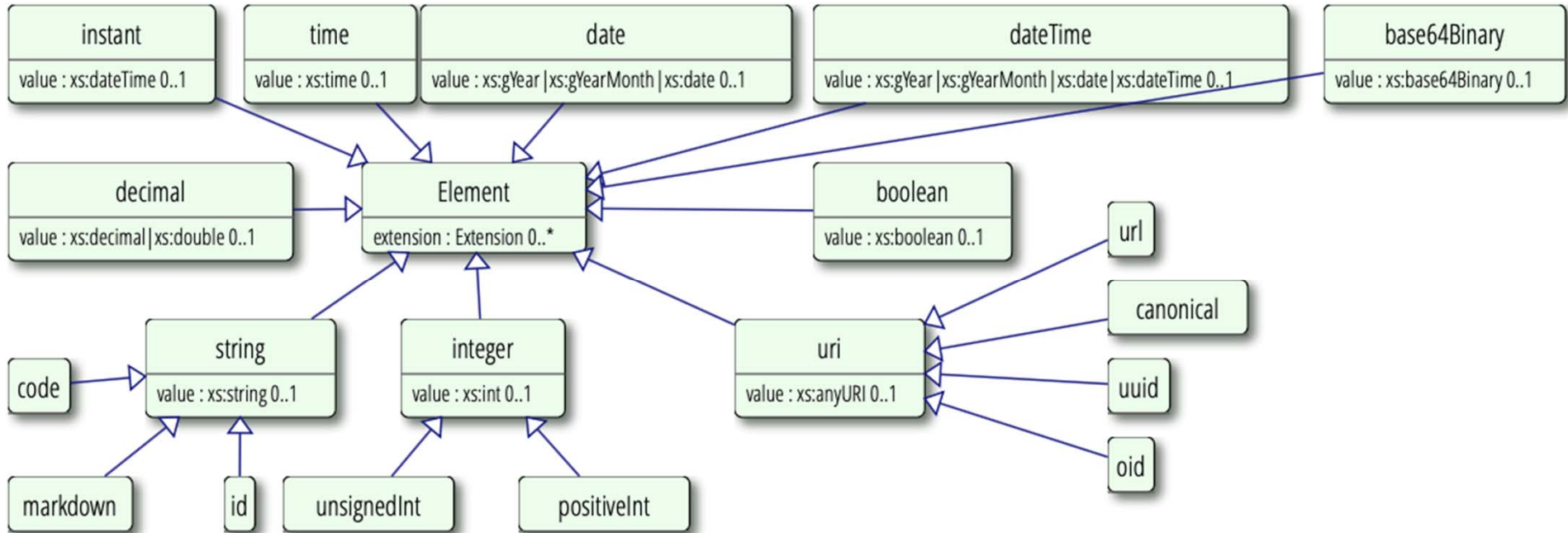
The left sidebar contains "Options" (Encoding: default, XML, JSON; Pretty: default, On, Off; Summary: none, true, text, data, count) and "Resources" with counts for various types: Patient (1006037), Observation (246941), MedicationStatement (22169), Encounter (17112), ValueSet (11449), Claim (10963), Procedure (9645), Condition (9469), ExplanationOfBenefit (8912), Binary (6794), Immunization (5001), MedicationRequest (4545), DiagnosticReport (3402), and Practitioner (2542).







# データタイプ(Primitive Data Type)



- V2→FHIR
  - <http://www.hl7.org/fhir/comparison-v2.html>
  - [http://wiki.hl7.org/index.php?title=Version\\_2\\_-\\_FHIR\\_Mapping\\_Scenarios](http://wiki.hl7.org/index.php?title=Version_2_-_FHIR_Mapping_Scenarios)
  - [http://www.ringholm.com/docs/04350\\_mapping\\_HL7v2\\_FHIR.htm](http://www.ringholm.com/docs/04350_mapping_HL7v2_FHIR.htm)
  
- CDA(CCDA)→FHIR
  - <https://github.com/HL7/ccda-to-fhir>

The screenshot shows the HealthIT.gov website with the following content:

- Header:** HealthIT.gov logo, navigation menu (TOPICS, HOW DO I?, BLOG, NEWS, ABOUT ONC), and search bar.
- Breadcrumbs:** Home > Topics > Certification of Health IT
- Left Sidebar:**
  - Certification of Health IT (+)
  - About the Health IT Certification Program
  - Certified Health IT Products List (CHPL)
  - Certification Regulations
  - Testing Process & Test Methods (+)
  - Certification Process
  - Surveillance and Oversight
  - Frequently Asked Questions (+)
  - Certification Resources (+)
  - Programs That Reference ONC Certified Health IT
  - EHR Reporting Program
- Main Content Area:**
  - Certification of Health IT:** The ONC Health IT Certification Program provides assurance to purchasers and other users that a system meets the technological capability, functionality, and security requirements adopted by HHS. [Learn More about the ONC Health IT Certification Program](#)
  - 2015 Edition Test Method:** The 2015 Edition Test Method has been constructed in an outcome-focused format with additional companion guide documents to aid stakeholder development of Health IT Modules. [Read More](#)
  - Certified Health IT:** Search the Certified Health IT Product List for Health IT modules that have been tested and certified under the ONC Health IT Certification Program. [Learn More About The CHPL](#)



# Certified Health IT

The image displays three screenshots of the HealthIT.gov website, each showing a different application access page. The screenshots are arranged vertically and are highlighted with a yellow border.

**Top Screenshot:** Shows the page for "Application access — patient selection". The breadcrumb trail is: Home > Topics > Certification of Health IT > Testing Process & Test Methods > 2015 Edition Test Method > Application access — patient selection. The main heading is "§170.315(g)(7) Application access — patient selection".

**Middle Screenshot:** Shows the page for "Application access — all data request". The breadcrumb trail is: Home > Topics > Certification of Health IT > Testing Process & Test Methods > 2015 Edition Test Method > Application access — all data request. The main heading is "§170.315(g)(8) Application access — data category request".

**Bottom Screenshot:** Shows the page for "Application access — data category request". The breadcrumb trail is: Home > Topics > Certification of Health IT > Testing Process & Test Methods > 2015 Edition Test Method > Application access — data category request. The main heading is "§170.315(g)(8) Application access — data category request". Below the heading, there are tabs for "CCGs" and "Test Procedure", and a version notice: "Version 1.9 Updated on 05-02-2018".

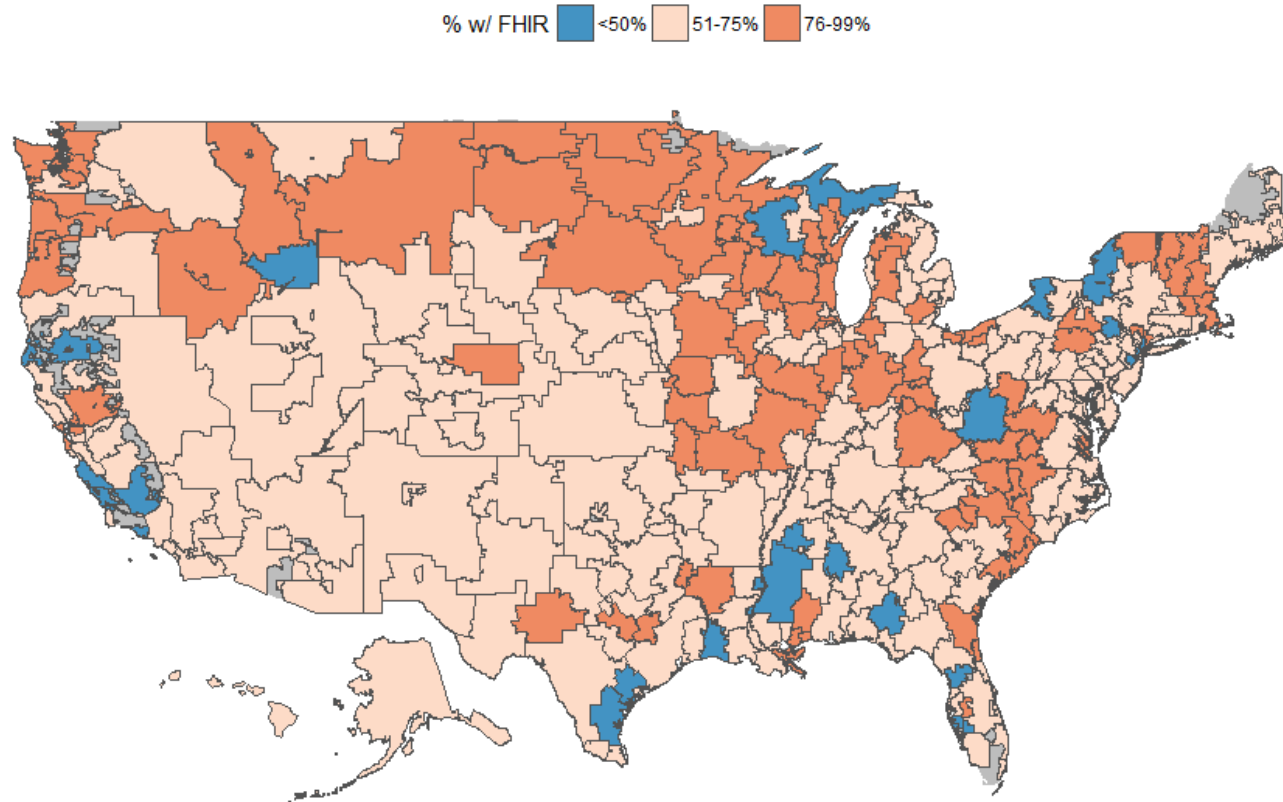
## FHIR採用状況

Ten Developers with the Largest Market Share	API standard Referenced	% of Hospitals Report Using	% of Clinicians Report Using
<b>Allscripts</b>	FHIR Release 2	5%	9%
<b>athenahealth</b>	FHIR Release 2	<1%	5%
<b>Cerner</b>	FHIR Release 2	21%	5%
<b>CPSI</b>	FHIR Release 2	10%	—
<b>eClinicalWorks</b>	FHIR Release 3	—	7%
<b>Epic</b>	FHIR Release 2	21%	27%
<b>GE</b>	FHIR Release 2	<1%	5%
<b>MEDHOST</b>	FHIR Release 2	5%	—
<b>MEDITECH</b>	FHIR Release 2	20%	<1%
<b>NextGen</b>	FHIR Release 2	<1%	6%
<b>Total</b>		<b>82%</b>	<b>64%</b>

## FHIRの2015年版認証APIを持つ臨床医の割合

### Percent of clinicians with a 2015 Edition certified-API enabled with FHIR

By Hospital Referral Region



Source: CHPL; Medicare EHR Incentive Program

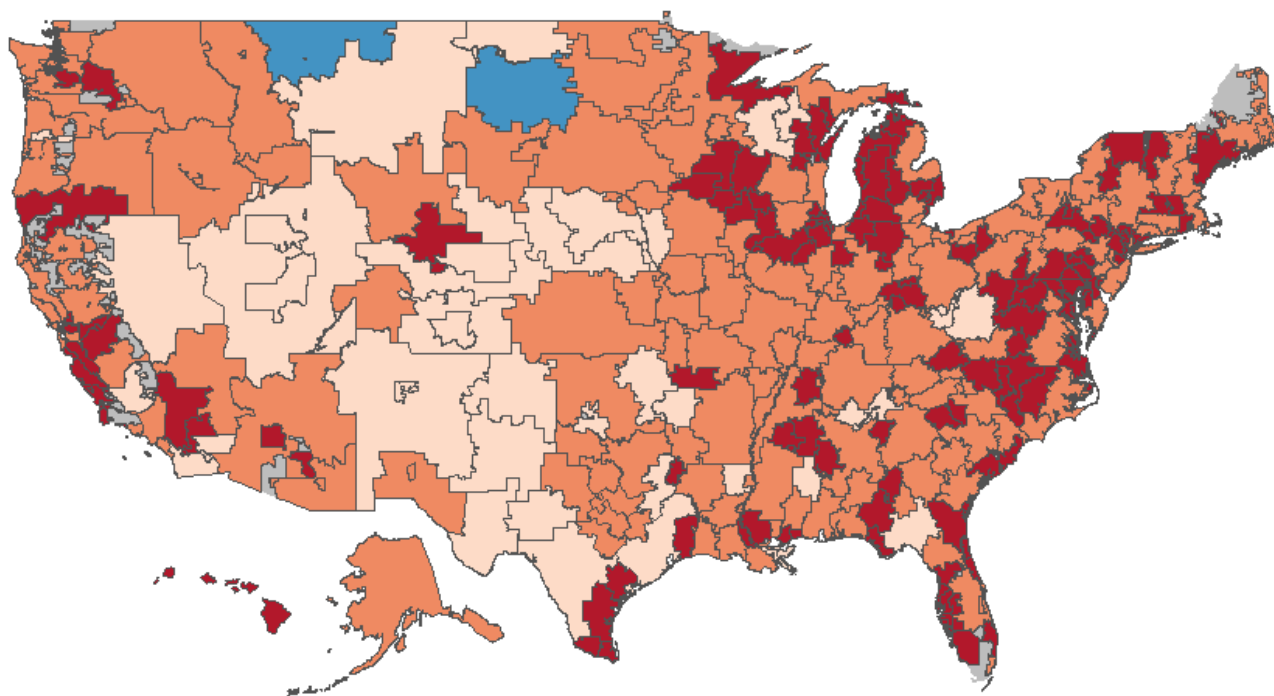
Notes: (1) gray areas = HRR with no clinicians; (2) The most recent attestations to the Medicare EHR Incentive Program were used to determine EHR installations for all clinicians. These attestations may not reflect the most currently installed technology for all clinicians. In some cases, %'s may be underestimated for HRRs.

## FHIRの2015年版認証APIを持つ臨床医の割合

### Percent of hospitals with a 2015 Edition certified-API enabled with FHIR

By Hospital Referral Region

% w/ FHIR ■ <50% ■ 51-75% ■ 76-99% ■ 100%



Source: CHPL; Medicare EHR Incentive Program

Notes: (1) gray areas = HRR with no hospital; (2) The most recent attestations to the Medicare EHR Incentive Program were used to determine EHR installations for all hospitals. These attestations may not reflect the most currently installed technology for all hospitals. In some cases, %'s may be underestimated for HRRs.



