

## 第94回HL7セミナー

# HL7 Internationalの最新動向紹介

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檀原 一之

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# Design and Evaluation of a FHIR Implementation Guide Comparison Platform:

A Case Study of 25 National Base  
and Core IGs

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期間中に開催された教育セッションのうち

Design and Evaluation of a FHIR Implementation Guide Comparison Platform  
(FHIR実装ガイド比較プラットフォームの設計と評価)

A Case Study of 25 National Base and Core IGs  
(25ヶ国のBaseまたはCore実装ガイドのケーススタディ)

の内容を紹介

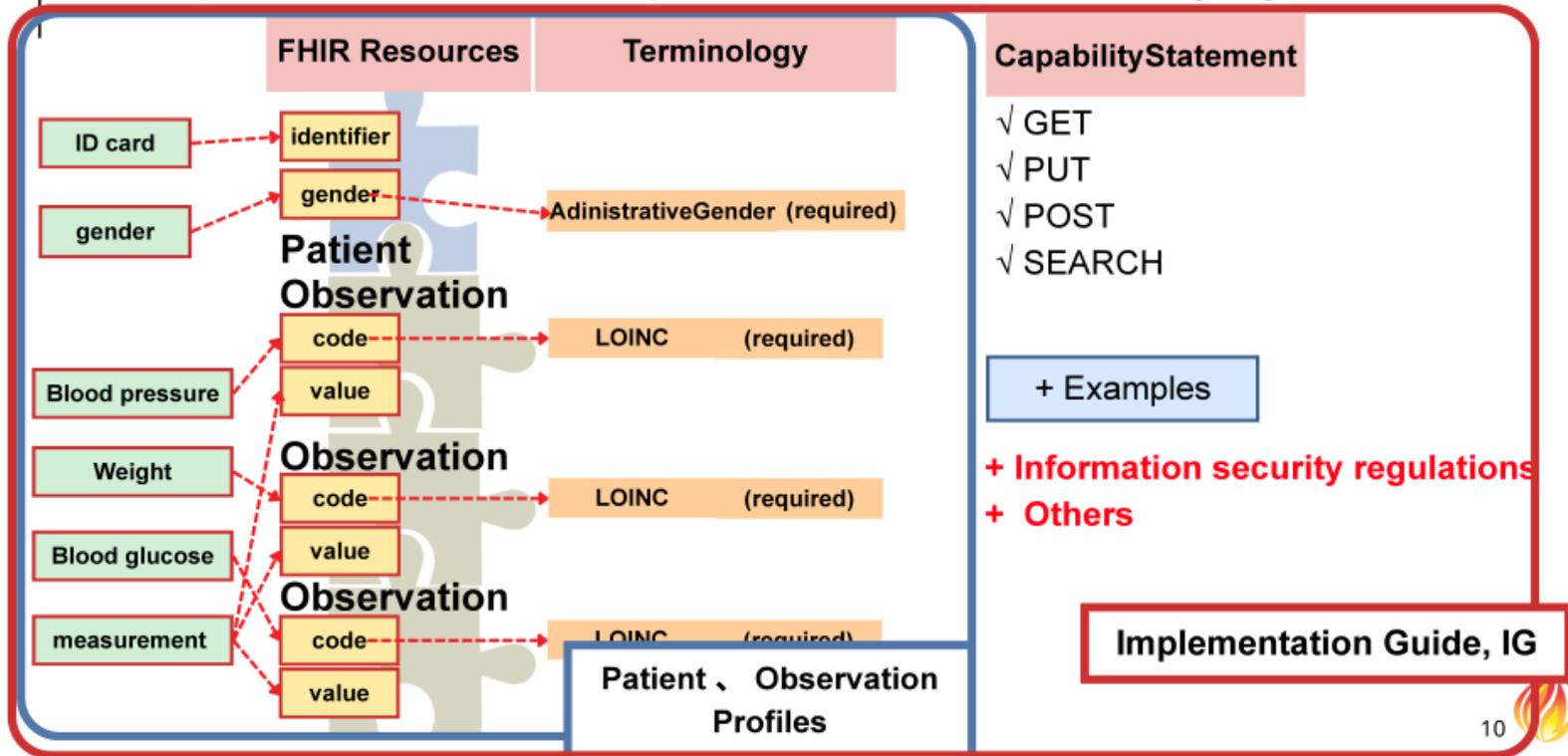
1. FHIRは2011年に初めて提案され、その後HL7によって新しい標準として採用された。これは、医療データ交換における一貫性と相互運用性の課題に対応するためのもの。
2. HL7の従来の標準と、最新のウェブ技術（RESTful API、JSON、XML）を組み合わせて、柔軟な設計を実現している。
3. 多様なユースケースやローカライゼーションをサポートする、豊富な実装例とともに、オープンかつ自由に利用できる。

# Differences Between Traditional System Specification Documents and Implementation Guides (IGs)

System Specs	IGs
<p><b>Human-Readable</b></p>	<p><b>Human-Readable + Machine-Readable (Validation of Implementation Conformance)</b></p>

これまでの仕様書…人間が理解できる  
 FHIR実装ガイド…人間やコンピュータが理解できる

## Components of an Implementation Guide (IG)



実装ガイドは、リソースの要素、要素で使われる用語、CapabilityStatement（サーバーの機能要件）、等で構成される。

## Elements redefine

### Design Approaches

#### **Must Support**

- Indicates elements that systems must be able to process and preserve.
- Even if optional, if marked Must Support, the receiving system cannot ignore it.

#### **Cardinality**

- 0..1 – Optional, appears at most once
- 1..1 – Required, must appear exactly once
- 0..\* – Optional, can appear multiple times
- 1..\* – Required, must appear at least once

#### **Data Type**

- String – Textual descriptions (e.g., patient name)
- Quantity – Numbers with units (e.g., weight in kg)
- CodeableConcept – Coded concepts (e.g., diagnosis code)

#### **Value Sets & Binding Strength**

- Required – Must use a code from the value set (strict).
- Extensible – Should use the value set, but may add others if needed.
- Preferred – Use from the value set if possible, but not mandatory.
- Example - Instances are not required or encouraged to use this value set; it is provided only as illustrative examples of possible concepts.

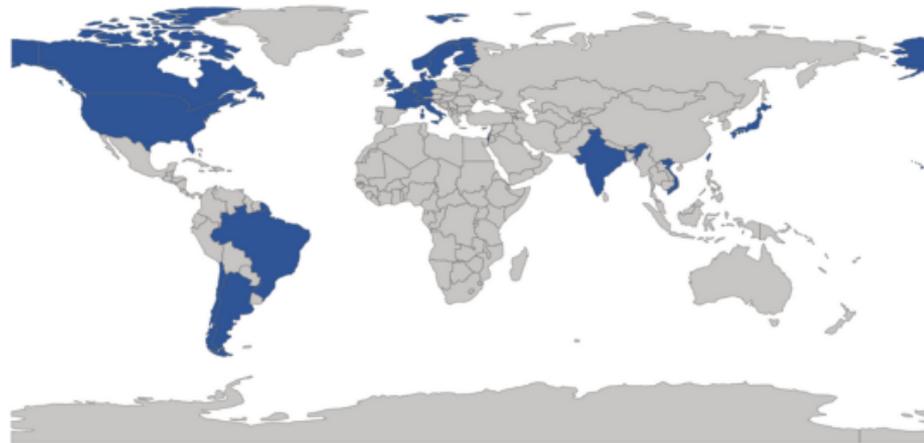
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「MustSupport」「Cardinality」「DataType」  
「ValueSet」「BindingStrength」などの設計が必要。

## National Base/Core IG Landscape

Over 100 countries have adopted FHIR as the standard for health data exchange, and at least 25 of them are actively developing national FHIR Base or Core IGs to support localization and future applications.



100カ国以上がFHIRを標準として採用し、25カ国以上がナショナルBase/Core IGを開発中。

## Base and Core IG

- **Base IG:** Provides only Resource Profiles, ValueSets, CodeSystems, and IdentifierSystems, without a CapabilityStatement.
- **Core IG:** Includes a complete CapabilityStatement, describing the required and recommended functions that an FHIR Server should support in real-world scenarios.

Category	Base IG	Core IG
Main Content	Profiles, ValueSets, CodeSystems, IdentifierSystems	All contents of Base IG + CapabilityStatement
CapabilityStatement	Not included	Included
Purpose	Provides structural definitions as a foundational reference	Defines the required and recommended functionalities of an FHIR Server

(Ben McAlister, 2025). Additional definitions may exist that have not been formally documented or referenced.



Base IGはリソースプロファイルやValueSet等の構造定義のみを提供し、Core IGはさらにCapabilityStatement（サーバーの機能要件）を含む。

CoreまたはBaseIG設計者の視点で、異なるコアIG間で同じ要素を比較した際、設計が異なる場合にどう感じるか？

- ルールが異なり、どれに従えばよいのか分からない。
- すべてのIGを手作業で確認するのは非常に時間がかかる。
- 各国が異なる方法で設計した場合、相互運用性はどうなるのか。
- 比較することで、お互いから学び、改善できる可能性がある。

## The Similar Element Pairs

sourceResource	sourceElement	targetResource	targetElement
Patient	name	Person	name
Patient	name	RelatedPerson	name
Patient	preferred	RelatedPerson	preferred
Patient	telecom	Person	telecom
Patient	telecom	RelatedPerson	telecom

## Research Tools: Similar Element Pairs



OpenAI ChatGPT 4.1



Google Gemini 1.5 flash



生成AI（ChatGPT 4.1、Google Gemini 1.5 flash）を活用し、類似要素ペアを自動抽出・比較。

## Result and Discussion: Descriptive Statistics of Similar Element Pairs



Similar Elements Pairs

Similar Elements Analysis	Results
Confirmed pairs of similar elements	6,846
Unique elements requiring similarity comparison	971
<b>Number of similar elements to be checked per element</b>	
Average (Standard Deviation)	7.05 (9.52)
Median	2
Minimum	1
Maximum	28

25カ国のBase/Core IGから6,846組の類似要素ペアを抽出し、設計の一貫性を分析。

## Research Subjects and Data Sources

- Simplifier.net and the HL7 Implementation Guide Registry
- Data Compiled on: September 5, 2025

ID	Country	Publishing Organization	Initial Release Date	Latest Revision Date	IG Name	IG Type
1	India	National Resource Center for EHR Standards	2020/8/16	2025/5/8	FHIR Implementation Guide for ABDM	Base
2	Finland	HL7 Finland	2023/2/2	2025/5/11	Finnish Base Profiles	Base
3	Norway	HL7 Norway	2020/4/22	2025/3/26	HL7 Norway no-basis	Base
4	New Zealand	HL7 New Zealand	2024/8/14	2024/8/14	HL7® FHIR® New Zealand Base Implementation Guide	Base
5	Estonia		2024/6/19	2025/9/4	Estonian Base Implementation Guide	Base
6	Sweden		2023/3/8	2025/5/20	Swedish Base Profiles Implementation Guide	Base
7	Italy		2020/6/30	2025/6/30	HL7 Italia FHIR Implementation Guide (base)	Base
8	Germany		2023/6/16	2025/6/16	de.basisprofil.r4	Base
9	Brazil		2023/5/6/4	2025/7/21	Guia de implementação do Core do Brasil: Release 1 - BR Real	Core
10	Japan		2022/2/26	2025/9/2	HL7 FHIR JP Core Implementation Guide	Core
11	Canada		2023/5/29			
12	Taiwan	Ministry of Health and Welfare(MOHW)	2023/7/5			
13	United States	International / Cross-Group Projects	2019/1/6			
14	Chile	HL7 Chile	2023/6/23			
15	Australia	HL7 Australia	2023/3/1			
16	South Korea	HL7 Korea	2023/6/20			
17	Denmark	HL7 Denmark	2021/12/18			
18	Belgium	eHealth Platform	2022/3/24			
19	Israel	Israel's Ministry of Health and the FHIR community	2021/1/30			
20	France	Interop/Santé	2022/10/26			
21	United Kingdom	HL7 UK	2022/12/16			
22	Colombia	HL7 Colombia	2024/11/19			
23	Netherlands	Nictiz	2022/3/1			
24	Vietnam	Cục Công nghệ thông tin - Bộ Y tế	2025/7/1			
25	Switzerland	HL7 Switzerland	2020/2/7	2025/5/22	HL7 FHIR Core Implementation Guide (R4)	Base/Core

25 FHIR Implementation Guides (IGs) across 25 countries

- Base IG (8)
- Core IG (8)
- Base/Core IG: Although labeled as a Core IG, the IG does not actually include Capability Statements. (9)

調査した国

1-8がBase IGを公開している国。

9-16がCore IGを公開している国。

17-25がCore IGを公開しているのだが、Capability Statementが含まれていない。

## Consistency Indicator: Global Design

Variable Name	Definition	Example Description
(1) Global Design Consistency	<ul style="list-style-type: none"> <li>• <b>(N) Total number of IGs:</b> The number of IGs participating in the analysis.</li> <li>• <b>(K) Number of design method types:</b> Among the N IGs, the number of types (K) of specified single design methods for the same element. Possible single design methods and their types are as follows: <ul style="list-style-type: none"> <li>◦ <b>MustSupport:</b> Yes / No, up to 2 types.</li> <li>◦ <b>Cardinality:</b> 0..1, 0..n, 1..1, 1..n, 0..0, n..m, or n..n, up to 7 types.</li> <li>◦ <b>DataType:</b> Varies depending on element data type, resulting in different numbers of types.</li> <li>◦ <b>BindingValueSet:</b> Varies depending on element, resulting in different numbers of types.</li> <li>◦ <b>BindingStrength:</b> required, extensible, preferred, or example, up to 4 types.</li> </ul> </li> <li>• <b>(n<sub>i</sub>) Number of IGs per design type:</b> The number of IGs that adopt the i-th design type.</li> <li>• <b>Global design consistency formula:</b> <math>\frac{\sum_{i=1}^K n_i(n_i-1)}{N(N-1)}</math></li> </ul> <p>The value ranges between 0 and 1; the closer it is to 1, the higher the consistency, and conversely, the lower it is.</p>	<p><b>Example:</b> For the calculation logic of global design consistency of the <i>cardinality</i> of the "Patient.active" element across 23 IGs:</p> <ol style="list-style-type: none"> <li>1. The cardinality definitions among the 23 IGs include only two options: 1..1 or 0..1, hence K = 2.</li> <li>2. Among them, 21 IGs define it as 0..1, and 2 IGs define it as 1..1.</li> <li>3. Therefore, the global design consistency is calculated as:</li> </ol> $\frac{21_{type1}(21_{type1}-1)+2_{type2}(2_{type2}-1)}{23(23-1)}$ <p>= 0.83</p> <div style="border: 1px solid black; padding: 5px; text-align: center;">             Referring to the Simpson Diversity Index         </div>



MustSupport、Cardinality、DataTypeは比較的高い一貫性が見られるが、ValueSet、BindingStrengthは国ごとにばらつきが大きい。

例えば、23カ国で「Patient.active」のCardinalityは21カ国が「0..1」、2カ国が「1..1」と定義しており、一貫性指標は0.83。

# IG Design Comparison Platform


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## Welcome to the FHIR® Implementation Guide Design Comparison Platform!

Do you, like us, often find yourself gathering information from numerous websites and various FHIR Implementation Guides (IGs) for reference, only to feel bogged down by the volume of data? When comparing the structures and specifications of similar IGs, do you struggle to see the big picture, quickly identify differences and consistencies, or to not feel 100 % confident that your design both meets requirements and remains compatible with similar IGs? Even after meticulous design, do you still worry that similar fields within the same IG may inadvertently lack consistency?

To address these challenges, we have curated core and base IG data from 25 countries and developed the FHIR IG Design Comparison Platform (hereinafter, "the Platform"). We sincerely invite you to explore the Platform! It is designed to help core IG designers like you rapidly access and compare the design approaches of IGs from your countries of interest, and to further evaluate the design differences of similar fields within your own IGs as a reference.

### Comparison Dimensions

On this platform, we compare and analyze the following design dimensions to help users understand how different national FHIR core IGs vary in their field design:

Comparison Item	Chinese Name	Description
MS	Must Support	If marked MustSupport, implementers must indicate support status and handle it appropriately in their implementation.
Cardinality	Cardinality	Specifies the minimum and maximum occurrences of this element within a resource, e.g.: 0..* = zero or more; 1..1 = exactly one; 1..* = at least one; and so on.
DataType	Data Type	The type of this element, e.g., boolean, integer, dateTime, etc.



Web Links



ご静聴ありがとうございました