# Introduction to FHIR

## Sep 9, 2017

## HL7 FHIR Connectathon 16

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# This presentation

- Can be downloaded at:
  - https://github.com/FHIR/documents/tree/master/connectathons/SanDiegoSep2017/FHIR%20Overview.pptx
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  - Creative Commons Attribution 3.0 Unported License
  - (Do with it as you wish, so long as you give credit)

# The acronym

- F – Fast (to design & to implement)
  - Relative – No technology can make integration as fast as we'd like
- H – Healthcare
  - That's why we're here
- I – Interoperable
  - Ditto
- R – Resources
  - Building blocks – more on these next

# Resources

- Defined Structured Data
  - The logical, *common* contents of the resource
  - Mapped to formal definitions/RIM & other formats
  - Syntax – XML, JSON and Turtle (TTL)
- Extensions
  - Local requirements, but everyone can use
  - Published and managed
- Narrative
  - Human readable

```
<Patient xmlns="http://hl7.org/fhir">
  <id value="example"/>
  <meta>
    <lastUpdated value="2017-01-14T09:14:33Z"/>
  </meta>

  <text>
    <status value="generated"/>
    <div xmlns="http://www.w3.org/1999/xhtml">
      <p>Henry Levin the 7th</p>
    </div>
  </text>

  <extension url="http://hl7.org/fhir/StructureDefinition/us-
core-birthsex">
    <valueCode value="M"/>
  </extension>

  <identifier>
    <use value="usual"/>
    <system value="urn:oid:1.2.36.146.595.217.0.1"/>
    <value value="12345"/>
  </identifier>
  <active value="true"/>
  <name>
    <use value="official"/>
    <family value="Levin"/>
    <given value="Henry"/>
    <suffix value="the 7th"/>
  </name>
  <gender value="male"/>
  <birthDate value="1974-12-25"/>
  <managingOrganization>
    <reference value="Organization/example"/>
  </managingOrganization>
</Patient>
```

FHIR Id & Metadata

Human Readable Summary

Extension with reference to its definition

Standard Data Content:

- Patient Identity
- Name
- Gender
- Date of Birth
- Provider

```
{
  "resourceType": "Patient",
  "id": "example",
  "meta": {
    "versionId": "1",
    "lastUpdated": "2017-01-03T16:05:00.792Z"
  },
  "text": {
    "status": "generated",
    "div": "<div xmlns=\"http://www.w3.org/1999/xhtml\"><p>Henry Levin
the 7th</p></div>"
  },
  "extension": [
    {
      "url": "http://hl7.org/fhir/StructureDefinition/us-core-birthsex",
      "valueCode": "M"
    }
  ],
  "identifier": [
    {
      "use": "usual",
      "system": "urn:oid:1.2.36.146.595.217.0.1",
      "value": "12345"
    }
  ],
  "active": true,
  "name": [
    {
      "use": "official",
      "family": "Levin",
      "given": [ "Henry" ],
      "suffix": [ "the 7th" ]
    }
  ],
  "gender": "male",
  "birthDate": "1974-12-25",
  "managingOrganization": {
    "reference": "Organization/example"
  }
}
```


FHIR Id & Metadata

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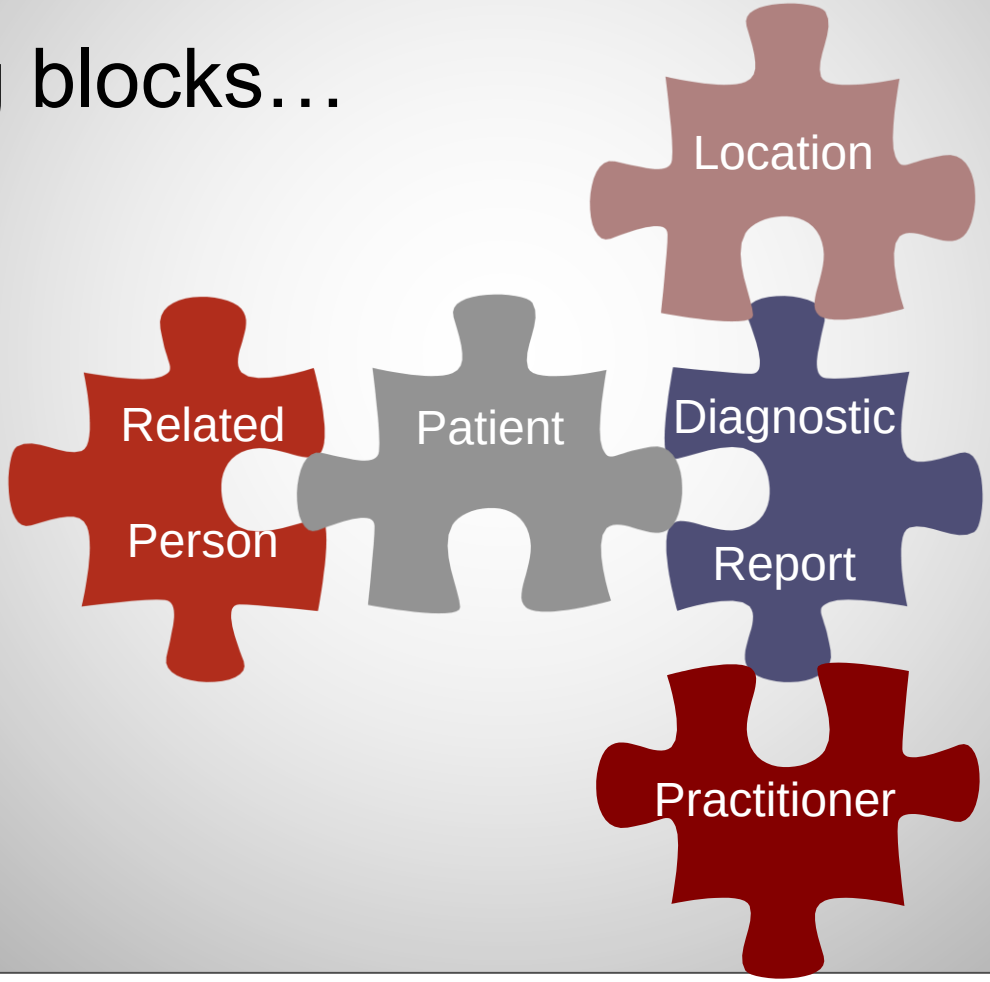
# It’s all about the resources . . .

- Building blocks…



# What is a Resource?

## Examples

- Administrative
  - Patient, Practitioner, Organization, Location, Coverage, Invoice
- Clinical Concepts
  - Allergy, Condition, Family History, Care Plan
- Infrastructure
  - Document, Message, Profile, Conformance*

## Non-examples

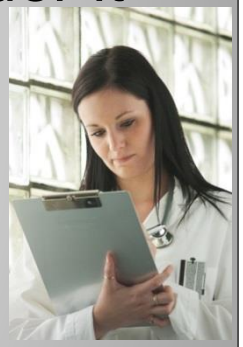
- Gender
  - Too small
- Electronic Health Record
  - Too big
- Blood Pressure
  - Too specific
- Intervention
  - Too broad

# Capability*

- There's a resource for documenting the capabilities of a FHIR client and server.
- Can be used for:
  - Stating how a specific system instance behaves
  - Defining how a software system is capable of behaving (including configuration options)
  - Identifying a desired set of behavior(s)
- To declare themselves "FHIR Conformant", a system **must** publish a CapabilityStatement.

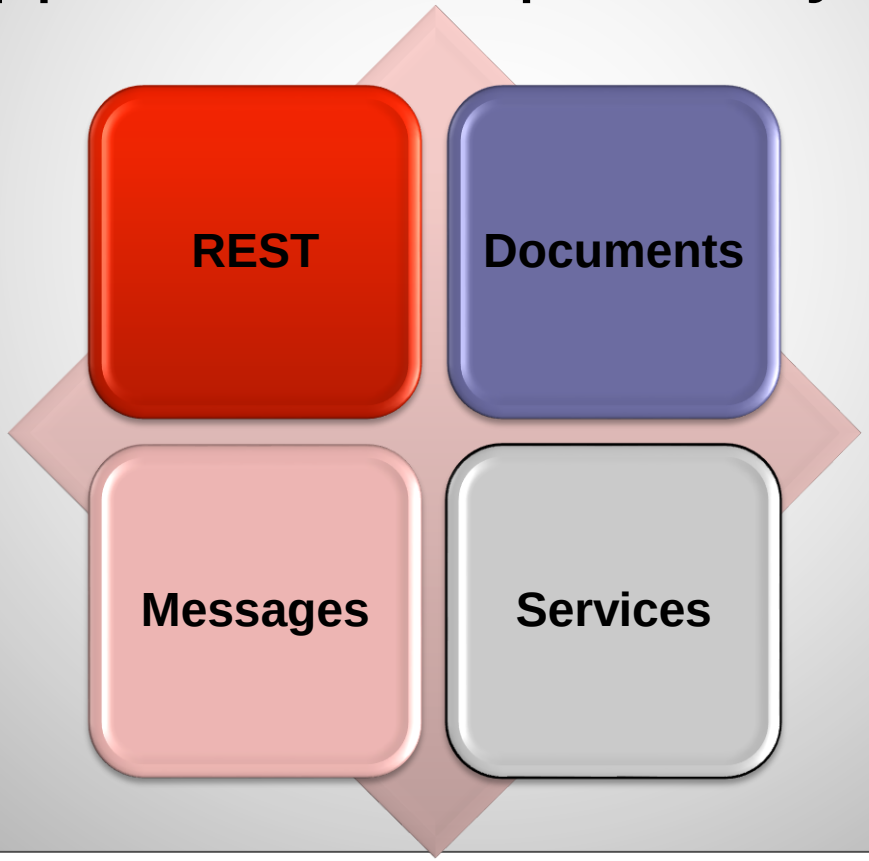
# Human Readable

- CDA taught HL7 a very important lesson
  - Even if the computers don't understand 99% of what you're sending, that's ok if they can properly render it to a human clinician
- This doesn't just hold for documents
- Important for messages, services, etc.
- Resources SHOULD always contain narrative to support human-consumption as a fallback.



# Paradigms

- FHIR supports 4 interoperability paradigms



# REST

- Simple, out-of-the-box interoperability
- Leverage HTTP: GET, POST, etc.
- Pre-defined operations
  - Create, Read, Update, Delete
  - Also: Patch, History, Read Version, Search, Validate, Conformance, Batch & Transaction
- Works best where control resides on client side and trust relationship exists

# Documents

- Similar to CDA
- Collection of resources bound together
  - Root is a “Composition” resource
  - Just like CDA header
- Sent as a Bundle **(FHIR Resource)**
- One context
- Can be signed, authenticated, etc.

# Messages

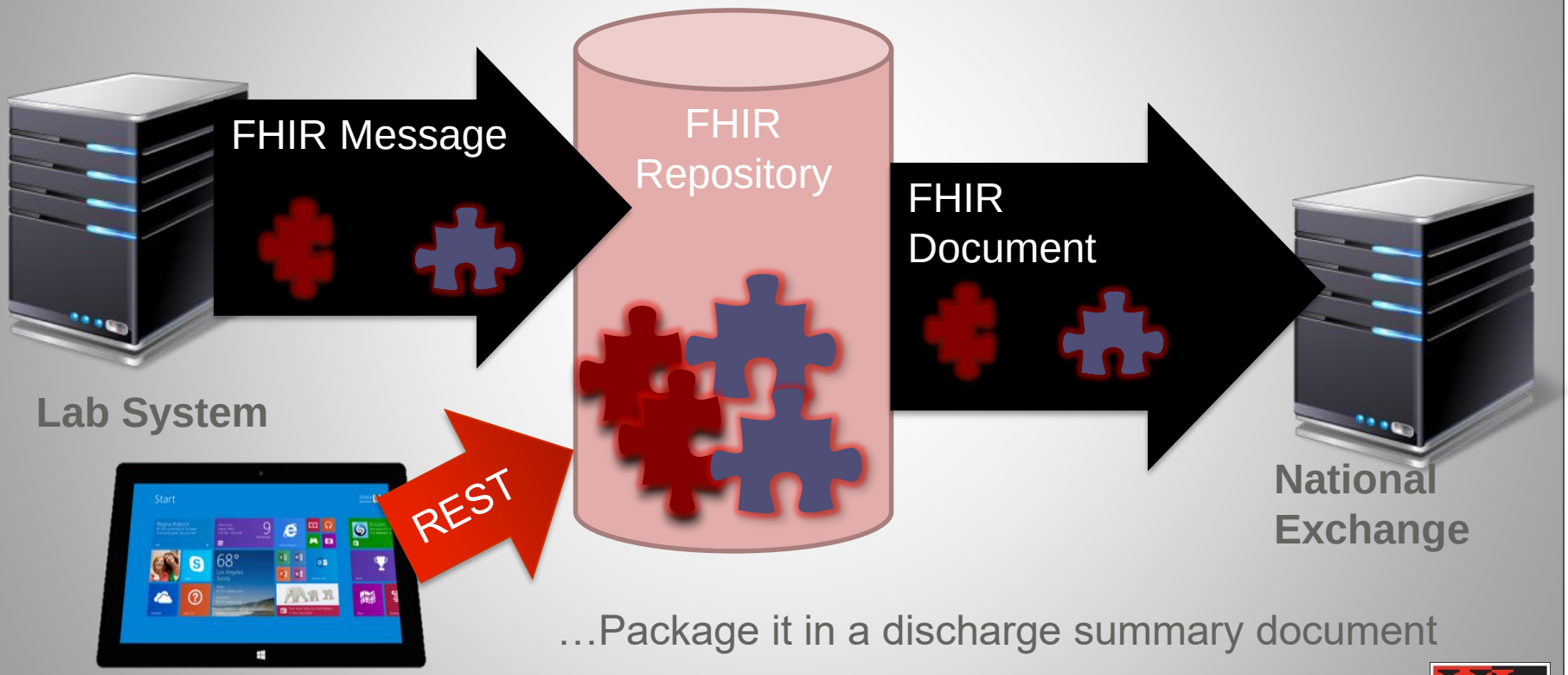
- Similar to v2 and v3 messaging
- Also a collection of resources as a Bundle **(FHIR Resource)**
- Allows request/response behavior for both request and response payloads
- Event-driven
  - e.g. Send lab order, get back result
- Can be asynchronous

# Service Oriented Architecture (SOA)

- Combination of previous paradigms
  - (based on SOA principles)
  - Ultra complex workflows
  - Ultra simple workflows
  - Individual resources or collections **(in Bundle, contained resources or other formats)**
  - Use HTTP or use something else
  - Only constraint is that you're passing around FHIR resources in some way, shape or manner

# Regardless of **paradigm** the content **is the same**

Receive a lab result in a message…




…Package it in a discharge summary document

# FHIR & other SDOs

- IHE
  - Using FHIR for MHD (mobile XDS) and PDQm (mobile Patient Query)

  http://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_Suppl_MHD.pdf

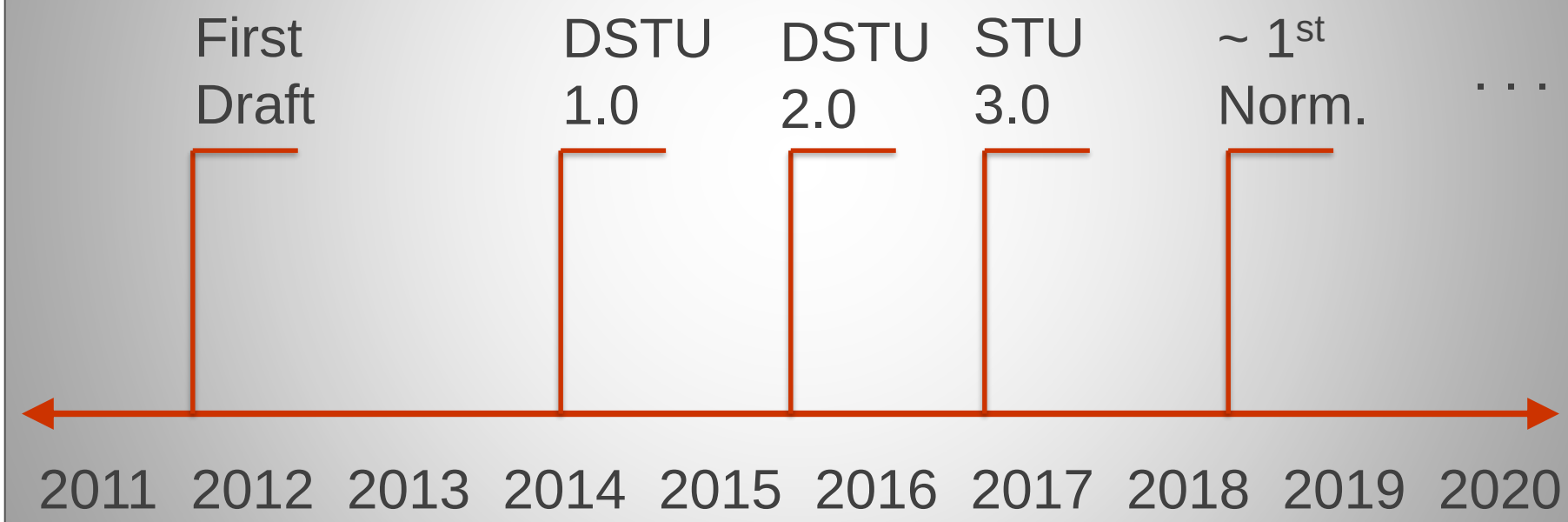
  http://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_Suppl_PDQm.pdf
- ONC
  - Structured Data Capture Initiative to facilitate the collection of supplemental EHR-derived data

  http://wiki.siframework.org/Structured+Data+Capture+Initiative
- Because FHIR is free and because of how it's structured, use by other SDOs is expected

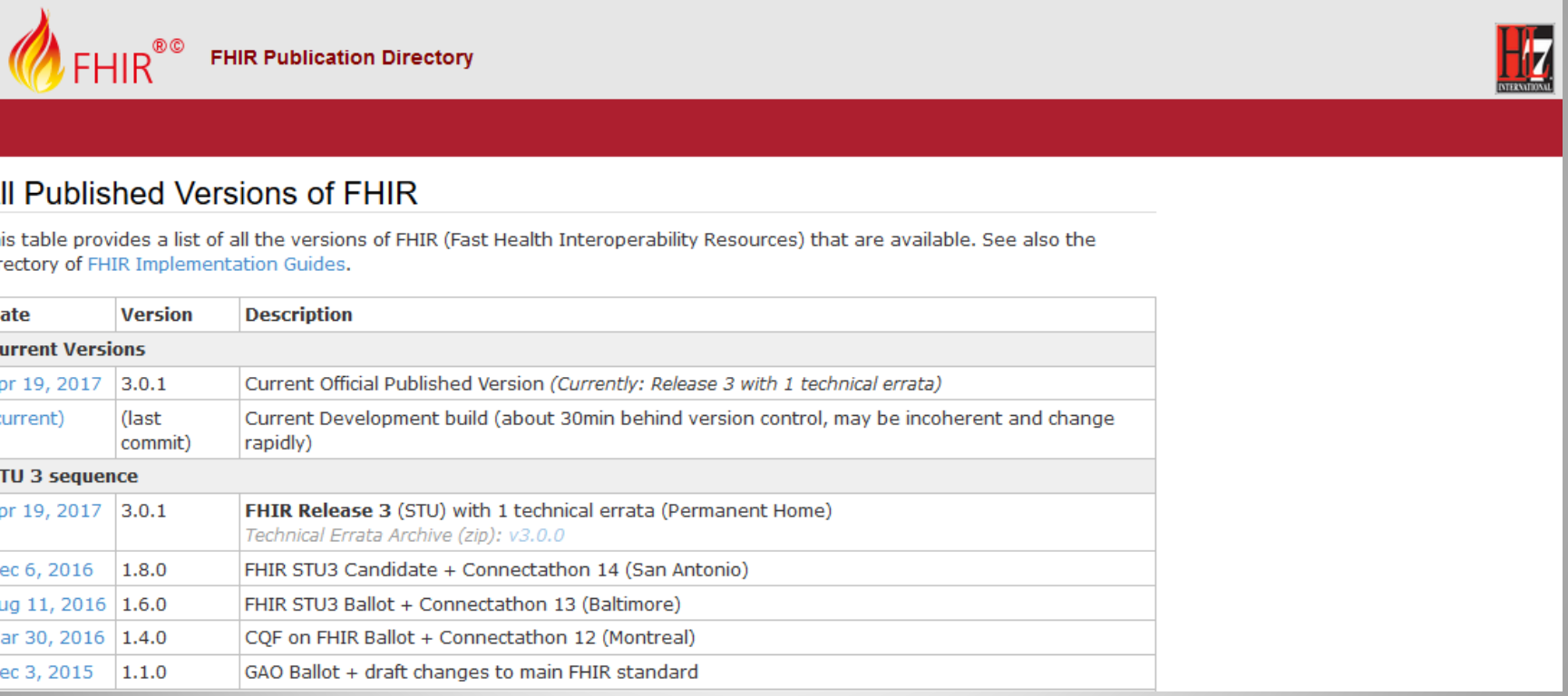
# Recap: What does FHIR provide?

- Resources (building blocks)
- Extensions (part of the spec)
- Methodology
  - Bundles, Profiles, Conformance
- Syntax - XML, JSON and RDF (JSON-LD)
- Human readability
- Support for multiple Paradigms
  - REST, Messaging, Documents, Services

# FHIR Timeline (planned)



# FHIR Specification



FHIR®© FHIR Publication Directory

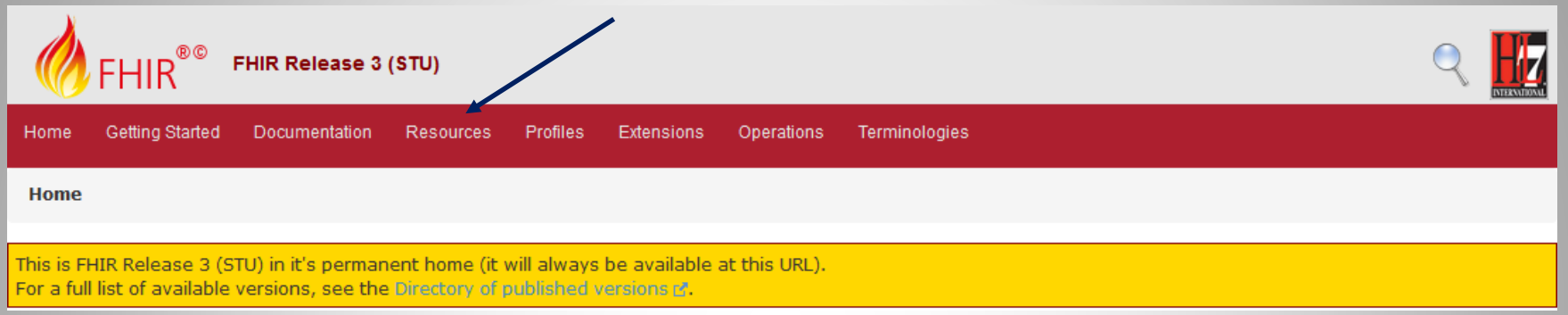
## All Published Versions of FHIR

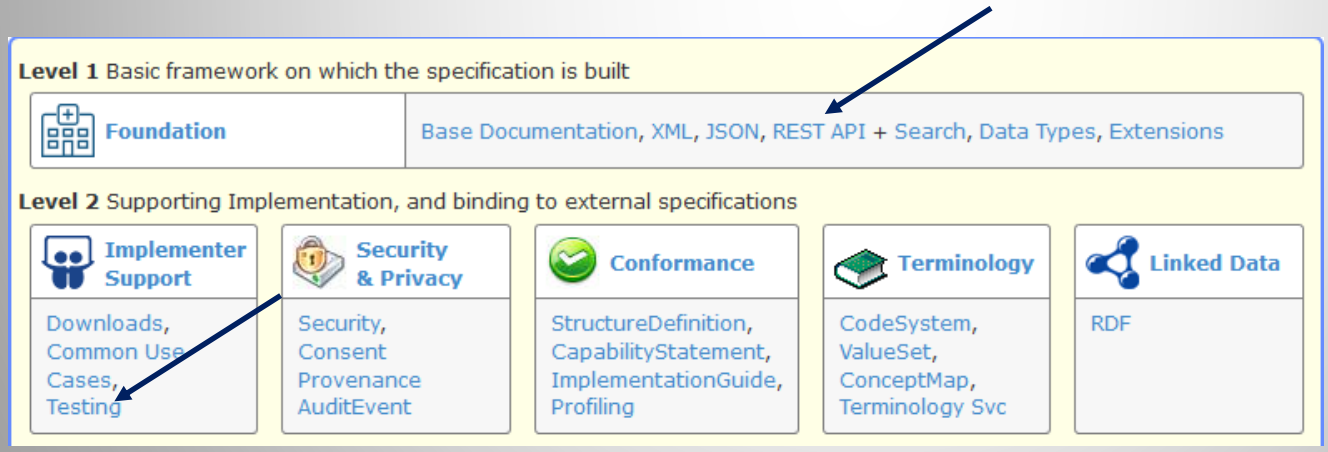
This table provides a list of all the versions of FHIR (Fast Health Interoperability Resources) that are available. See also the directory of FHIR Implementation Guides.

| Date | Version | Description |
|---|---|---|
| **Current Versions** | | |
| Apr 19, 2017 | 3.0.1 | Current Official Published Version *(Currently: Release 3 with 1 technical errata)* |
| (current) | (last commit) | Current Development build (about 30min behind version control, may be incoherent and change rapidly) |
| **STU 3 sequence** | | |
| Apr 19, 2017 | 3.0.1 | **FHIR Release 3** (STU) with 1 technical errata (Permanent Home)<br>*Technical Errata Archive (zip): v3.0.0* |
| Dec 6, 2016 | 1.8.0 | FHIR STU3 Candidate + Connectathon 14 (San Antonio) |
| Aug 11, 2016 | 1.6.0 | FHIR STU3 Ballot + Connectathon 13 (Baltimore) |
| Mar 30, 2016 | 1.4.0 | CQF on FHIR Ballot + Connectathon 12 (Montreal) |
| Dec 3, 2015 | 1.1.0 | GAO Ballot + draft changes to main FHIR standard |

Directory to all FHIR versions: http://hl7.org/fhir/directory.html

# FHIR Specification




Useful links: Resource, REST API, Testing

# Discussion (Q & A)