Integrating the Healthcare Enterprise

IHE IT Infrastructure
Technical Framework Supplement

IHE Appendix on HL7® FHIR®

FHIR® DSTU2
Trial Implementation

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Please verify you have the most recent version of this document. See here for Trial Implementation and Final Text versions and here for Public Comment versions.

Foreword

This is a supplement to the IHE IT Infrastructure Technical Framework V12.0. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

This supplement is published on June 2, 2016 for trial implementation and may be available for testing at subsequent IHE Connectathons. The supplement may be amended based on the results of testing. Following successful testing it will be incorporated into the IT Infrastructure Technical Framework. Comments are invited and can be submitted at http://www.ihe.net/ITI_Public_Comments.

This supplement describes changes to the existing technical framework documents.

"Boxed" instructions like the sample below indicate to the Volume Editor how to integrate the relevant section(s) into the relevant Technical Framework volume.

Amend Section X.X by the following:

Where the amendment adds text, make the added text **bold underline**. Where the amendment removes text, make the removed text **~~bold strikethrough~~**. When entire new sections are added, introduce with editor's instructions to "add new text" or similar, which for readability are not bolded or underlined.

General information about IHE can be found at: http://ihe.net.

Information about the IHE IT Infrastructure domain can be found at: http://ihe.net/IHE_Domains.

Information about the organization of IHE Technical Frameworks and Supplements and the process used to create them can be found at: http://ihe.net/IHE_Process and http://ihe.net/Profiles.

The current version of the IHE IT Infrastructure Technical Framework can be found at: http://ihe.net/Technical_Frameworks.

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Introduction to this Supplement

There is a set of profiles in IHE using the HL7®[1] FHIR®[2] standard, including Patient Demographics Query for Mobile (PDQm), Patient Identifier Cross-reference for Mobile (PIXm), and Mobile Health Document (MHD). These profiles define a lightweight RESTful interface leveraging technologies readily available to mobile applications and lightweight browser based applications. There is some common explanation and profiling provided in this supplement as a new appendix in ITI Volume 2x.

Currently the HL7 FHIR standard is in "Draft Standard for Test Use" (DSTU), and it may experience a large amount of change during this phase. Readers are advised that the profiled components in this supplement may not accurately reflect the most recent version of the FHIR standard. Changes to the FHIR DSTU will be integrated into this supplement via the formal IHE Change Proposal (CP) process.

Open Issues and Questions

1. The message of Appendix E.3 is unclear. Please comment on this section as it is unclear which of the requirements are necessary, and if much of it can be removed with references to FHIR DSTU2 as sufficient.

Closed Issues

None

[1] HL7 is the registered trademark of Health Level Seven International.

[2] FHIR is the registered trademark of Health Level Seven International.

Appendices

Add the following Appendix to the Volume 2x Appendices

Appendix Z – FHIR Implementation Material

The HL7® FHIR® standard has several overarching concepts, which should be profiled consistently throughout any mobile/lightweight IHE transactions using FHIR. IHE profiles FHIR, like any other standard, in ways that narrow the standard for specific use-cases. IHE profiles are intended to be proper subsets of the standard and are not intended to be incompatible.

We discuss here how IHE profiles FHIR concepts such as Resource Bundles, Query Parameters, Conformance and Profile Resources, and Resource Reference URIs.

References

HL7 FHIR	HL7® FHIR® standard DSTU2 (currently v1.0.2) http://hl7.org/fhir/DSTU2/index.html
IETF RFC 2616	Hypertext Transfer Protocol – HTTP/1.1
IETF RFC 7540	Hypertext Transfer Protocol – HTTP/2
IETF RFC 3986	Uniform Resource Identifier (URI): Generic Syntax
IETF RFC 4627	The application/json Media Type for JavaScript Object Notation (JSON)
IETF RFC 6585	Additional HTTP Status Codes

Z.1 Resource Bundles

Any operation which results in or requires submission of a collection of resources is done via a Resource Bundle mechanism. A FHIR Bundle Resource is a collection of resources which are related in some way, for example: the result of a search operation, or a collection of historical versions of a particular resource.

Bundles are described at FHIR DSTU2 http://hl7.org/fhir/DSTU2/bundle.html.

This section has no specific constraints.

Z.2 Query Parameters

FHIR DSTU2: http://hl7.org/fhir/DSTU2/search.html specifies a series of query parameter types which may be used when querying for a particular resource on a server. The representation of these query parameters within the HTTP request URL are intended to support a broad set of use cases and in some cases the behavior is unclear.

In this section we discuss query parameters in the context of RESTful HTTP queries represented in the request URL within IHE profiles.

Query parameters not mentioned here are not constrained by this appendix.

Z.2.1 Query Parameter Modifiers

This section has no specific constraints.

Z.2.2 Token Parameters

Query parameters of type token searches on a URI/value pair. It is used against a code or identifier data type where the value may have a URI that scopes its meaning. The search is performed against the pair from a Coding or an Identifier (see FHIR DSTU2 http://hl7.org/fhir/DSTU2/search.html#token).

This section has no specific constraints.

Z.2.3 String Parameters

HL7 FHIR defines matching semantics for query parameters of type string as case and accent insensitive, wildcard matches (see FHIR DSTU2 http://hl7.org/fhir/DSTU2/search.html#string).

This section has no specific constraints.

Z.3 Conformance Resource

HL7 FHIR allows service implementers to publish a Conformance Resource describing the resources, transport, formats, and operations that can be performed on a series of resources for the service instance. The Conformance Resource is described in FHIR DSTU2 http://hl7.org/fhir/DSTU2/conformance.html

This section has no specific constraints.

Z.4 StructureDefinition Resource

HL7 FHIR allows service implementers to publish a `StructureDefinition` Resource describing the constraints, terminology bindings, extensions and search parameters supported for a particular resource. This `StructureDefinition` Resource allows consumers to determine the capabilities and data requirements of a particular FHIR based service. The `StructureDefinition` Resource is described in FHIR DSTU2 http://hl7.org/fhir/DSTU2/structuredefinition.html

This section has no specific constraints.

Z.5 Resource Reference URIs in FHIR

Many of the defined elements in a resource are references to other resources. Using these references, the resources combine to build a web of information about healthcare. Resource References are described in FHIR DSTU2 http://hl7.org/fhir/DSTU2/references.html

This section has no specific constraints.

Z.6 Populating Expected Response Format

The FHIR standard provides encodings for response message content as either XML or JSON. The server actor shall support both message encodings, whilst the client actors shall support one and may optionally support both.

The use of http content negotiation and `_format` are described in FHIR DSTU2 http://hl7.org/fhir/DSTU2/http.html#mime-type. A client shall indicate with at least one of the following values. Other values are not required of servers, but may be supported.

Table Z.6-1: Desired response encoding

Desired Encoding	mime-type Value
JSON	application/json+fhir
XML	application/xml+fhir

Z.7 Guidance on Access Denied Results

The server must choose the response carefully when an Access Denied condition exists. Returning too much information may expose details that should not be communicated. The Access Denied condition might be because of missing required Authentication, the user is not authorized to access the endpoint, the user is not authorized to access specific data, or other policy reasons.

To balance usability of the returned result vs appropriate protection, the actual result method used needs to be controlled by policy and context.

Typical methods used are:

- **Return a Success with Bundle containing zero results** – This result is indistinguishable from the case where no data is known. When consistently returned on Access Denied, this will not expose which patients exist, or what data might be blinded. This method is also consistent with cases where some results are authorized while other results are excluded from the results. This can only be used when returning a Bundle is a valid result.
- **Return a 404 "Not Found"** – This also protects from data leakage as it is indistinguishable from a query against a resource that doesn't exist. It does however leak that the user authentication is validated.
- **Return a 403 "Forbidden"** – This communicates that the reason for the failure is an Authorization failure. It should only be used when the client and/or user is well enough known to be given this information. Thus this method is most used when the user is allowed to know that they are forbidden access. It doesn't explain how the user might change things to become authorized.

- **Return a 401 "Unauthorized"** – This communicates that user authentication was attempted and failed to be authenticated.

When the server needs to report an error, it shall use HTTP error response codes and should include a FHIR OperationOutcome with more details on the failure. See FHIR DSTU2
190 http://hl7.org/fhir/DSTU2/http.html and http://hl7.org/fhir/DSTU2/operationoutcome.html

Appendix E

Add the following section to the end of ITI TF-2x:Appendix E

E.3 FHIR Identifier Type

The HL7® FHIR® standard uses the data type Identifier to express a business identifier that uniquely identifies a thing or object (see FHIR DSTU2 http://hl7.org/fhir/DSTU2/datatypes.html#identifier) including medical record number or patient identifiers. This concept is different than the resource identifier, known as "logical id" or "id" in FHIR, which identifies a particular resource. (A resource identifier may also be represented as an Identifier instance however.)

This section specifies how IHE profiles use the Identifier data type to express patient identifiers in FHIR resources.

Since IHE adds additional constraints to the Identifier data type, requirements for populating its elements vary slightly depending on what actor is originating a transaction.

The FHIR Identifier type introduces a new mechanism for conveying the originating system of a particular identifier. Whereas HL7 Version 2 and Version 3 messages identify an assigning organization as an HD (Hierarchical Descriptor) or an OID in the "root" attribute respectively, HL7 FHIR permits the use of a URI. This may require some configuration on the part of actors in IHE profiles to correctly map a URL to an OID or HD to maintain consistency with other actors which are not implementing the FHIR specification.

IHE imposes the following restrictions on the Identifier type:

- Actors may expose the assigning authority name (the name of the organization which assigned the identifier) via the `assigner` attribute of the `Identifier` data type. When provided, the actor shall at minimum, populate the `display` attribute.
- Identity domains shall be qualified by a `system` attribute. The use of the value "urn:ietf:rfc:3986" in `system` (which specifies the value of the identifier is already globally unique) is prohibited in the scope of patient identities. The `system` attribute could be represented as one of the following choices:
    a. A uniquely identifying URL which identifies the identity domain, or assigner, for example: "http://example.com/patientIds"
    b. An OID which identifies the identity domain represented as a URI with scheme "urn:oid:", for example: "urn:oid:1.2.3.4.5.6"
    c. A URI containing the CX.4.1 (assigning authority name) value prefixed with a valid URN.

