2022-05 Terminology Service

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### Short Description
Terminology, and the proper use of it, is fundamental for everything that we do in FHIR. The purpose of this track is to test and enhance the capabilities of FHIR Terminology Services and promote their use throughout the FHIR implementation community.

### Long Description
The FHIR specification includes support for the provision of a terminology service - that is, a service that lets healthcare applications make use of codes and value sets without having to become experts in the fine details of the value sets and underlying code systems and their related resources. The management and proper use of terminology is fundamental to effective, interoperable data exchange, so this is an important capability to provide and test in the Connectathons. We expect and hope to achieve: (1) improved capabilities of terminology servers measured by testing performance, (2) improved and more extensive terminology service testing, (3) implementation and implementer experience with aspects of the terminology services specifications, including experience with newer and previously lesser used terminology service operations and operation capabilities, (4) identify potential improvements as well as deficiencies and possibly errors in the FHIR terminology service specifications based on implementation and testing experience, and (5) increased awareness and utilization of terminology services by other Connectathon tracks.

[David Hay's blog post on Terminology Services](#)
<table>
<thead>
<tr>
<th>Track Lead(s)</th>
<th>Davera Gabriel <a href="mailto:dgabrie4@jhmi.edu">dgabrie4@jhmi.edu</a></th>
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<td>Current build: FHIR R4, R5</td>
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| Specification(s) this track uses | http://hl7.org/fhir/terminology-service.html (R4 Terminology Services)  
http://build.fhir.org/conceptmap.html (proposed R5 changes to ConceptMap)  
https://www.hl7.org/fhir/terminologycapabilities.html (Terminology Capabilities) |
| Artifacts of focus | http://hl7.org/fhir/terminology-service.html (R4 Terminology Services)  
http://build.fhir.org/conceptmap.html (proposed R5 changes to ConceptMap)  
https://www.hl7.org/fhir/terminologycapabilities.html (Terminology Capabilities) |
| Expected participants | Davera Gabriel, TBD |
| Zulip stream | https://chat.fhir.org/#narrow/stream/179202-terminology Terminology General Topics  
https://chat.fhir.org/#narrow/stream/312007-Terminology-Services.20Connectathon Terminology Service Connectathon track topics |
| Track Kick Off Call | Breakout Sessions  
"Ask the Expert" Office Hours - TBD  
An open, unstructured discussion of HL7 FHIR Terminology current events, resources, and implementation "tips and tricks." Pull up a chair and bring your Connectathon comments, discoveries and unresolved terminology issues to the table. All are welcome.  
System roles:  
FHIR Terminology Server  
For service providers, implement the following operations from http://hl7.org/fhir/terminology-service.html:  
  - $expand - Value Set Expansion  
  - $validate-code - Value Set Validation  
  - $lookup - Concept Lookup  
  - $validate-code - Code System Validation  
  - $subsumes - Subsumption Testing  
  - $translate - Concept Translation  
  - $closure - Maintaining a Closure Table  
  - $preferred-id - Naming System Preferred Identifier Search  
Support additional capabilities:
1. Capability Statement
2. Produce a Terminology Service Capability Statement
3. SNOMED CT and LOINC implicit value sets - using SNOMED CT with FHIR and using LOINC with FHIR
4. $find-matches - Finding codes based on supplied properties (experimental)

Service providers are not required to implement all of this functionality - it's a lot to do. For new implementers, start at the top and work down (generally).

**FHIR Terminology Client Consumer**

Implement any one or more of:

- Do a value set expansion of one of the value sets in the spec
- Validate a code using the spec against a FHIR value set, a v2 value set, LOINC or SNOMED CT
- Validate a code using the spec against a code system such as LOINC or SNOMED CT
- Look up a display for a code (most appropriate for v2/FHIR conversion)
- Translate a code from one value set to another, based on the existing value set and ConceptMap resources, and/or other additional knowledge available to the server
- Maintain a client-side closure table based on server-side terminological logic
- References to SNOMED CT and LOINC implicit value sets
- Create (POST, PUT) ValueSet resources referencing in-line and/or external code systems

At least one server supports all of these operations and capabilities ([http://test.fhir.org/r5](http://test.fhir.org/r5)). Other servers (see the list above) will support several of these operations and capabilities.

**Scenarios**

Scenarios

1 - Testing Proposed ConceptMap R5 Changes

For FHIR R5 significant changes have been made to the ConceptMap resource, including:

1. Replace the previous 'equivalence' element with a new 'relationship' element.
2. Revise the concept-map-relationship (previously concept-map-equivalence) code system and value set so that the codes are easier and simpler to understand and choose and so that the mapping relationship direction is clearly specified.
3. Related changes to the $translate and $closure operations based on the above code changes.
4. Updates to group.element.target.dependsOn and group.element.target.product

Connectathon testing and implementation experience is needed to progress the revised ConceptMap resource through the maturity levels toward normative status.

2 - Formal Testing of Terminology - Participants with FHIR experience

This scenario introduces a more formalized testing approach for those participants that have been working the FHIR Terminology specification and wish to move beyond basic testing and may have systems that are in active development, deployed or soon to be deployed into a production environment. Automated testing tooling is significantly leveraged for both automated terminology server testing (testing tool to FHIR terminology server) and surveillance of peer-to-peer testing (external FHIR client to external FHIR server).

Pre-connectathon testing is highly encouraged in order to be better prepared for the actual Connectathon event and to become familiar with the public testing platforms that will be used for the formal testing.

Testing and test reporting will be done using the public testing platforms which will provide test results via the new FHIR TestReport resource type as well as any specific reporting capabilities of those testing platforms. These reports will provide qualitative and quantitative analysis of the system under test and its conformance to the FHIR specification.

4 - NamingSystem $translate-id proposed operation testing (R5)

Executing the use of the NamingSystem resource in and with FHIR terminology services and its applications in profiles and IGs, testing the $translate-id operation functionality

**TestScript(s):**

This track includes formal testing and reporting of test results utilizing a defined set of test scripts.

AEGIS Touchstone TestScripts will be available for Connectathon 29. Please email Touchstone_Support@aegis.net for any questions about using Touchstone.

**Available Connectathon 29 Test Script Sets**

The test scripts listed below have been updated for Connectathon 29 and scripts for additional tests may be added.

**Test Scripts - Supported Formats**
Test Scripts - ValueSet Expand - $expand

- connectathon-29-terminology-expand - Terminology tests for $expand where the FHIR server is expected to have the existing ValueSet resources for extensional and intensional test cases.
- connectathon-29-terminology-expand-filter - Terminology tests for $expand with filter options where the FHIR server is expected to have the existing ValueSet resources for extensional and intensional test cases.
- terminology-29-expand-version-extensional1-01-ok - $expand operation with a valid version parameter test for ValueSet extensional-case-1 where the expected outcome is a successful response.
- terminology-29-expand-version-extensional1-02-notok - $expand operation with an invalid version parameter test for ValueSet extensional-case-1 where the expected outcome is a failure response with a returned OperationOutcome.

Test Scripts - CodeSystem Lookup - $lookup

- connectathon-29-terminology-lookup-loinc-01-ok-get-simple - CodeSystem $lookup simple tests against known LOINC codes where the expected outcome is a successful response with valid name and display value. All $lookup operations are performed using the FHIR Operation Framework HTTP GET method.
- connectathon-29-terminology-lookup-loinc-02-ok-post-code-simple - CodeSystem $lookup simple tests against known LOINC codes where the expected outcome is a successful response with valid name and display value. All $lookup operations are performed using the FHIR Operation Framework HTTP POST method with Parameters of system and code.
- connectathon-29-terminology-lookup-loinc-03-ok-post-coding-simple - CodeSystem $lookup simple tests against known LOINC codes where the expected outcome is a successful response with valid name and display value. All $lookup operations are performed using the FHIR Operation Framework HTTP POST method with Parameters of system, codeA and codeB.
- connectathon-29-terminology-lookup-sct-01-ok-get-simple - CodeSystem $lookup simple tests against known SNOMED codes where the expected outcome is a successful response with valid name and display value. All $lookup operations are performed using the FHIR Operation Framework HTTP GET method.
- connectathon-29-terminology-lookup-sct-02-ok-post-code-simple - CodeSystem $lookup simple tests against known SNOMED codes where the expected outcome is a successful response with valid name and display value. All $lookup operations are performed using the FHIR Operation Framework HTTP POST method with Parameters of system, codeA and codeB.
- connectathon-29-terminology-lookup-sct-03-ok-post-coding-simple - CodeSystem $lookup simple tests against known SNOMED codes where the expected outcome is a successful response with valid name and display value. All $lookup operations are performed using the FHIR Operation Framework HTTP POST method with Parameters of coding.
- connectathon-29-terminology-lookup-loinc-03-ok-post-coding-simple - CodeSystem $lookup simple tests against known LOINC codes where the expected outcome is a successful response with valid name and display value. All $lookup operations are performed using the FHIR Operation Framework HTTP POST method with Parameters of system, codeA and codeB.
- connectathon-29-terminology-lookup-loinc-02-ok-post-code-simple - CodeSystem $lookup simple tests against known LOINC codes where the expected outcome is a successful response with valid name and display value. All $lookup operations are performed using the FHIR Operation Framework HTTP POST method with Parameters of system, codeA and codeB.
- connectathon-29-terminology-lookup-loinc-01-ok-get-simple - CodeSystem $lookup simple tests against known LOINC codes where the expected outcome is a successful response with valid name and display value. All $lookup operations are performed using the FHIR Operation Framework HTTP GET method.

Test Scripts - CodeSystem Subsumes - $subsumes

- connectathon-29-terminology-subsumes-snomed-01-ok-get - $subsumes tests against known SNOMED codes where the expected outcome is a successful response with a valid outcome code value. All $subsumes operations are performed using the FHIR Operation Framework HTTP GET method.
- connectathon-29-terminology-subsumes-snomed-02-ok-post-code - $subsumes tests against known SNOMED codes where the expected outcome is a successful response with a valid outcome code value. All $subsumes operations are performed using the FHIR Operation Framework HTTP POST method with Parameters of system, codeA and codeB.
- connectathon-29-terminology-subsumes-snomed-03-ok-post-coding - $subsumes tests against known SNOMED codes where the expected outcome is a successful response with a valid outcome code value. All $subsumes operations are performed using the FHIR Operation Framework HTTP POST method with Parameters of system, codeA and codeB.
- connectathon-29-terminology-subsumes-snomed-04-notok-get - $subsumes tests against known and unknown SNOMED codes where the expected outcome is a failure response with a returned OperationOutcome. All $subsumes operations are performed using the FHIR Operation Framework HTTP GET method.
- connectathon-29-terminology-subsumes-snomed-05-notok-post-code - $subsumes tests against known and unknown SNOMED codes where the expected outcome is a failure response with a returned OperationOutcome. All $subsumes operations are performed using the FHIR Operation Framework HTTP POST method with Parameters of system, codeA and codeB.
- connectathon-29-terminology-subsumes-snomed-06-notok-post-coding - $subsumes tests against known and unknown SNOMED codes where the expected outcome is a failure response with a returned OperationOutcome. All $subsumes operations are performed using the FHIR Operation Framework HTTP POST method with Parameters of system, codingA and codingB.

Test Scripts - CodeSystem Translate - $translate

- connectathon-29-terminology-translate-01-ok-get - $translate tests against known FHIR code systems where the expected outcome is a successful response with a matched code value from the target system. All $translate operations are performed using the FHIR Operation Framework HTTP GET method.
- connectathon-29-terminology-translate-02-ok-post-code - $translate tests against known FHIR code systems where the expected outcome is a successful response with a matched code value from the target system. All $translate operations are performed using the FHIR Operation Framework HTTP POST method with Parameters of system, codeA and codeB.
- connectathon-29-terminology-translate-03-ok-post-coding - $translate tests against known FHIR code systems where the expected outcome is a successful response with a matched code value from the target system. All $translate operations are performed using the FHIR Operation Framework HTTP POST method with Parameters of system, codingA and codingB.
- connectathon-29-terminology-translate-04-notok-get - $translate tests against known and unknown FHIR code systems where the expected outcome is a failure response with a returned OperationOutcome. All $translate operations are performed using the FHIR Operation Framework HTTP GET method.
- connectathon-29-terminology-translate-05-notok-post-code - $translate tests against known and unknown FHIR code systems where the expected outcome is a failure response with a returned OperationOutcome. All $translate operations are performed using the FHIR Operation Framework HTTP POST method with Parameters of system, codeA and codeB.
- connectathon-29-terminology-translate-06-notok-post-coding - $translate tests against known and unknown FHIR code systems where the expected outcome is a failure response with a returned OperationOutcome. All $translate operations are performed using the FHIR Operation Framework HTTP POST method with Parameters of system, codingA and codingB.
Test Scripts - CodeSystem Validate Code - $validate-code

- connectathon-29-terminology-validate-code-loinc-01-ok-get - $validate-code tests against known LOINC codes where the expected outcome is a successful response using the FHIR Operation Framework HTTP GET method.
- connectathon-29-terminology-validate-code-loinc-02-ok-post-code - $validate-code tests against known LOINC codes where the expected outcome is a successful response using the FHIR Operation Framework HTTP POST method with Parameters of url, code and display.
- connectathon-29-terminology-validate-code-loinc-03-ok-post-coding - $validate-code tests against known LOINC codes where the expected outcome is a successful response using the FHIR Operation Framework HTTP POST method with Parameters of url and coding.
- connectathon-29-terminology-validate-code-loinc-04-notok-get - $validate-code tests against known LOINC codes where the expected outcome is a failure response using the FHIR Operation Framework HTTP GET method.
- connectathon-29-terminology-validate-code-loinc-05-notok-post-code - $validate-code tests against known LOINC codes where the expected outcome is a failure response using the FHIR Operation Framework HTTP POST method with Parameters of url, code and display.
- connectathon-29-terminology-validate-code-loinc-06-notok-post-coding - $validate-code tests against known LOINC codes where the expected outcome is a failure response using the FHIR Operation Framework HTTP POST method with Parameters of url and coding.

Test Scripts - ValueSet Validate Code - $validate-code

- connectathon-29-terminology-validate-code - $validate-code tests where the FHIR Terminology server is expected to have the LOINC and SNOMED-CT code systems available.
- connectathon-29-terminology-validate-code-optional - $validate-code tests with optional invocations where the FHIR Terminology server is expected to have the LOINC and SNOMED-CT code systems available.

Test Scripts - NamingSystem Preferred ID - $preferred-id

- connectathon-29-terminology-preferred-id - $preferred-id tests against the example NamingSystem resource in the R4 specification namingsystem-example.xml. All $preferred-id operations are performed using the FHIR Operation Framework HTTP GET method.
- connectathon-29-terminology-preferred-id-optional - $preferred-id tests against the example NamingSystem resource in the R4 specification namingsystem-example.xml. All $preferred-id operations are performed using the FHIR Operation Framework HTTP POST method with Parameters of id and type

The AEGIS Touchstone testing tool has test scripts available for tracks to test their implementations. See www.touchstone.com to sign in our register if you are a new user. Below, you will find a link to the tests specific to this HL7 track. Please send questions or issues to touchstone_support@aegis.net and a team member will be glad to assist you.

Terminology Tests for Connectathon 29 are found here:  Terminology Tests in Touchstone

Security and Privacy Considerations:

Most FHIR terminology terminology service endpoints are open (at present). This may change in the future as adoption and implementation experience increases in order to more directly manage external (non-HL7) terminology licensing considerations. Some servers do allow or require authentication (e.g. Apelon - see above).