Lantern Project Webinar

Proposed Solutions to Publish FHIR Endpoint Lists

December 16, 2021. 2-5PM EST.

The Office of the National Coordinator for
Health Information Technology

The Office of the National Coordinator for
Health Information Technology

Introduction & Agenda

Vaishali Patel, ONC

The Office of the National Coordinator for
Health Information Technology

Why we're here today

- It's an ONC Cures Rule maintenance of certification requirement for certification criterion *Standardized API for Patient and Population Services* 170.315(g)(10) for certified API developers to publish service base URLs for all customers in a machine-readable format.

- We've convened today to discuss proposed solutions to simplify the publication of these endpoint lists.

- These solutions were developed as part of the Lantern Project, which developed a tool to monitor FHIR implementations through an analysis of FHIR endpoints.

- Lantern is a consumer of FHIR endpoints and so the work done to engineer and develop the tool has led the team to consider how some of its project findings can inform how certified API developers can fulfill rule requirements to publish their customers' service base URLs.

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Today's Goals

- We want to hear from attendees about the proposed solutions to simplify the publication of FHIR endpoint lists.

- The Lantern project team has conferred with developers and HL7 on FHIR endpoint publication and the desire to facilitate discovery and use of these endpoints.

- The team will present these proposed solutions and welcomes participants to ask questions to improve upon these proposals and further build consensus on ways to simplify endpoint list publication.

- Feedback and dialogue from today will inform continued collaborative work on this front and identify any next steps for these proposed solutions.

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Agenda: Part 1

- Wes Barker will start off the agenda with an overview of these efforts and introduce today's content.

- Brianna Mathiowetz will provide an overview of the Lantern Project and its public dashboard.

- Keith Carlson will then discuss clarifications to the certification companion guide for the *Standardized API* criterion that recommend a common format to publish endpoint lists.

- We will then answer questions and a take a brief poll before a short break.

Lantern Webinar		
December 16, 2 - 5PM, EST		
Part 1. Introduction to Lantern & Publication of FHIR Endpoint Lists		
Welcome & Review of Agenda	Vaishali Patel, ONC	2:00 - 2:10
Opening Remarks	Wes Barker, ONC	2:10 - 2:20
Lantern Background	Brianna Mathiowetz, MITRE	2:20 - 2:40
Question & Answers	Wes Barker, Moderator	2:40-2:50
Endpoint List Publishing	Keith Carlson, ONC	2:50 - 3:10
Question & Answers	Wes Barker, Moderator	3:10-3:20
Break & Poll		3:20pm-3:35
Part 2. Standardizing Publication of FHIR Endpoint Lists: Organization Information		
Welcome, Introduction & Agenda to Part 2	Vaishali Patel, ONC	3:35-3:45pm
Recommendations for Standardizing Publication of FHIR endpoint lists	Jeff Brown, MITRE	3:45 - 4:15
Q&A and Poll	Wes Barker, Moderator	4:15 - 4:45
Recognition of Wayne Kubick of HL7	ONC	4:45 - 4:50
Closing Remarks & Next Steps	Vaishali Patel, ONC	4:50-5:00pm

Overview of Lantern's Work to Standardize Endpoint List Publication

Wes Barker, ONC

Lantern efforts to implement the ONC Cures Final Rule

- Today's webinar presents on an ONC project, Lantern, and the work done over the past year to help implement portions of Application Programming Interface regulations in the ONC Cures Final Rule.

- Lantern has led work over the last year to work with industry and ONC stakeholders to coalesce around a common format to represent endpoints published as part of Cures Rules requirements.

- You will hear today from Lantern project team members about this work and we would like to hear from you about our work and its impact on you.

ONC Cures Final Rule, Maintenance of Certification Requirement: Service Base URL List

<u>Regulatory Text: 45 CFR 170.404(b)(2)</u>

- Certified API Developers must publish service base URLs for all Health IT Modules certified to § 170.315(g)(10) that can be used by patients to access their EHI.

- Certified API Developers must publicly publish service base URLs for all customers **<u>in a machine-readable format</u>** at no charge.

- Lantern is designed to consume these lists and analyze the endpoints discovered therein to monitor and assess the implementation of FHIR APIs nationwide.

Endpoint List Publication Assessment

- As a consumer of these endpoints, Lantern monitors and analyzes the representation and content of endpoints.

- Lantern has helped build consensus on how endpoint lists should be formatted and how data should be made available on the endpoint.

- A consensus-driven, coordinated approach can foster more uniform endpoint list publication by developers.
  - Certified API developers can adopt recommendations so they do not need to develop their own approach (recommendations use existing FHIR resources.)
  - This can also create a more predictable, standardized way for app developers, patients, and others to consume the lists (if lists follow a common format and have consistent data available, consumers of endpoints can get the information they need to process requests.)

Coalescing Around a Common Format: List Consumer Perspective

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Coalescing Around a Common Format: List Consumer Perspective

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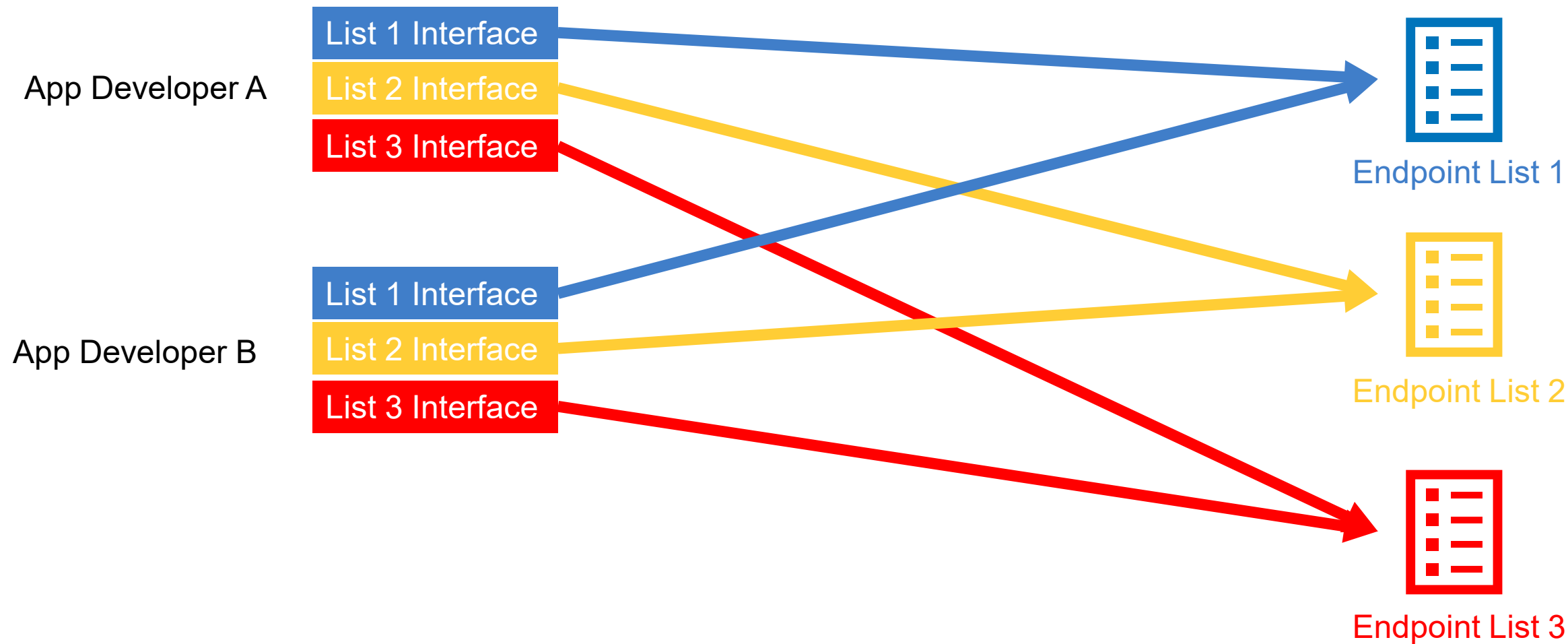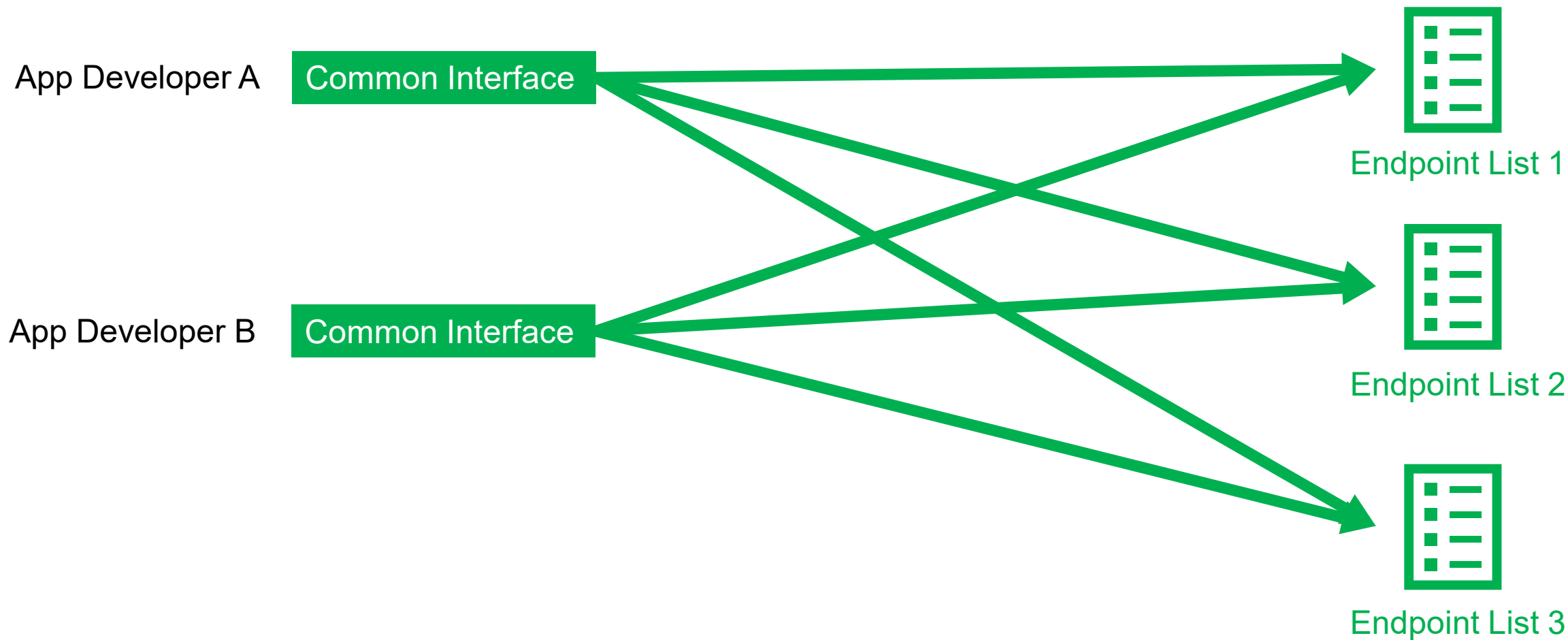
Use FHIR Endpoint resource to represent published endpoint lists

Name	Flags	Card.	Type	Description & Constraints
Endpoint	TU		DomainResource	The technical details of an endpoint that can be used for electronic services Elements defined in Ancestors: id, meta, implicitRules, language, text, contained, extension, modifierExtension
identifier	Σ	0..*	Identifier	Identifies this endpoint across multiple systems
status	?! Σ	1..1	code	active | suspended | error | off | entered-in-error | test EndpointStatus (Required)
connectionType	Σ	1..1	Coding	Protocol/Profile/Standard to be used with this endpoint connection Endpoint Connection Type (Extensible)
name	Σ	0..1	string	A name that this endpoint can be identified by
managingOrganization	Σ	0..1	Reference(Organization)	Organization that manages this endpoint (might not be the organization that exposes the endpoint)
contact		0..*	ContactPoint	Contact details for source (e.g. troubleshooting)
period	Σ	0..1	Period	Interval the endpoint is expected to be operational
payloadType	Σ	1..*	CodeableConcept	The type of content that may be used at this endpoint (e.g. XDS Discharge summaries) Endpoint Payload Type (Example)
payloadMimeType	Σ	0..*	code	Mimetype to send. If not specified, the content could be anything (including no payload, if the connectionType defined this) MimeType (Required)
address	Σ	1..1	url	The technical base address for connecting to this endpoint
header		0..*	string	Usage depends on the channel type

- Representing published endpoint lists as a collection of Endpoint resources may reduce the development burden for those that need to consume published endpoint lists and may reduce the level of effort required to ultimately represent endpoints in a FHIR endpoint directory.

- Keith Carlson will discuss clarifications made to the Standardized API criterion certification companion guide that recommends this standard approach for endpoint list publication.

- The proposed approach is not without precedent: the Validated Healthcare Directory Implementation Guide and the Davinci PDEX Payer Network Implementation Guide both use the FHIR Endpoint resource as the base resource for representing FHIR Endpoints.

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Getting information about all organizations associated with an endpoint

Name	Flags	Card.	Type	Description & Constraints
Endpoint	TU		DomainResource	The technical details of an endpoint that can be used for electronic services Elements defined in Ancestors: id, meta, implicitRules, language, text, contained, extension, modifierExtension
identifier	Σ	0..*	Identifier	Identifies this endpoint across multiple systems
status	?! Σ	1..1	code	active | suspended | error | off | entered-in-error | test EndpointStatus (Required)
connectionType	Σ	1..1	Coding	Protocol/Profile/Standard to be used with this endpoint connection Endpoint Connection Type (Extensible)
name	Σ	0..1	string	A name that this endpoint can be identified by
managingOrganization	Σ	0..1	Reference(Organization)	Organization that manages this endpoint (might not be the organization that exposes the endpoint)
contact		0..*	ContactPoint	Contact details for source (e.g. troubleshooting)
period	Σ	0..1	Period	Interval the endpoint is expected to be operational
payloadType	Σ	1..*	CodeableConcept	The type of content that may be used at this endpoint (e.g. XDS Discharge summaries) Endpoint Payload Type (Example)
payloadMimeType	Σ	0..*	code	Mimetype to send. If not specified, the content could be anything (including no payload, if the connectionType defined this) MimeType (Required)
address	Σ	1..1	url	The technical base address for connecting to this endpoint
header		0..*	string	Usage depends on the channel type

- <u>Jeff Brown</u> will discuss work he's lead to drive consensus around an approach to make information about the organizations associated with an endpoint publicly accessible and available on the endpoint without authentication. This work highlights the team's rigor to develop and gain consensus on a standardized and consensus-driven approach.

Part 1: Introduction to Lantern & Publication of FHIR Endpoint Lists

Lantern: A FHIR API Monitoring Tool

Brianna Mathiowetz

MITRE | SOLVING PROBLEMS FOR A SAFER WORLD™

Lantern

Lantern is a system that monitors and provides analytics about the availability and adoption of FHIR API service base URLs across healthcare organizations in the U.S.

Mission

- Monitor FHIR API endpoints and display the key metrics gathered in order to understand FHIR use across the country and ultimately to ensure patient access to their health data.

Success

- Lantern enables The Office of the National Coordinator for Health Information Technology (ONC) to understand availability, distribution, and growth of FHIR endpoints across the nation.

MITRE

Lantern Capabilities

- Query metadata API of published endpoints to ensure availability and monitor changes that might signal noncompliance.

- Collect data about the API, such as availability (service uptime) and stated capabilities from the CapabilityStatement/Conformance Resource.

- Visualize availability and compliance of Health IT APIs certified under the Health IT Certification Program.

- Map APIs to providers and certified products.

CapabilityStatement/Conformance Resource

- FHIR endpoints host their CapabilityStatement/Conformance Resource at the /metadata endpoint

  - https://epicproxy.et1123.epichosted.com/FHIRProxy/api/FHIR/DSTU2/metadata

- Describes the capabilities of the endpoint

  - FHIR Version

  - Authentication Information

  - Supported FHIR Resources

  - Supported Actions

  - Software Product/Version

Use Cases

- Endpoint List Validation

  - How many endpoints from list X are active?

  - How many FHIR endpoints support resource X?

  - How many endpoints from list X support Y?

- Endpoint Discovery

  - Ease the burden of having to discover and parse each different vendor-provided endpoint lists

Data Sources

- Lantern gathers and combines data from the following sources:

  - FHIR API endpoints

    - Discovered in publicly available Endpoint Lists

  - The Certified Health IT Product List (CHPL) database for product and vendor information

  - The National Plan & Provider Enumeration System (NPPES) for provider organization information

MITRE

Current Endpoint Metrics

Last Updated: 2021-07-20 20:04:34

	TOTAL ENDPOINTS
🔥	**1780**

	INDEXED ENDPOINTS
⚡	**1780**

	NON-INDEXED ENDPOINTS
🚫	**0**

Current endpoint responses:

1635
200 (Success)

63
404 (Not found)

6
503 (Unavailable)

Endpoint Counts by Developer and FHIR Version

Vendor	FHIR Version	Count
Allscripts	1.0.2	1
Cerner Corporation	1.0.2	1196
Cerner Corporation	4.0.0	1
Epic Systems Corporation	1.0.2	409
Epic Systems Corporation	4.0.0	12
Epic Systems Corporation	Unknown	4
Microsoft Corporation	4.0.1	1
Unknown	1.0.2	1
Unknown	1.0.2-7202	1
Unknown	3.0.1	4
Unknown	Unknown	150

Endpoints by Developer and FHIR Version
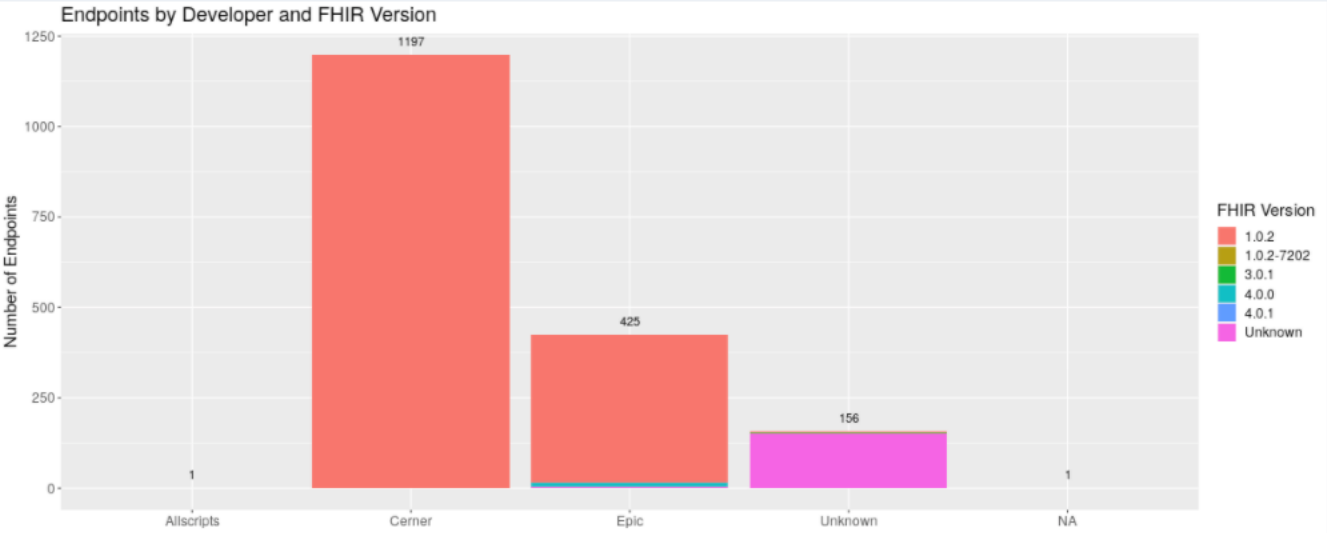
Note: (1) The endpoints queried by Lantern are limited to Fast Healthcare Interoperability Resources (FHIR) endpoints published publicly by Certified API Developers in conformance with the ONC Cures Act Final Rule, or discovered through the National Plan and Provider Enumeration System (NPPES). This data, therefore, may not represent all FHIR endpoints in existence. (2) The number of endpoints for each Certified API Developer and FHIR version is a sum of all API Information Sources and unique endpoints discovered for each unique Certified API Developer. The API Information Source name associated with each endpoint may be represented as different organization types, including as a single clinician, practice group, facility or health system. Due to this variation in how API Information Sources are represented, insights gathered from this data should be framed accordingly.

List of Endpoints

FHIR Version:

All Versions ▾

Developer:

All Developers ▾

Availability Percentage:

0-100 ▾

Matching Endpoints: 1780

⬇ Download Endpoint Data (CSV)   ⬇ Download Field Descriptions (CSV)

Show 10 ▾ entries   Search: _____

URL	API Information Source Name	Updated	Certified API Developer Name	FHIR Version	TLS Version	MIME Types	HTTP Response	Availability
https://webproxy.allina.com/FHIR/api/FHIR/DSTU2/	{"Allina Health System"}	2021-07-20	Epic Systems Corporation	1.0.2	TLS 1.2	{application/json+fhir,application/fhir+json}	200 - OK	100
https://epicproxy.et1123.epichosted.com/FHIRProxy/api/FHIR/DSTU2/	{AltaMed}	2021-07-20	Epic Systems Corporation	1.0.2	TLS 1.2	{application/json+fhir}	200 - OK	99.03
https://epicsoap.altru.org/fhir/api/FHIR/DSTU2/	{"Altru Health System"}	2021-07-20	Epic Systems Corporation	1.0.2	TLS 1.2	{application/fhir+json}	200 - OK	99.51
https://epicproxy.et0971.epichosted.com/FHIRProxy/api/FHIR/DSTU2/	{"AnMed Health"}	2021-07-20	Epic Systems Corporation	1.0.2	TLS 1.2	{application/json+fhir,application/fhir+json}	200 - OK	99.51
dentrix.com		2021-07-20	Unknown	Unknown	TLS 1.3		404 - Not Found	0
www.fusionwebclinic.com	{"Apex Therapy, LLC"}	2021-07-20	Unknown	Unknown	TLS 1.3		404 - Not Found	0
complexmotion.com		2021-07-20	Unknown	Unknown			0 - NA	0
https://allscriptsstore.cloud.prod.iapps.com/fihr-apps		2021-07-20	Unknown	Unknown			0 - NA	0
peachespharmacy.com		2021-07-20	Unknown	Unknown			0 - NA	0
https://epicmobile.med.cornell.edu/FHIR/api/FHIR/DSTU2/	{"Weill Cornell Medicine"}	2021-07-20	Epic Systems Corporation	1.0.2	TLS 1.2	{application/json+fhir,application/fhir+json}	200 - OK	61.22

Showing 1 to 10 of 1,780 entries   Previous 1 2 3 4 5 … 178 Next

Note: The endpoints queried by Lantern are limited to Fast Healthcare Interoperability Resources (FHIR) endpoints published publicly by Certified API Developers in conformance with the ONC Cures Act Final Rule, or discovered through the National Plan and Provider Enumeration System (NPPES). This data, therefore, may not represent all FHIR endpoints in existence. Insights gathered from this data should be framed accordingly.

Certain values represented here are derived from the algorithms used by the Lantern application and are subject to change. For more information about the data used by Lantern and the algorithms performed to arrive at the information contained in the derived fields please see the "About Lantern" page. For further clarification, or to report a data discrepancy please contact us at Lantern Support.

Capability Page

FHIR Version:

All Versions

Developer:

All Developers

FHIR Resource Types

By default, the list of resources below contains the supported resources across all endpoints and FHIR versions. Remove a resource from the list by clicking the 'x' in each box. You may also change the FHIR Version or Developer filtering criteria to select the applicable supported resources from the default list. Any selected resources at that point will be removed if no endpoints that pass the selected filtering criteria support the given resource. Resources that are filtered out of the selected list will not re-appear in the list if you make other changes to the FHIR Version or Developer filtering criteria. You must either (1) select a resource from the resources drop down to add it to the list, or (2) click the 'Select All Resources' button to add all resources that are supported by the endpoints passing the selected criteria.

Note: This is the list of FHIR resource types reported by the capability statements from the endpoints. This reflects the most recent successful response only. Endpoints which are down, unreachable during the last query or have not returned a valid capability statement, are not included in this list.

Click in the box below to add or remove resources:

Account × ActivityDefinition × AdverseEvent × AllergyIntolerance × Appointment × AppointmentResponse × AuditEvent × Basic × Binary × BiologicallyDerivedProduct × BodyStructure × Bundle × CapabilityStatement × CarePlan × CareTeam × CatalogEntry × ChargeItem × ChargeItemDefinition × Claim ×
ClaimResponse × ClinicalImpression × CodeSystem × Communication × CommunicationRequest × CompartmentDefinition × Composition × ConceptMap × Condition × Conformance × Consent × Contract × Coverage × CoverageEligibilityRequest × CoverageEligibilityResponse × CriteriaReview × DetectedIssue × Device ×
DeviceDefinition × DeviceMetric × DeviceRequest × DeviceUseStatement × DiagnosticOrder × DiagnosticReport × DocumentManifest × DocumentReference × EffectEvidenceSynthesis × Encounter × Endpoint × EnrollmentRequest × EnrollmentResponse × EpisodeOfCare × EventDefinition × Evidence × EvidenceVariable ×
ExampleScenario × ExplanationOfBenefit × FamilyMemberHistory × Flag × Goal × GraphDefinition × Group × GuidanceResponse × HealthcareService × ImagingStudy × Immunization × ImmunizationEvaluation × ImmunizationRecommendation × ImplementationGuide × InsurancePlan × Invoice × Library × Linkage ×
List × Location × Measure × MeasureReport × Media × Medication × MedicationAdministration × MedicationDispense × MedicationKnowledge × MedicationOrder × MedicationRequest × MedicationStatement × MedicinalProduct × MedicinalProductAuthorization × MedicinalProductContraindication ×
MedicinalProductIndication × MedicinalProductIngredient × MedicinalProductInteraction × MedicinalProductManufactured × MedicinalProductPackaged × MedicinalProductPharmaceutical × MedicinalProductUndesirableEffect × MessageDefinition × MessageHeader × MolecularSequence × NamingSystem × NutritionOrder ×
Observation × ObservationDefinition × OperationDefinition × OperationOutcome × Organization × OrganizationAffiliation × Parameters × Patient × PaymentNotice × PaymentReconciliation × Person × PlanDefinition × Practitioner × PractitionerRole × Procedure × ProcedureRequest × Provenance × Questionnaire ×
QuestionnaireResponse × RelatedPerson × RequestGroup × ResearchDefinition × ResearchElementDefinition × ResearchStudy × ResearchSubject × ReviewCollection × RiskAssessment × RiskEvidenceSynthesis × Schedule × SearchParameter × ServiceRequest × Slot × Specimen × SpecimenDefinition × StructureDefinition ×
StructureMap × Subscription × Substance × SubstanceNucleicAcid × SubstancePolymer × SubstanceProtein × SubstanceReferenceInformation × SubstanceSourceMaterial × SubstanceSpecification × SupplyDelivery × SupplyRequest × Task × TerminologyCapabilities × TestReport × TestScript × ValueSet × VerificationResult ×
VisionPrescription ×

[Select All Resources] [Remove All Resources]

Click in the box below to add or remove operations:

read ×

[Clear All Operations]

Note: When selecting multiple operations, only the resources that implement all selected operations will be displayed in the table and graph below. Choosing the 'not specified' option will display resources where no operation was defined in the Capability Statement.

Resource	FHIR Version	Endpoints
Account	4.0.0	1
Account	4.0.1	1
ActivityDefinition	4.0.1	1
AdverseEvent	4.0.0	12
AdverseEvent	4.0.1	1
AllergyIntolerance	1.0.2	1606
AllergyIntolerance	1.0.2-7202	1
AllergyIntolerance	3.0.1	1
AllergyIntolerance	4.0.0	13
AllergyIntolerance	4.0.1	1
Appointment	1.0.2	1195
Appointment	4.0.0	1
Appointment	4.0.1	1
AppointmentResponse	4.0.1	1

Resource Count

All Developers

FHIR Version ■ 1.0.2 ■ 1.0.2-7202 ■ 3.0.1 ■ 4.0.0 ■ 4.0.1

Number of Endpoints

Capability Page

FHIR Version:

All Versions ▾

Developer:

All Developers ▾

FHIR Resource Types

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Note: This is the list of FHIR resource types reported by the capability statements from the endpoints. This reflects the most recent successful response only. Endpoints which are down, unreachable during the last query or have not returned a valid capability statement, are not included in this list.

Click in the box below to add or remove resources:

Patient ×   Appointment ×   Medication ×

[Select All Resources]   [Remove All Resources]

**Click in the box below to add or remove operations:**

read ×

[Clear All Operations]

Note: When selecting multiple operations, only the resources that implement all selected operations will be displayed in the table and graph below. Choosing the 'not specified' option will display resources where no operation was defined in the Capability Statement.

Resource	FHIR Version	Endpoints
Appointment	1.0.2	1195
Appointment	4.0.0	1
Appointment	4.0.1	1
Medication	1.0.2	410
Medication	3.0.1	1
Medication	4.0.0	12
Medication	4.0.1	1
Patient	1.0.2	1606
Patient	1.0.2-7202	1
Patient	3.0.1	3
Patient	4.0.0	13
Patient	4.0.1	1

Resource Count

All Developers

FHIR Version: ■ 1.0.2 ■ 1.0.2-7202 ■ 3.0.1 ■ 4.0.0 ■ 4.0.1

Number of Endpoints
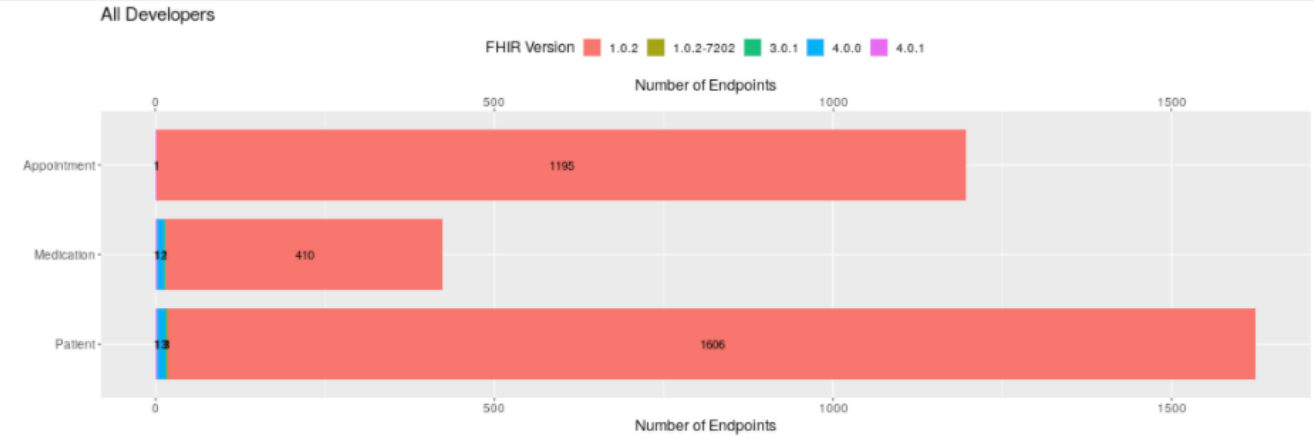
Try Lantern Out Yourself!

http://lantern.healthit.gov

Please contact alert-lantern@hitrc.org with any questions, to report any incorrect data or to provide additional publicly available endpoint lists for Lantern to query.

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Q & A

- Please ask any questions about the Lantern Project in the Chat.

- We will monitor and respond to the questions as they're asked.

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FHIR Endpoint List Publishing

Keith Carlson, ONC

The Office of the National Coordinator for
Health Information Technology

API Requirements finalized in ONC Cures Act Final Rule

Technical capabilities

Standardized API for patient and
population services

+

Compliance requirements

API Conditions and Maintenance of
Certification requirements

=

API access without special effort

API Requirements finalized in ONC Cures Act Final Rule

- **Technical capabilities in 170.315(g)(10)**: **Standardized API for Patient and Population Services**
    - Requirement for single patient API
    - Requirement for multiple patients API
    - Technical capabilities of Health IT Modules finalized at 170.315(g)(10)
        - Registration, Authentication & Authorization / Revocation / Introspection, Data Search, Data Response, Documentation
- **Compliance requirements for health IT developers certified to 170.315(g)(10)**
    - API Conditions of Certification requirements
        - Publish APIs, transparency, API fees, openness & pro-competitive conditions
    - API Maintenance of Certification requirements
        - Authenticity verification / registration, service base URL publication, API Conditions compliance for existing technology

API Requirements finalized in ONC Cures Act Final Rule

- **Service base URL publication at 45 CFR 170.404(b)(2):**

    (2) *Service base URL publication.* A Certified API Developer must publish the service base URLs for all Health IT Modules certified to § 170.315(g)(10) that can be used by patients to access their electronic health information. The Certified API Developer must publicly publish the service base URLs:

    (i) For all of its customers regardless of whether the Health IT Modules certified to § 170.315(g)(10) are centrally managed by the Certified API Developer or locally deployed by an API Information Source; and

    (ii) In a machine-readable format at no charge.

Certification Companion Guide Clarifications to 45 CFR 170.404(b)(2)

- Certified API Developers must make available appropriately scoped service base URLs that can be used by patients to access their EHI for Health IT Modules certified to § 170.315(g)(10).

- As discussed in section VIII.C.6.c of the ONC Cures Act Final Rule, API Information Sources who locally manage their FHIR servers without Certified API Developer assistance cannot refuse to provide to Certified API Developers the FHIR service base URL(s) that is/are necessary for patients to use to access their EHI. Equally, pursuant to this Maintenance of Certification requirement, they would be required to publish the FHIR service base URLs they centrally manage on behalf of API Information Sources.

Certification Companion Guide Clarifications to 45 CFR 170.404(b)(2)

- *One (large) clarification broken up for readability:*

- To be open and transparent to the public, developers must provide a hyperlink to the list of service base URLs to be published with the product on the ONC Certified Health IT Product List (CHPL)

- Certified API Developers are encouraged to use a standardized format when publishing the service base URLs for all of its customers

  - ONC recommends Certified API Developers leverage the HL7 FHIR 4.0.1 "Endpoint" resource, or profiles of this resource such as the Validated Healthcare Directory Implementation Guide STU1 "vhdir-endpoint" profile, to represent service base URLs that can be used by patients to access their health information

- ONC also encourages developers to provide as much information about the service base URLs as available, including the API Information Source's organization details, such as name, location, and provider identifiers (e.g., NPI, CCN, or health system ID)

- These steps will help industry coalesce around standards that enable application developers to more easily and consistently provide patients access to their electronic health information.

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Thank you!

Q & A

- Please ask any questions about the Certification Companion Guide clarifications in the Chat.

- We will monitor and respond to the questions as they're asked.

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Poll Questions

Break

We will resume @ 3:35PM EST

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Agenda: Part 2

- Jeff Brown will present on work to build consensus on a standard way to get information about organization(s) associated with a FHIR endpoint.

- We will then answer questions and a take a brief poll before closing out today's session.

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Break & Poll		3:20pm-3:35
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Welcome, Introduction & Agenda to Part 2	Vaishali Patel, ONC	3:35-3:45pm
Recommendations for Standardizing Publication of FHIR endpoint lists	Jeff Brown, MITRE	3:45 - 4:15
Q&A and Poll	Wes Barker, Moderator	4:15 - 4:45
Recognition of Wayne Kubick of HL7	ONC	4:45 - 4:50
Closing Remarks & Next Steps	Vaishali Patel, ONC	4:50-5:00pm

Part 2: Standardizing Publication of FHIR Endpoint Lists: Organization
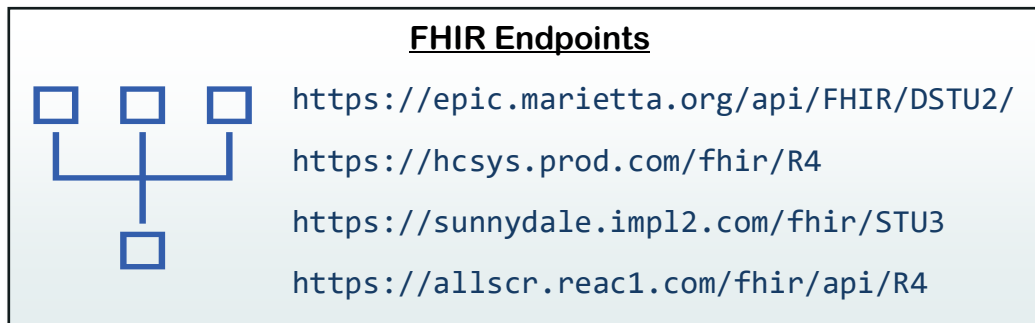
FHIR Endpoints and Organizations

Issue History and Solution Proposal

Jeff Brown
December 16, 2021

FHIR Endpoints and Organizations

Reviewing the Issue:

The ONC Final Rule contains a specific requirement that "*an API Technology Supplier must support the publication of Service Base URLs for all of its customers*" and also "*make such information publicly available (in a computable format) at no charge.*"

FHIR Endpoints

```
https://epic.marietta.org/api/FHIR/DSTU2/
https://hcsys.prod.com/fhir/R4
https://sunnydale.impl2.com/fhir/STU3
https://allscr.reac1.com/fhir/api/R4
```

These Service Base URLs are commonly referred to as "FHIR Endpoints", and for this data to be publicly available there cannot be any requirements for authorization or credentials.

To provide the appropriate level of information regarding FHIR endpoints, including all the organizations that are serviced by a particular FHIR Endpoint, a more structured approach is necessary than is currently in place within this requirement to publish endpoint information.

FHIR Endpoints and Organizations

Reviewing the Issue:

Endpoints -

The initial step in solving the problem at hand would be to recommend all endpoint information to be published, and accessible, in the FHIR Endpoint resource format[1]. This would allow for standardized and consistent ingestion of the required endpoint publications, without the need for potential customizations to tailor processing for individual vendors.

A few key stakeholders (e.g., Epic) have already begun doing this of their own accord, but it is still a rare situation.

Name	Flags	Card.	Type
Endpoint	TU		DomainResource
identifier	Σ	0..*	Identifier
status	?! Σ	1..1	code
connectionType	Σ	1..1	Coding
name	Σ	0..1	string
managingOrganization	Σ	0..1	Reference(Organization)
contact		0..*	ContactPoint
period	Σ	0..1	Period
payloadType	Σ	1..*	CodeableConcept
payloadMimeType	Σ	0..*	code
address	Σ	1..1	url
header		0..*	string

[1] At ~~the~~ a July 2021 ONC Workshop, it was noted that a large majority of participants supported the idea of using the FHIR Endpoint resource for their published lists.

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FHIR Endpoints and Organizations

Reviewing the Issue:

Organizations -

While the critical need and requirement for endpoint information is evident, it is also necessary to know about the organizations related to the endpoint – not only the one that manages the endpoint (i.e., controls or owns it), but it has also been determined that multiple organizations may be serviced by a single endpoint.

Regional Healthcare System

Provider Org **A**

Provider Org **B**

Provider Org **C**

https://mhs.ehr.com/fhir/R4

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FHIR Endpoints and Organizations
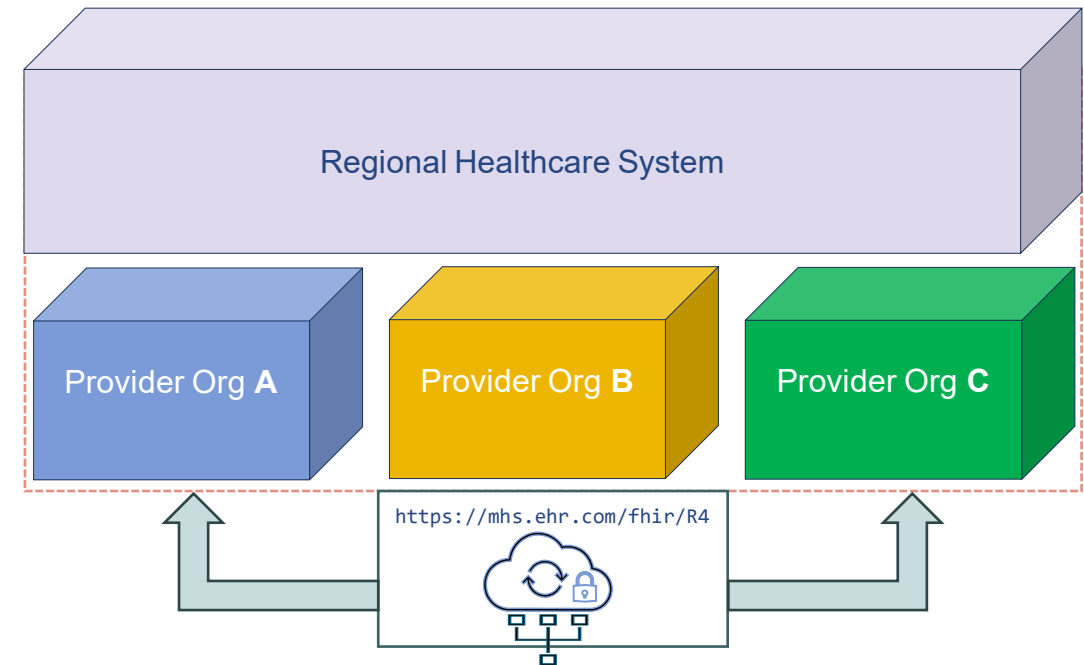
Reviewing the Issue:

Name	Flags	Card.	Type
Endpoint	TU		DomainResource
identifier	Σ	0..*	Identifier
status	?! Σ	1..1	code
connectionType	Σ	1..1	Coding
name	Σ	0..1	string
managingOrganization	Σ	0..1	Reference(Organization)
contact		0..*	ContactPoint
period	Σ	0..1	Period
payloadType	Σ	1..*	CodeableConcept
payloadMimeType	Σ	0..*	code
address	Σ	1..1	url
header		0..*	string

With the assumption that the initial step seeking publication of endpoint information to be as FHIR **Endpoint** resources materializes, Considering this, the current structure of the FHIR Endpoint resource allows for a maximum of only 1 occurrence of the managingOrganization element (Cardinality 0..1).

This design would not satisfy the current need, as multiple organizations may often be serviced by a single endpoint.

The real question now is "How do we get all associated organizations?"

FHIR Endpoints and Organizations

The Lantern team from MITRE reviewed the responses and feedback received during the July Workshop to develop a solution that would provide the necessary information availability while remaining a feasible lift for implementers and vendors.

The following summary provides a sequential overview of the proposed solutions and related efforts the team has worked through to ultimately determine a final proposal.

Proposed Solutions:

1. Change the Endpoint resource `managingOrganization` element cardinality from 0..1 to 0..*

2. Create FHIR Operation to allow retrieval of organization resources upon demand.

3. Adding a `servicedOrganization` element to the Endpoint resource

4. Creating an associative entity for `Organization` and `Endpoint` resources

FHIR Endpoints and Organizations

Proposal 1: Change the Endpoint resource `managingOrganization` element cardinality from 0..1 to 0..* to represent the various serviced organizations.

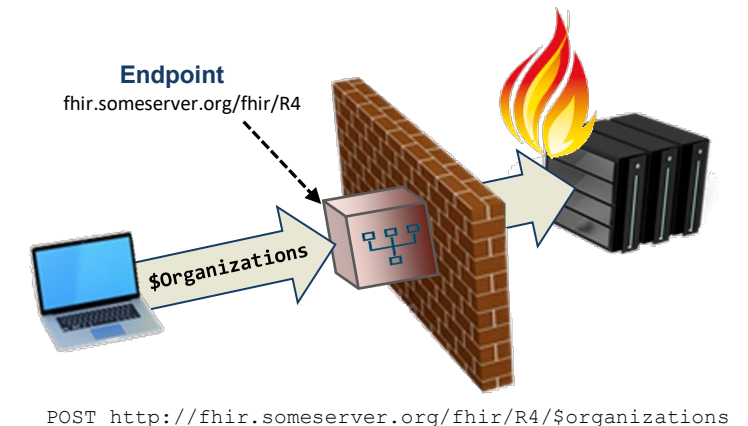✗ This solution was rejected due to opposition received by the FHIR Infrastructure workgroup:

- The intent of the `managingOrganization` element is to represent the single controlling organization for the endpoint. The proposed usage would contradict the intended meaning of the element and thus would be considered inappropriate. After some consideration, the MITRE Lantern team agreed with this assessment.

Name	Flags	Card.	Type
Endpoint	TU		DomainResource
identifier	Σ	0..*	Identifier
status	?! Σ	1..1	code
connectionType	Σ	1..1	Coding
name	Σ	0..1	string
managingOrganization	Σ	0..1	Reference(Organization)
contact		0..*	ContactPoint
period	Σ	0..1	Period
payloadType	Σ	1..*	CodeableConcept
payloadMimeType	Σ	0..*	code
address	Σ	1..1	url
header		0..*	string

Proposal 2: Create FHIR Operation to allow retrieval of organization resources upon demand.

✗ This solution received enough substantive opposition to dismiss due to a couple of reasons:

- A concern of setting a precedent toward an uncontrollable proliferation of specialized operations for unique use-cases
- Difficulty in prescribing the optionality/requirement of such an operation and development implications.

Endpoint
fhir.someserver.org/fhir/R4

`$Organizations`

POST http://fhir.someserver.org/fhir/R4/$organizations

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FHIR Endpoints and Organizations

Proposal 3: Adding a `servicedOrganization` element to the Endpoint resource

✗ This solution was abandoned due to opposition toward an unwanted architectural side-effect:

- The Organization resource has an Endpoint element (0..*) allowing for a single organization to refer to the various endpoints that it offers. By including a 0..* element within Endpoint, there would be an implicit "many to many" relationship, which is not only avoided in most best practices but is also contrary to FHIR design guidelines.

Name	Flags	Card.	Type
Endpoint	TU		DomainResource
identifier	Σ	0..*	Identifier
status	?! Σ	1..1	code
connectionType	Σ	1..1	Coding
name	Σ	0..1	string
managingOrganization	Σ	0..1	Reference(Organization)
contact		0..*	ContactPoint
period	Σ	0..1	Period
payloadType	Σ	1..*	CodeableConcept
payloadMimeType	Σ	0..*	code
address	Σ	1..1	url
header		0..*	string
servicedOrganization		0..*	Reference(Organization)

Proposal 4: Creating an associative entity for `Organization` and `Endpoint` resources

✗ This proposal was not considered an acceptable solution by the MITRE team due to several reasons, including but not limited to:

- This solution would require similar references to what is found in Proposed Solution 3 and would add additional complexity
- Introducing entirely new artifacts within the FHIR specification as peripheral, supportive structures would require extensive work within the HL7 process and would offer minimal or no improvement compared to other solutions.

NOTE: This solution only proposed as a mechanism to accommodate the architectural side-effect surfaced in Proposed Solution 3.
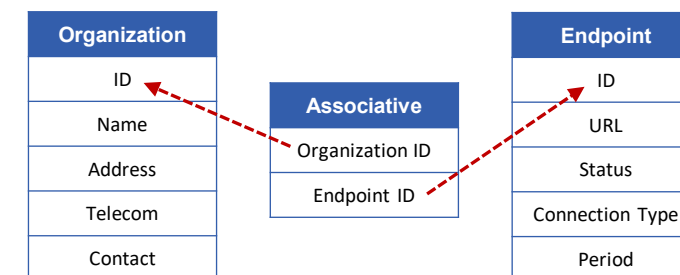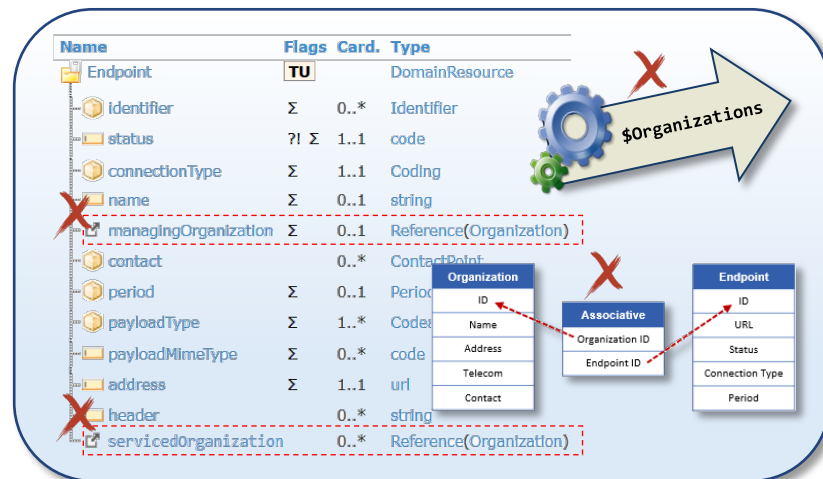
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FHIR Endpoints and Organizations

Final Proposed Solution:

Proposed guidance that endpoint information be published in FHIR Endpoint resource format and Organization resource accessibility on these published endpoints external to Authentication/Security frameworks.

The MITRE Lantern team took the feedback from the various participants in these discussions (i.e., HL7, Epic, etc.) for consideration and analysis to take a fresh look at the issue at hand to see if a new approach was called for.

This effort resulted in this new proposal which was reviewed and brought to an esteemed FHIR leadership member and the HL7 CTO for consideration with very positive response and support.

**MITRE**

FHIR Endpoints and Organizations

Final Proposed Solution:

Proposed guidance that endpoint information be published in FHIR Endpoint resource format and Organization resource accessibility on these published endpoints external to Authentication/Security frameworks.

Publicly accessible FHIR Organization resource instances must be offered on the endpoint and support queries of those resources (i.e., outside of any authentication security framework). This would allow a user to query a publicly accessible endpoint's system for associated organizations and retrieve them in the standardized FHIR format already supported by the system.

Requires no modification to the FHIR Specification and only moderate additional effort on endpoint publishers.

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FHIR Endpoints and Organizations
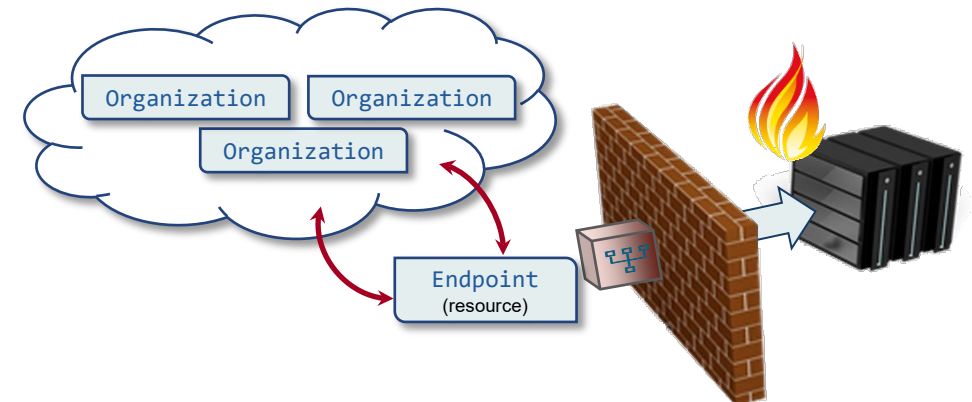
In Addition…

The FHIR At Scale Taskforce (FAST) is an ONC initiative for FHIR Scalability and includes a specific Tiger Team (*Directory Versioning & Scale*) to focus on resource directory solutions and ensuring a process to handle versioning and the anticipated scale of resources. The goals of this effort have significant relevancy to the Lantern functionality being developed and will be supported by the product.

The Directory Versioning & Scale team has identified several problem areas currently within the industry, many of which will be directly remedied by Lantern's functional capabilities and information.

Some of the problem areas addressed are…

- Multiple places to find endpoints may require tribal knowledge to determine where endpoint are defined.
- Amount of information at an endpoint varies greatly depending on source
- Degree of audit and currency of the information varies tremendously
- Operational endpoint capability discovery unavailable
- No initial or recurring validation of endpoints for compliance to FHIR specification

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Q & A

- Please ask any questions about the proposal in the chat.

- We will monitor and respond to the questions as they're asked.

Poll Questions

Recognition of Wayne Kubick, HL7 CTO

ONC

Closing Remarks & Next Steps

Vaishali Patel, ONC

The Office of the National Coordinator for
Health Information Technology

Thank You!

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