Office of the National Coordinator for Health Information Technology

ONC LANTERN PROJECT

Lighting the Way for FHIR® API Implementation: Solutions for Endpoint Publication and Discovery

New Evidence and Findings for Publishing FHIR Endpoints

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DEPARTMENT OF HEALTH & HUMAN SERVICES · USA

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Executive Summary

The Office of the National Coordinator for Health Information Technology (ONC) project Fast Healthcare Interoperability Resources (FHIR®) Application Programming Interface (API) Monitoring System, otherwise known as Lantern, was created to help ONC monitor and publicly provide nationwide analytics about the availability and standardization of FHIR API service base URLs ("FHIR Endpoints") deployed by healthcare organizations. In particular, based on the initial use case (i.e., patient access) expected to be broadly supported as a result of ONC's 21st Century Cures Act Final Rule, Lantern analytics are positioned to help shine a light on the healthcare industry's FHIR API readiness and ongoing support of patient access.

The purpose of this document is to describe and identify solutions to ***two challenges*** that both limit the Lantern tool from effectively monitoring and reporting on the implementation of FHIR based APIs, and ultimately make it harder for patients to access their data. The solutions were developed through consensus-building with partners and stakeholders, including two ONC-hosted virtual meetings that presented and iterated upon the Lantern team's work, as well as discussions with key HL7® workgroup committees. These challenges and proposed solutions are listed below.

Challenge 1: To date, the industry has not coalesced around a common framework or approach to publish their FHIR API Service Base URL ("FHIR Endpoints") lists, which means that applications like Lantern have to develop a unique way to retrieve each endpoint and associated data for each endpoint list (Figure 1). This is a resource intensive process that is not only problematic for Lantern but for others, such as app developers who need to retrieve the endpoint lists to serve their users (i.e., patients).

Proposed solution: The Lantern team recommends the broad use of FHIR Bundles containing FHIR Endpoint resources that developers would populate and make publicly available. This solution is consistent with the use of FHIR on all servers and has been shared with the developer community with widespread support.

Challenge 2: It is difficult to associate an endpoint with the organization(s) it services using the information currently available, which is usually just a name of an organization. An organization's name alone does not indicate where it's located, if it's an organization that services many healthcare providers, and other complexities of the healthcare organization system in the United States. Without additional organizational information, Lantern cannot fully realize its goal of monitoring FHIR implementations by healthcare providers, and it is more difficult for patients to discover what endpoint serves their healthcare provider, potentially preventing access to their Electronic Health Information (EHI).

Proposed Solution: The team initially considered making a change to the FHIR standard itself to address this challenge, but after working with members of the HL7 community, the team decided to recommend structuring FHIR servers so that FHIR Organization resources are publicly available, which requires no change to the FHIR standard. Other solutions have also emerged from the community, including the "Patient-access Brands" model proposed through the Argonaut Project.

Abstract

This document discusses two challenges that the Lantern team identified while developing the Fast Healthcare Interoperability Resources (FHIR) Application Programming Interface (API) Monitoring Service: (1) FHIR API list standardization and (2) mapping organizations to FHIR API endpoints The document (a) describes the initial approaches the team created to address these challenges, (b) summarizes the outcomes of public workshops where these challenges and proposed solutions were shared with health IT stakeholders, and (c) the follow-up work our team completed to implement the proposed solutions.

1 Introduction

1.1 WHAT IS LANTERN

The Office of the National Coordinator for Health Information Technology (ONC) project, Fast Healthcare Interoperability Resources (FHIR) Application Programming Interface (API) Monitoring Service, otherwise known as Lantern, was created to help ONC monitor and publicly provide nationwide analytics about the availability and standardization of FHIR Endpoints deployed by healthcare organizations. The Capability Statement, a publicly accessible FHIR resource that can be retrieved from each URL, includes the information about the FHIR server itself and has been the main source of data that Lantern processes. The Lantern system also uses the National Plan and Provider Enumeration System (NPPES) to match the URLs to specific organizations, and the Certified Health IT Product List (CHPL) to match them to specific developers and certified products. Together, these data sources provide us with more complete information about the availability of FHIR API Service Base URLs, the healthcare organizations that are implementing them, and the software products that are associated with these endpoints.

1.2 PURPOSE

This report describes and identifies solutions to two challenges that limit the Lantern tool from effectively monitoring and reporting on the implementation of FHIR based APIs that support patient access across the United States. The challenges are as follows:

- Lack of FHIR API Endpoint List Standardization: Developers do not follow a standard to publish their endpoint lists.
- Mapping Organizations to FHIR API Endpoints: It is difficult to map multiple, unique organizations to endpoints in the current state.

This report describes each challenge and proposes solutions to address them. These solutions were developed through consensus-building with partners and stakeholders, including two ONC-hosted virtual meetings that presented and iterated upon the Lantern team's work, as well as discussions with key HL7 workgroup committees. This report will also summarize the outcomes of the previously mentioned ONC-hosted meetings — a July 2021 workshop and a December 2021 webinar— and elaborate on implementation of the proposed solutions. Table 1 lists the proposed solutions.

Table 1: Challenges and Proposed Solutions

Challenge	Proposed Solution
Endpoint List Standardization	Use a FHIR Bundle containing FHIR Endpoint resources as an endpoint list
Mapping Organizations	FHIR Endpoint resources can be used to find associated organizations if Organization resources are accessible on the FHIR server external to authentication frameworks

1.3 BACKGROUND

In the ONC 21st Century Cures Act Proposed Rule, ONC recognized the need to make FHIR Service Base URLs publicly available (emphasis added). The proposed rule states:

> In order to interact with a FHIR RESTful API, an app needs to know the FHIR Service Base URL, which is often referred to colloquially as a FHIR server's endpoint. [93] The **public availability and easy accessibility of this information is a central necessity to assuring the use of FHIR-based APIs without special effort**, especially for patient access apps. Accordingly, we propose to adopt in § 170.404(b)(2) a specific requirement that an API Technology Supplier (Certified API Developer) must support the publication of Service Base URLs for all of its customers, regardless of those that are centrally managed by the API Technology Supplier (Certified API Developer) or locally deployed, and make such information publicly available **(in a computable format)** at no charge. In instances where an API Technology Supplier (Certified API Developer) is contracted by an API Data Provider (API Information Source) to manage its FHIR server, we expect that this administrative duty will be relatively easy to manage. In instances where an API Data Provider (API Information Source) assumes full responsibility to "locally manage" its FHIR server, the API Technology Supplier (Certified API Developer) would be required, pursuant to this proposed maintenance requirement, to obtain this information from its customers. **We strongly encourage API Technology Suppliers, healthcare providers, HINs and patient advocacy organizations to coalesce around the development of a public resource or service from which all stakeholders could benefit**. We believe this would help scale and enhance the ease with which Service Base URLs could be obtained and used."

The ONC Cures Act Final Rule, at 85 FR 170.404(b)(2), finalized this proposal and requires that Certified API Developers (i.e. software developers) maintain a list of the FHIR service base URLs (endpoints) exposed by API Information Sources (i.e. deployed systems) using their product. However, the regulation makes no requirement for the content or format of the lists, only that they must be freely accessible and machine-readable. Through the Lantern work, the team has found that developers with publicly discoverable lists have defined their own publication approach and format, which we'll describe in more depth later in the report. **To date, no one has coalesced around a common framework or approach**. As the December 31, 2022, deadline for the API provisions of the Cures Act to be met has passed, it is now imperative that the industry agrees on a common format for publishing these endpoints.

While developing Lantern, the team also realized that some data that are important to facilitate connections to these endpoints were not as accessible as expected when starting this project:

- (1): The organization(s) associated with an endpoint. Mapping organizations to these endpoints is integral to identifying what healthcare organizations and providers are serviced by a single endpoint. Knowing this information facilitates a patient's discovery of what endpoint serves their healthcare provider, which in turn would allow the patient to access their health information through that endpoint.

- (2): The software product behind the API. The ability to associate an endpoint with a specific certified software product can facilitate the discovery of API documentation and other technical resources needed by the patient (or their chosen application) to make a successful and secure connection to the endpoint and retrieve data from the FHIR server. Knowing this data can make further use of these APIs as effortless as possible.

The following sections will provide more details about the Lantern Project's approach to identifying these challenges and developing recommendations to help guide health IT developers, healthcare providers, HINs, and patient advocacy organizations to coalesce around a standard approach to make this information available and accessible to patients, application developers, and other data users.

2 FHIR API Endpoint List Standardization

2.1 INITIAL STATE

This was the list of FHIR API endpoints ingested into Lantern, as of April 2022.

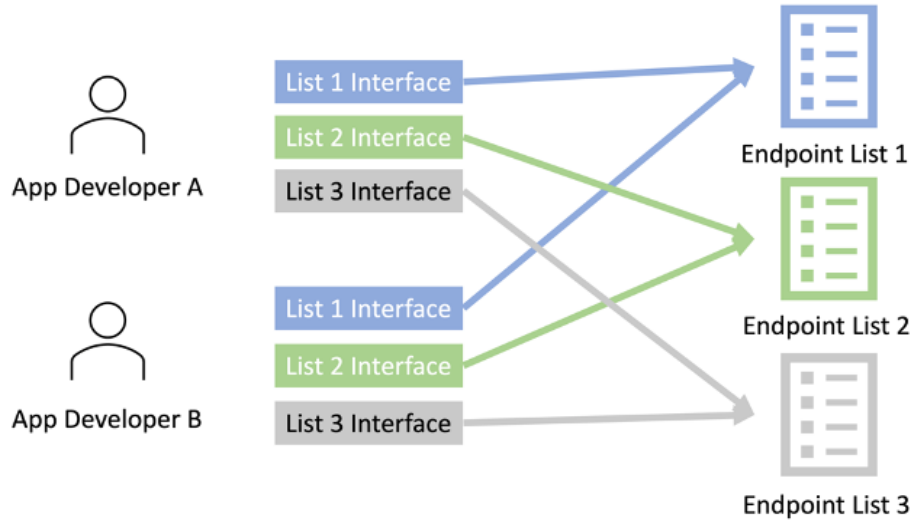
Table 2. FHIR API Endpoint Lists, Their Format, and Included Fields

Developer	Resource Location	Format	Included Fields
Epic	https://open.epic.com/MyApps/endpoints	FHIR Bundle of Endpoint Resources	See FHIR Endpoint Resource Documentation
Care Evolution	https://fhir.docs.careevolution.com/overview/public_endpoints.html	HTML Table	**Name**, **Patient-Facing URI**, State(s)/ZIP Code(s) Serviced
Cerner	https://github.com/cerner/ignite-endpoints/blob/main/dstu2-patient-endpoints.json	JSON File	**Name**, **BaseURL**, Server Type
1upHealth	https://1up.health/fhir-endpoint-directory	JSON	**Name, resource_url**, api_version, location

There are two other sources of endpoints that the Lantern team uses. The CMS National Plan and Provider Enumeration System (NPPES) National Provider Identifier (NPI) endpoint file includes FHIR endpoints. The Certified Health IT Product List (CHPL) recently started requiring developers to include an endpoint list with their certified product, and any available endpoints from those lists have also been added.

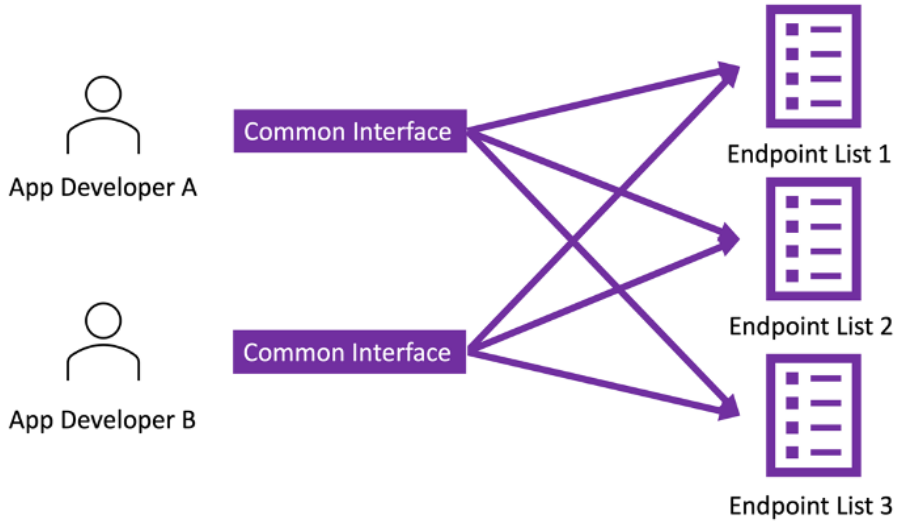
Table 2 shows how each endpoint list uses a different format and includes different fields. Without a defined format for all developers to use, any application interested in ingesting each list must develop a separate interface to interact with each one, as seen in Figure 1.

Figure 1. Separate Interfaces Needed to Ingest Each Endpoint List



This is not a sustainable model as more developers make their lists publicly available. So, ideally, all developers would share their data in the same way (Figure 2), which reduces the development burden for those consuming the lists and gives any developers that have not created their lists yet a framework to work within instead of creating their own proprietary option.

Figure 2. Common Interface Used for Each Endpoint List



2.2 PROPOSED SOLUTION

In preparation for the July 2021 ONC workshop, the Lantern team proposed a standard solution for publishing FHIR API endpoint lists. This solution called for the broad use of FHIR Bundles containing FHIR Endpoint resources that developers would populate and make publicly available. The Lantern team proposed this solution because:

1) This is an established, standardized format that accomplishes the 'common interface' solution pictured in Figure 2.
2) Certified API Developers are required to use FHIR. Use of FHIR for the endpoint lists as well keeps the whole ecosystem consistent.
3) 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. Consistency between these different use cases helps developers that are designing for multiple uses cases.

The team did not see any negatives to using this format outside of the effort necessary for developers to switch to this new format. Support for this solution led to guidelines released by ONC that were also discussed during the July Workshop.

2.3 ONC GUIDELINES

The above solution led to ONC creating and publishing a new clarification in the Certification Companion Guide: Application Programming Interfaces. The guidance most relevant to this document is clarified in paragraph "(b) *Maintenance of certification requirement – (2) Service base URL publication" in 85* FR § 170.404:

> 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.

Both the proposed solution and ONC's released guidance were presented and discussed during the workshop to address any issues or oversights that were missed while developing this solution.

2.4 WORKSHOP OUTCOMES

After presenting the above solution and guidelines at the July 2021 Workshop, and discussing them with attendees, most attendees agreed that using the FHIR Endpoint resource was a good way to store this information.

During the breakout session to discuss this recommendation, many developers mentioned that they already had plans to use the FHIR Endpoint resource for their endpoint lists. As an example, at the time

of the workshop, Epic was using a JSON format with their own format, and as shown in Table 2 above, they now have switched over to a FHIR Bundle of Endpoint resources. A poll question was sent out after the breakout session to gauge the level of effort required to model the endpoint list after the FHIR Endpoint resource, and 75% of attendees stated that it would require little to no additional effort.

During the December 2021 Webinar, the information was again presented, this time to a wider audience. After the presentation, attendees were asked to what degree would standardization of endpoint list publication make it easier for their organization to publish and/or use the data. Around 50% of attendees said it would make it easier "to a great extent", and another 30% saying it would be "somewhat" easier. These responses came from across domains, including healthcare organization/systems, EHR developers, technology developers, and vendors.

3 Mapping Organizations to FHIR API Endpoints

3.1 INITIAL STATE

Figure 3. Organization Name from 1 Endpoint Mapped to 6 Entries in NPPES

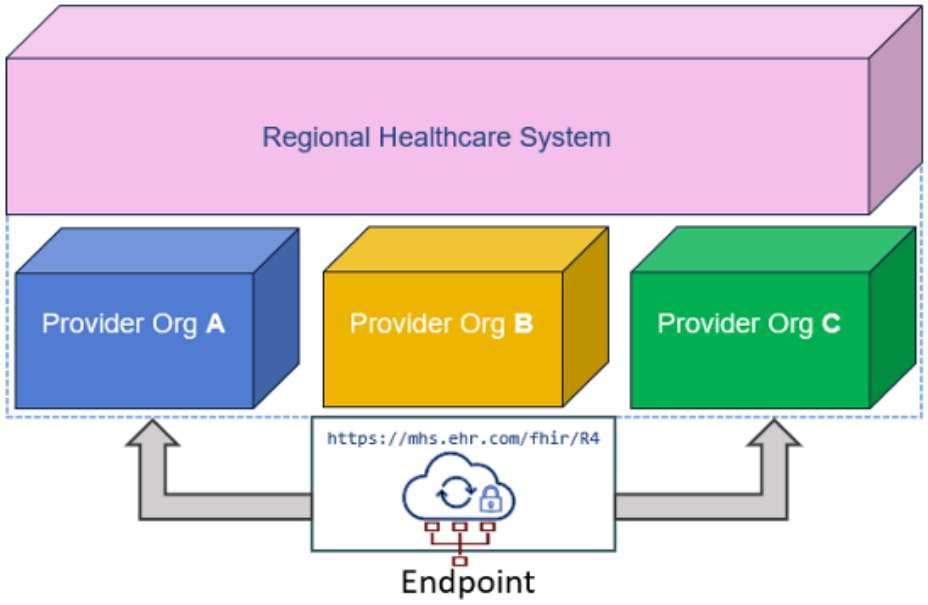
endpoint_names character varying[] (500)	organization_name character varying (500)	organization_secondary_name character varying (500)	match_score numeric (5,3)
{"The Pediatric Clinic"}	THE PEDIATRIC CLINIC, P.A.		0.842
{"University of Maryland Medical S...	UNIVERSITY OF MARYLAND MEDICAL SYSTEM CORP...		0.842
{"University of Maryland Medical S...	UNIVERSITY OF MARYLAND MEDICAL SYSTEM CORP...	CRNA/UNIVERSITY OF MARYLAND MEDI...	0.842
{"Akron Children's Hospital"}	CHILDREN'S HOSPITAL MEDICAL CENTER OF AKRON	AKRON CHILDREN'S HOSPITAL ANESTHE...	0.843
{"Akron Children's Hospital"}	CHILDREN'S HOSPITAL MEDICAL CENTER OF AKRON	AKRON CHILDREN'S HOSPITAL-PHYSICIA...	0.843
{"Akron Children's Hospital"}	CHILDREN'S HOSPITAL MEDICAL CENTER OF AKRON	AKRON CHILDREN'S HOSPITAL-RADIOLO...	0.843
{"Akron Children's Hospital"}	CHILDREN'S HOSPITAL MEDICAL CENTER OF AKRON	AKRON CHILDREN'S HOSPITAL-URGENT ...	0.843
{"Akron Children's Hospital"}	CHILDREN'S HOSPITAL MEDICAL CENTER OF AKRON	AKRON CHILDREN'S HOSPTIAL	0.843
{"Akron Children's Hospital"}	CHILDRENS HOSPITAL MEDICAL CENTER OF AKRON	AMBULATORY CARE CENTER PHARMACY	0.843
{"Associates In Anesthesia"}	ANESTHESIA ASSOCIATES		0.843

In the experience of the Lantern team, each entry in an endpoint list generally includes the name of the organization associated with the FHIR API URL. It is formatted as free text (i.e., String), with no unique identifier to tie the organization back to an organization database, such as NPPES. This lack of a unique identifier makes it difficult to know which organization is being supported by the FHIR API URL in cases such as Figure 3.

In this example, the organization name given by the endpoint, "Akron Children's Hospital", has been mapped by the Lantern string-matching algorithm to six possible organization names from NPPES, including "Akron's Children's Hospital Anesthesiology," "Akron's Children's Hospital - Urgent Care," etc. This endpoint might map to any one of these organizations, so the Lantern system cannot make a definite match.

There is also the possibility of the above endpoint representing all six of the above organizations in NPPES. A single String is unable to represent the complexity of healthcare systems as defined in the U.S., where a system can contain many subsystems, as seen in Figure 4, or where a FHIR API URL can support a set of systems. Being able to include all organizations that are serviced by an endpoint is important for a patient's discovery of what endpoint serves their healthcare provider, which in turn would allow the patient to access their health information through that endpoint.

Figure 4. A Single Endpoint Servicing Multiple Subsystems Under One Overarching System



3.2 INITIAL PROPOSED OPTIONS

The Lantern team, in preparation for the July 2021 ONC workshop, proposed three potential solutions to address mapping organizations to FHIR API endpoints. Each of these are described below.

3.2.1 Modify the CapabilityStatement.implement.custodian Cardinality

First, we proposed to modify the FHIR Capability Statement. The implement.custodian field in the Capability Statement resource is defined as a FHIR Organization resource and is "the organization responsible for the management of the instance and oversight of the data on the server at the specified URL." The Organization resource has a field labeled "identifier" that is for identifying "this organization across multiple systems." The custodian field has a built-in way to support a unique identifier for organizations.

Because the field only allows the inclusion of one organization, it does not satisfy the use case pictured in Figure 4 where a single endpoint may service multiple organizations. To utilize this solution, a change request would have to be submitted to the Capability Statement resource to update the FHIR standard to allow for defining more than one organization.

3.2.2 Profile the CapabilityStatement Resource to Add a New Extension

We also considered the possibility of profiling the Capability Statement resource to include an extension so that a new element could be included to reference zero to many (0..*) Organization resources. This scenario would allow for the returned instance of the Capability Statement resource to directly support multiple organizations that are serviced by the endpoint, though it would require referenced organization resources to be accessible outside of the security framework of the system.

The primary complication with this approach involves convincing implementers to conform to this profile of the resource, which is currently optional. This would need to be modified to become required.

3.2.3 Add a New Operation

Finally, we proposed a new FHIR Operation. Operations are used in a variety of situations across the FHIR standard, especially when more complex functionality is involved, and could be applied to this use case. This would require creating a new operation for FHIR APIs that returns a Bundle of Organization resources, which includes all organizations that are serviced by the FHIR endpoint. The added benefit of this operation is that it is a separate query from the metadata query, which allows for users to query the information only when they are interested in it, as opposed to including it in the Capability Statement or another resource where it would always be included.

3.3 JULY 2021 WORKSHOP OUTCOMES

After presenting the above options during the workshop, a fourth option was proposed and preferred by most attendees. This option was to change cardinality of the "managingOrganization" field of the Endpoint resource. This field is defined as the "organization that manages this endpoint." Similar to the above custodian field, it only allows for defining a single organization, so the recommendation was to change the cardinality so that every organization associated with the endpoint could be referenced.

This was the preferred option for several reasons.

- An earlier discussion during the workshop made it clear that most developers were interested in using a Bundle of Endpoint resources for their endpoint list, so it made sense to attendees to put organizations in that resource.
- The Endpoint resource seemed to be a good place to put endpoint-related metadata; most attendees thought the Capability Statement should only focus on the FHIR server's capabilities.
- Changing the cardinality of a field in a trial use resource like Endpoint was thought to be easier to implement than changing a normative resource like Capability Statement.

We pursued this solution with HL7's FHIR Infrastructure (FHIR-I) working group following the workshop.

3.4 PROPOSED SOLUTIONS AND FEEDBACK

The Lantern team reviewed the responses and feedback received during the July 2021 ONC Workshop to develop a solution that would provide the necessary information while remaining a feasible level of effort for implementers and developers.

The team worked through efforts and proposals with members of the HL7 community, with the following results:

- **Change the Endpoint resource managingOrganization element cardinality from 0 to 1 to 0 to many (.1 to 0..*) to represent the various serviced organizations.**

  - This is the proposal that came out of the July 2021 Workshop. The team realized after starting to pursue this change that 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, so this suggestion was abandoned.
- **Create FHIR Operation to allow retrieval of organization resources upon demand.**
  - This is the same proposal as the above proposal defined in 3.2.3. When the team realized the managingOrganization option was not feasible, the team turned back to this option because it required minimal overhead and no authorization with the FHIR server. However, concerns about setting a precedent that would lead to an uncontrollable proliferation of specialized operations for unique use-cases, figuring out how to prescribe the requirement of an operation, and development implications led the team to move away from this solution.
- **Adding a servicedOrganization element to the Endpoint resource.**
  - The possibility of adding a new element to the Endpoint resource was then discussed. Like the above managingOrganization option, it would have a .* cardinality. The Organization resource, however, already 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.
- **Creating an associative entity for Organization and Endpoint resources.**
  - This proposal was not considered an acceptable solution by the Lantern team due to several reasons, including the fact that it would require similar references to what is found in the servicedOrganization option and would add additional complexity. Also, 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.

Ultimately, none of these solutions were decided upon as a valid way to map organizations to their FHIR APIs, which led to the team’s final decision, as we describe in the following section.

3.5 FOLLOW-UP PROPOSED SOLUTION

This work led to the proposed guidance that was recommended by HL7 members. Their suggestion was that endpoint information should be published in the FHIR Endpoint resource format which can be used to find associated organizations if Organization resources are accessible on the FHIR server external to Authentication/Security frameworks. Making Organization resources accessible outside the security framework does not present a security or privacy vulnerability as information in the Organization resource is not confidential and is separate from personally identifiable information (PII) and other confidential information.

If publicly accessible FHIR Organization resource instances are offered on the endpoint, then they can 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.

Figure 5. How to Retrieve Organization Resources from an Endpoint Resource

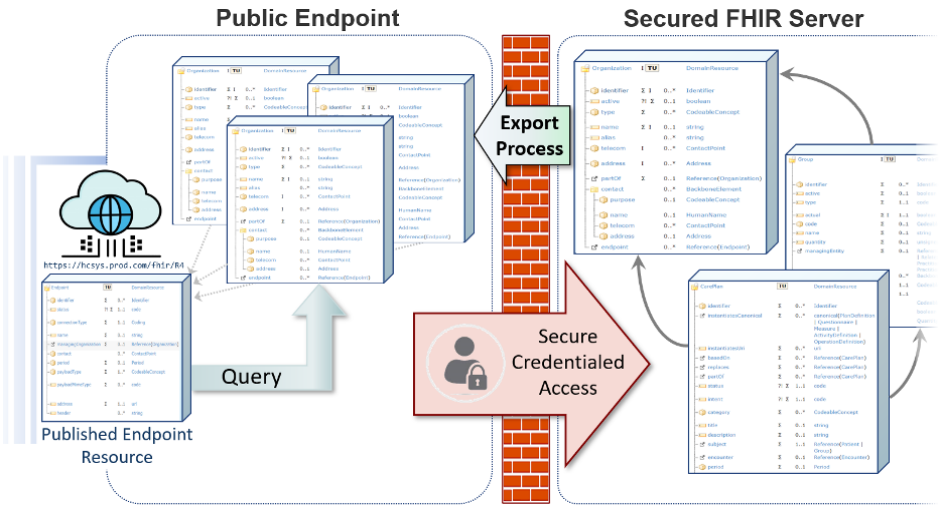


Figure 5 is a visual representation of the final proposed solution to include organization related information. Only the Organization resources containing public information and referencing the endpoint itself must be available outside of the Secured FHIR Server, where they can be queried using a “Reverse Include” query referring to a given Endpoint resource. There is no requirement for how to make them publicly accessible, so the “Export Process” noted in the diagram is left up to the discretion of the developer. This diagram also attempts to clarify the delineation between the publicly accessible information and the secured information which can only be accessed using authorized credentials. Only the information required by the FHIR specification (such as a Capability Statement) and Organization resources referring to the endpoint are expected to be publicly accessible; everything else would not be available unless a user has credentials.

The information available within the Organization resource can enhance the semantic functionality of a querying system, but only if these elements are reasonably populated. Elements such as “name,” “address,” and “telecom” provide obvious value and are necessary within the resource instance, but others can also provide additional benefits. The “partOf” reference, for example, can provide a linkage mechanism useful for navigating an organizational hierarchy. “Alias” may also provide supportive information regarding additional names by which an organization is known.

This solution required no modification to the FHIR Specification and only moderate additional effort from endpoint publishers according to polling done during the December Webinar (see Table 3 below).

3.6 DECEMBER 2021 WEBINAR

The above solution was proposed to a wide audience during the December 2021 webinar. After the presentation, attendees were polled on how this proposal would impact their organization. The questions and results can be found in Table 3. Responses mostly came from EHR and technology developers and, overall, voiced support for the proposal and declared minor or moderate effort to implement.

Table 3. December Webinar Poll Questions and Results

Question 1	Great Value	Some Value	Little Value	No Value	N/A to my organization
How valuable is it to include information about the organization(s) serviced by a FHIR endpoint?"	54%	26%	5%	2%	13%
Question 2	Sufficient	Somewhat Sufficient	Not Sufficient	Don't Know Yet	Not Applicable
Would the proposed approach provide sufficient access to organization information?"	26%	31%	5%	23%	15%
Question 3	No Changes	Minor Changes	Moderate Changes	Major Changes	Not Applicable
Would the proposed approach force any changes to how your organization configures endpoints or how it accesses data on an endpoint?	2%	26%	31%	15%	26%

3.7 FINAL PROPOSED SOLUTION

Given some concern with placing the Organization resources outside of the security framework, the team revisited the approach using a FHIR operation to retrieve the organizations (see section 3.4 for more information). The solution was proposed to the FHIR Infrastructure co-chairs. The co-chairs were not supportive of a new operation. They suggested, instead, that a FHIR query could be used to retrieve an endpoint's supported organizations (for example "GET [base]/Organization?endpoint=[EndpointID]"). FHIR servers already support this type of query and are capable of making the query request publicly accessible, but this is not the default configuration. Developers may choose to configure their FHIR servers in this way to support this type of query. Beyond voluntary configurations of this type, further guidance or requirements may be needed to align developers with this approach. This approach would require minimal effort for developers to implement and no change to the FHIR standard.

4 Conclusion

This report serves as a reference for how the Lantern team identified and addressed two core challenges for endpoint publication and discovery: (1) FHIR API endpoint list standardization and (2) Mapping organizations to FHIR APIs The report outlines why the proposed solutions were determined and why it's important for developers and the FHIR community to consider these solutions as the industry coalesces around a common framework or approach for endpoint publication and discovery. Lantern is meant to "light the way" for FHIR API implementation. Through its public, online tool, Lantern provides insight into active FHIR API implementations and how these conform to federal requirements. This report provides a more robust understanding of how the project team identified challenges and solutions to ensure more uniform and consistent conformance to API Maintenance of Certification requirements. As the federal health IT coordinator, ONC uses the Lantern project to coordinate and work with industry to address challenges and to make its findings and FHIR API implementation monitoring results open to the public. This approach ensures the knowledge base is public and that the health IT industry and community can work together to implement APIs without special effort.