

Integrating the Healthcare Enterprise



5
**IHE IT Infrastructure
Technical Framework Supplement**

10
**Mobile Care Services Discovery
(mCSD)**

HL7® FHIR® Release 4

Using FHIR Resources at FMM Level 2-3

15
Rev. ~~2.13.0~~ – Draft for Public Comment

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25 **Please verify you have the most recent version of this document. See [here](#) for Trial Implementation and Final Text versions and [here](#) for Public Comment versions.**

Foreword

30 This is a supplement to the IHE IT Infrastructure Technical Framework V15.0. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

This supplement is published on March 28, 2019 for public comment. Comments are invited and can be submitted at http://www.ihe.net/ITI_Public_Comments. In order to be considered in development of the trial implementation version of the supplement, comments must be received by April 27, 2019.

35 This supplement describes changes to the existing technical framework documents.

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

<i>Amend Section X.X by the following:</i>
--

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

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

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

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

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

50

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Introduction to this Supplement

145

Whenever possible, IHE profiles are based on established and stable underlying standards. However, if an IHE domain determines that an emerging standard has high likelihood of industry adoption, and the standard offers significant benefits for the use cases it is attempting to address, the domain may develop IHE profiles based on such a standard. During Trial Implementation, the IHE domain will update and republish the IHE profile as the underlying standard evolves.

Product implementations and site deployments may need to be updated in order for them to remain interoperable and conformant with an updated IHE profile.

This mCSD Profile is based on Release 4 of the emerging HL7^{®1} FHIR^{®2} specification. HL7 describes FHIR Change Management and Versioning at <https://www.hl7.org/fhir/versions.html>.

HL7 provides a rating of the maturity of FHIR content based on the FHIR Maturity Model (FMM): level 0 (draft) through N (Normative). See <http://hl7.org/fhir/versions.html#maturity>.

The FMM levels for FHIR content used in this profile are:

FHIR Content	FMM Level
Organization Resource	3
Location Resource	3
Practitioner Resource	3
PractitionerRole Resource	2
HealthcareService Resource	2

The Mobile Care Services Discovery (mCSD) Profile supports RESTful queries across the following related care service resources:

1. **Organization** – Organizations are “umbrella” entities; these may be considered the administrative bodies under whose auspices care services are provided such as Healthcare Information Exchanges (HIEs), Integrated Delivery Networks (IDNs), Non-Government Organizations (NGOs), Faith-Based Organizations (FBOs) or even a one-physician

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

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

155 family practice. An organization has a unique identifier and may have additional administrative attributes such as contact person, mailing address, etc. Departments of an institution, or other administrative units, may be represented as child Organizations of a parent Organization.

160 2. Facility – Facilities are physical care delivery sites such as hospitals, clinics, health outposts, physician offices, labs, pharmacies, etc. A Facility has a unique identifier, geographic attributes (address, geocode), contact attributes, attributes regarding its hours of operation, etc. Each Facility is defined by a pairing of Location and Organization.

165 2.3 Location – Locations are physical ~~care delivery sites~~ places where care can be delivered such as facilities, buildings, wards, rooms, or vehicles, hospitals, clinics, health outposts, physician offices, labs, pharmacies. Locations also include political administrative units such as a village districts or regions. A Location has a unique identifier and may have geographic attributes (address, geocode), ~~contact attributes~~, attributes regarding its hours of operation, etc. Each Location may be related to ~~at least~~ one Organization. A location may have a ~~parent-child~~ parent-child hierarchical relationship with ~~another locations~~.

170 3.4 Practitioner – A Practitioner is a health worker such as defined by WHO (http://www.who.int/whr/2006/06_chap1_en.pdf); a Practitioner might be a physician, nurse, pharmacist, community health worker, district health manager, etc. Practitioners have contact and demographic attributes. Each Practitioner may be related to one or more Organizations, one or more Locations and one or more Healthcare Services. Specific attributes may be associated with the Practitioner relationship with these other entities.

175 4.5 Healthcare Service – Each healthcare service has a unique identifier. Examples include surgical services, antenatal care services, or primary care services. The combination of a Healthcare Service offered at a Location may have specific attributes including contact person, hours of operation, etc.

180 The mCSD Profile describes four actors and the transactions between them. The Find Matching Care Services transaction allows a consumer to search a supplier based on allowed parameters to get a bundle of matching resources. The Request Care Services Updates transaction allows a consumer to get a complete list of updated resources based on a timestamp from the supplier.

- 185 1. **Care Services Selective Consumer** – the Care Services Selective Consumer submits search queries to the Care Services Selective Supplier, which returns the requested resource(s).
2. **Care Services Selective Supplier** – the Care Services Selective Supplier processes inbound queries from Care Services Selective Consumers and returns responses from local data.
3. **Care Services Update Consumer** – the Care Services Update Consumer queries updates from one or more Care Services Update Suppliers.
- 190 4. **Care Services Update Supplier** – the Care Services Update Supplier is responsible for returning a bundle of resources in response to a refresh request from a Care Services

Update Consumer. The response bundle contains content which has been inserted or updated in the listing since the last refresh.

195 Because it maintains interlinked directory information, the mCSD Profile is able to respond to queries such as:

- Which locations are associated with which organizations?
- What services are provided at specific locations or, conversely, where are the locations that provide a specified service?
- 200 • Who are the practitioners associated with a particular organization; what services do they provide; at which locations do they provide these services, and when?

The loosely coupled design and flexible querying capability of the mCSD Profile means it can be deployed within a variety of eHealth architectures and support a wide array of care workflows.

Open Issues and Questions

205 mCSD_7. Should there be additional required search parameters? Should we also require any reverse chaining (`_has`) options for the search? Should we require any reverse includes (`_revinclude`)? These would add complexity to the server and most will have similar options through include and normal chaining.

210 mCSD_8. IHE ~~is has~~ updated ~~ing~~ mCSD to add support for organizational facilities. ~~This work is scheduled for Public Comment in Summer of 2019.~~ As part of ~~that this~~ revision of mCSD, we ~~intend to have~~ removed the “Organization Option”, “Location Option”, “Practitioner Option”, and “Healthcare Services Option”. These options existed to enable servers to focus only on a small subset of the resources. The actual burden to support all resources is small and set of options seems to add unnecessary complexity. The result would be that servers shall support all of the FHIR Resources, the clients can use the FHIR Resources in the way defined. If there is
215 concern with the removal of these options, please ~~contact IHE prior to Summer 2019, or on the forthcoming submit a~~ Public Comment ~~this summer~~.

220 mCSD_9. We have added a requirement to include a meta.profile tag for all compliant resources. This is so that in a mixed server that has these resources as well as others, a Care Services Selective Consumer can limit the results of Find Matching Care Service [ITI-90] to only mCSD resources using the `_profile` parameter. Since this type of parameter isn't allowed for the `_history` transaction for Request Care Services Updates [ITI-91] the Care Services Update Consumer may have to filter results if required. Is this a common configuration and is this step necessary?

Closed Issues

225 mCSD_1. Should we include the *FreeBusy* transaction and use cases or just remove them?

- Take this out, and possibly add later if needed as an option.

mCSD_2. Should we include the aggregate reporting use case from Care Services Discovery (CSD) or remove with a reference to Aggregate Data Exchange (ADX) in cross profile

considerations? This use case would define options for the actors in this use case to return aggregate data.

- 230
- At this time we do not believe these are key uses cases, but request feedback.

mCSD_3. How do we capture data about community health workers? In some environments, there are community health workers that are associated with a facility but don't actually work there. Such a worker might have a set area of villages that they rotate through providing community-based care. The villages are within the catchment area of a Health facility, and the supervisor of the community health worker may be based at that facility.

235

Not quite sure the best way to capture this when looking at:

<http://build.fhir.org/location.html#bnr>

It is clear that we have a hierarchy of locations to capture the geographic hierarchy (jurisdictions):

- 240
- *The health facility in question would be situated at a location above the village level, say at the county or district level - this we can capture in the parent-child relationship "partOf" in the location resource*
 - *The community health worker is providing services at several villages - this we can capture through the location data field of the role in the practitioner resource*
 - *The community health worker is associated to a health facility - again we can capture this through the location field but perhaps we would use a different role to indicate that they're community health worker associated to this facility but not directly providing services at the facility, only its catchment area*
 - *In case a community health worker is reporting to a supervisor - that's not captured anywhere that I can see in FHIR. I think this is a larger that exists beyond the community health worker context*
- 245
- 250

Perhaps the best way to model this is to define each village as a location, and associate that worker with each location they rotate through. Each village is a partOf the health district. The facility is also a location that is partOf the district. The practitioner is related to the village locations with a "delivers care to" role; and to the facility with a "based out of" role.

255

mCSD_4. Do we need to include more geospatial data (such as polygons or more complex geometry types) stored with Locations and how? This would be so jurisdictions (such as districts or counties) could include that data instead of just a position (latitude/longitude). CP#13391 has been opened for this.

- 260
- As per the request, FHIR has added a standard extension to address this:

<https://www.hl7.org/fhir/extension-location-boundary-geojson.html>

mCSD_5. With a federated deployment, data may come from multiple sources and there can be an issue with resolving duplicate records and maintaining the mapping. Patient has a link field and we have opened a CP for Organization, Location, and Practitioner. CP GF#13264 has been opened for this. There is also the Linkage resource, but it is maturity level 0.

265

FHIR has closed the issued with the recommendation to use the Linkage resource to handle this. *mCSD_6. We need a way to deprecate identifiers. For now we can use period and we have created a CP to add an entry to the use field: [GF#13265](#).*

FHIR has added an additional Identifier.use code of “old” for this case.

270

General Introduction

Update the following Appendices to the General Introduction as indicated below. Note that these are not appendices to Volume 1.

Appendix A – Actor Summary Definitions

Add the following actors to the IHE Technical Frameworks General Introduction list of actors:

275

Actor	Definition
Care Services Selective Consumer	The Care Services Selective Consumer queries the Care Services Selective Supplier for information about healthcare practitioners, organizations, locations, and services.
Care Services Selective Supplier	The Care Services Selective Supplier processes received queries from Care Services Selective Consumers and returns information about healthcare practitioners, organizations, locations, and services.
Care Services Update Consumer	The Care Services Update Consumer can query for updates since a previous refresh, to information about healthcare practitioners, organizations, locations, and services from one or more Care Services Update Suppliers.
Care Services Update Supplier	The Care Services Update Supplier can provide updates about healthcare practitioners, organizations, locations, and services information in response to a refresh request from a Care Services Update Consumer. The updates include new or modified information since a previous refresh.

Appendix B – Transaction Summary Definitions

Add the following transactions to the IHE Technical Frameworks General Introduction list of transactions:

Transaction	Definition
Find Matching Care Services [ITI-90]	The Find Matching Care Services transaction is used to query for practitioners, locations, organizations, and healthcare services resources as well as links between these resources. The Find Matching Care Services transaction is initiated by the Care Services Selective Consumer against the Care Services Selective Supplier.
Request Care Services Updates [ITI-91]	The Request Care Services Updates is used to obtain practitioners, locations, organizations, and healthcare services resources that have been inserted or updated since the specified timestamp. The Request Care Services Updates is initiated by the Care Services Update Consumer against the Care Services Update Supplier.

280

Glossary

Add the following glossary terms to the IHE Technical Frameworks General Introduction Glossary:

No new Glossary terms.

285

Volume 1 – Profiles

Copyright Licenses

Add the following to the IHE Technical Frameworks General Introduction Copyright section:

None

290

Add Section 46

46 Mobile Care Services Discovery (mCSD) Profile

The Mobile Care Services Discovery (mCSD) Profile supports discovery of care services resources using a RESTful interface in interrelated, federated environments.

295 The profile supports querying for:

1. Organization – Organizations are “umbrella” entities; these may be considered the administrative bodies under whose auspices care services are provided such as Healthcare Information Exchanges (HIEs), Integrated Delivery Networks (IDNs), Non-Government Organizations (NGOs), Faith-Based Organizations (FBOs) or even a one-physician family practice. An organization has a unique identifier and may have additional administrative attributes such as contact person, mailing address, etc. Departments of an institution, or other administrative units, may be represented as child Organizations of a parent Organization.

300

2. Facility – Facilities are physical care delivery sites such as hospitals, clinics, health outposts, physician offices, labs, pharmacies, etc. A Facility has a unique identifier, geographic attributes (address, geocode), contact attributes, attributes regarding its hours of operation, etc. Each Facility is defined by a pairing of Location and Organization.

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3. Location – Locations are physical places where care can be delivered care delivery sites such as hospitals, clinics, health outposts, physician offices, labs, pharmacies, facilities, buildings, wards, rooms, or vehicles. Locations also include political administrative units such as a village districts or regions. A Location has a unique identifier and may have geographic attributes (address, geocode), contact attributes, attributes regarding its hours of operation, etc. Each Location may be related to one or more Organizations. A location may have a hierarchical relationship with other locations.

310

4. Practitioner – A Practitioner is a health worker such as defined by WHO (http://www.who.int/whr/2006/06_chap1_en.pdf); a Practitioner might be a physician, nurse, pharmacist, community health worker, district health manager, etc. Practitioners have contact and demographic attributes. Each Practitioner may be related to one or more Organizations, one or more Locations and one or more Healthcare Services. Specific attributes may be associated with the Practitioner relationship with these other entities.

315

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5. Healthcare Service – Each healthcare service has a unique identifier. Examples include surgical services, antenatal care services, or primary care services. The combination of a Healthcare Service offered at a Location may have specific attributes including contact person, hours of operation, etc.

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The capabilities detailed in this profile support consumer-centric queries such as finding “where is the closest youth mental health services clinic” or “what are the hours of a physiotherapist near my workplace”. In addition, mCSD supports crucial health system management workflows. This can include reporting and analyses, such as “what are my health human resource capacities, by facility, by cadre,” “what are all the services offered at this facility,” or conversely, “where are all the facilities that offer this service.” The mCSD Profile may be employed to support, for example, the Provider Queries listed by the US Office of the National Coordinator as part of the

330

Standards and Interoperability Framework (http://wiki.siframework.org/file/view/ESI_Query_and_Response.pdf).

335 The loosely coupled design and flexible querying capability of the mCSD Profile means it can be deployed within a variety of eHealth architectures and support a wide array of care workflows.

46.1 mCSD Actors, Transactions, and Content Modules

This section defines the actors, transactions, and/or content modules in this profile. General definitions of actors are given in the Technical Frameworks General Introduction Appendix A at https://www.ihe.net/resources/technical_frameworks/#GenIntro.

340 Figure 46.1-1 shows the actors directly involved in the mCSD Profile and the relevant transactions between them. If needed for context, other actors that may be indirectly involved due to their participation in other related profiles are shown in dotted lines. Actors which have a mandatory grouping are shown in conjoined boxes.

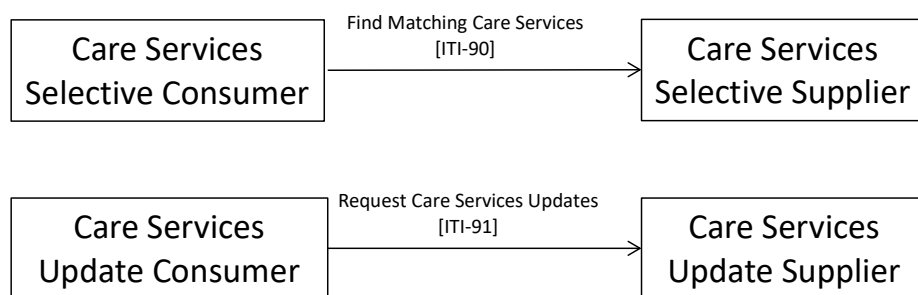


Figure 46.1-1: mCSD Actor Diagram

345 Table 46.1-1 lists the transactions for each actor directly involved in the mCSD Profile. To claim compliance with this profile, an actor shall support all required transactions (labeled “R”) and may support the optional transactions (labeled “O”).

Table 46.1-1: mCSD Profile - Actors and Transactions

Actors	Transactions	Optionality	Reference
Care Services Selective Consumer	Find Matching Care Services [ITI-90]	R	ITI TF-2c: 3.90
Care Services Selective Supplier	Find Matching Care Services [ITI-90]	R	ITI TF-2c: 3.90
Care Services Update Consumer	Request Care Services Updates [ITI-91]	R	ITI TF-2c: 3.91

Actors	Transactions	Optionality	Reference
Care Services Update Supplier	Request Care Services Updates [ITI-91]	R	ITI TF-2c: 3.91

46.1.1 Actor Descriptions and Actor Profile Requirements

350 Most requirements are documented in ITI TF-2 Transactions. This section documents any additional requirements on mCSD actors.

355 mCSD supports querying for Organization, Facility, Location, Practitioner, and Healthcare Service Resources. However, a Care Services Selective Supplier or Care Service Update Supplier is not required to contain data on all Resources. If a Supplier actor receives a query for a Resource that it does not support, it will return an empty result set.

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46.2 mCSD Actor Options

Options that may be selected for each actor in this profile, if any, are listed in the Table 46.2-1. Dependencies between options when applicable are specified in notes.

Table 46.2-1: mCSD - Actors and Options

Actor	Option Name	Reference
Care Services Selective Consumer	Organization Option (Note 1) Location Option (Note 1) Practitioner Option (Note 1) Healthcare Service Option (Note 1) Location Distance Option (Note 2)	Section 46.2.1 Section 46.2.2 Section 46.2.3 Section 46.2.4 Section 46.2.15
Care Services Selective Supplier	Organization Option (Note 1) Location Option (Note 1) Practitioner Option (Note 1) Healthcare Service Option (Note 1) Location Distance Option (Note 2)	Section 46.2.1 Section 46.2.2 Section 46.2.3 Section 46.2.4 Section 46.2.15
Care Services Update Consumer	No options defined Organization Option (Note 1)	Section 46.2.1
Care Services Update Supplier	No options defined Organization Option (Note 1)	Section 46.2.1

360 Note 1: The actor shall support at least one of these options.

Note 2: Any actor supporting the Location Distance Option shall also support the Location Option.

46.2.1 Organization Option

The Organization Option enables querying for Organization resources.

365 A Care Services Selective Consumer or Care Services Selective Supplier that supports the Organization Option will implement the semantics for the Organization Option of the Find Matching Care Services [ITI-90] transaction. See ITI TF-2c: 3.90.4.1.2.1 and ITI TF-2c: 3.90.4.2.2.1.

370 ~~A Care Services Update Consumer or Care Services Update Supplier that supports the Organization Option will implement the semantics for the Organization Option of the Request Care Services Updates [ITI-91] transaction. See ITI TF 2e: 3.91.4.2.2.1.~~

46.2.2 Location Option

~~The Location Option enables querying for Location resources.~~

375 ~~The Location may be used to record more than just a specific address. For example, the jurisdiction in which a community healthcare worker practices can be recorded as a Location in addition to an office-based Location.~~

~~A Care Services Selective Consumer or Care Services Selective Supplier that supports the Location Option will implement the semantics for the Location Option of the Find Matching Care Services [ITI-90] transaction. See ITI TF 2e: 3.90.4.1.2.2 and ITI TF 2e: 3.90.4.2.2.2.~~

380 ~~A Care Services Update Consumer or Care Services Update Supplier that supports the Location Option will implement the semantics for the Location Option of the Request Care Services Updates [ITI-91] transaction. See ITI TF 2e: 3.91.4.2.2.2.~~

46.2.3 Practitioner Option

~~The Practitioner Option enables querying for Practitioner and PractitionerRole resources.~~

385 ~~A Care Services Selective Consumer or Care Services Selective Supplier that supports the Practitioner Option will implement the semantics for the Practitioner Option of the Find Matching Care Services [ITI-90] transaction. See ITI TF 2e: 3.90.4.1.2.3, ITI TF 2e: 3.90.4.1.2.4, ITI TF 2e: 3.90.4.2.2.3, and ITI TF 2e: 3.90.4.2.2.4.~~

390 ~~A Care Services Update Consumer or Care Services Update Supplier that supports the Practitioner Option will implement the semantics for the Practitioner Option of the Request Care Services Updates [ITI-91] transaction. See ITI TF 2e: 3.91.4.2.2.3 and ITI TF 2e: 3.90.4.2.2.4.~~

46.2.4 Healthcare Service Option

~~The Healthcare Service Option enables querying for HealthcareService resources.~~

395 ~~A Care Services Selective Consumer or Care Services Selective Supplier that supports the Healthcare Service Option will implement the semantics for the Healthcare Service Option of the Find Matching Care Services [ITI-90] transaction. See ITI TF 2e: 3.90.4.1.2.5 and ITI TF 2e: 3.90.4.2.2.5.~~

400 ~~A Care Services Update Consumer or Care Services Update Supplier that supports the Healthcare Service Option will implement the semantics for the Healthcare Service Option of the Request Care Services Updates [ITI-91] transaction. See ITI TF 2e: 3.91.4.2.2.5.~~

46.2.15 Location Distance Option

The Location Distance Option enables querying Location resources based on relative distances.

~~The Location Distance Option requires that the Location Option is supported.~~

405 A Care Services Selective Consumer or Care Services Selective Supplier that supports the Location Distance Option will implement the semantics for the Location Distance Option of the Find Matching Care Services [ITI-90] transaction. See ITI TF-2c: 3.90.4.1.2.2 and ITI TF-2c: 3.90.4.2.2.2.

46.3 mCSD Required Actor Groupings

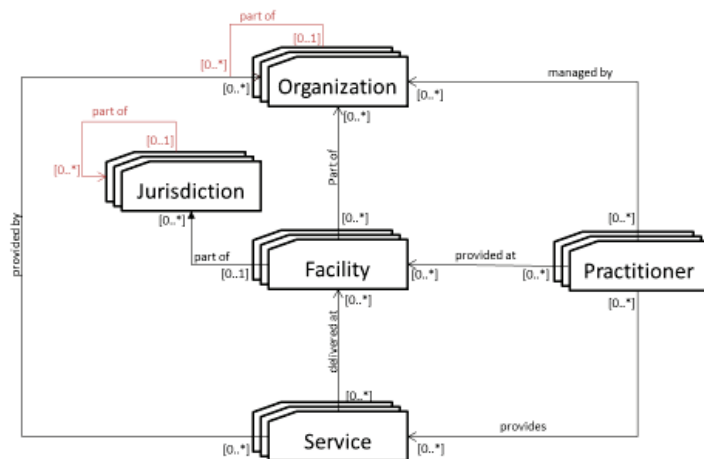
Table 46.3-1: mCSD - Required Actor Groupings

mCSD Actor	Actor to be grouped with	Reference	Content Bindings Reference
Care Services Selective Consumer	None	--	--
Care Services Selective Supplier	None	--	--
Care Services Update Consumer	None	--	--
Care Services Update Supplier	None	--	--

410 46.4 mCSD Overview

46.4.1 Concepts

The Mobile Care Services Discovery (mCSD) Profile supports queries for organizations, locations, facilities, practitioners, and healthcare services. The relationship between these entities is illustrated in Figure 46.4.1-1.



415

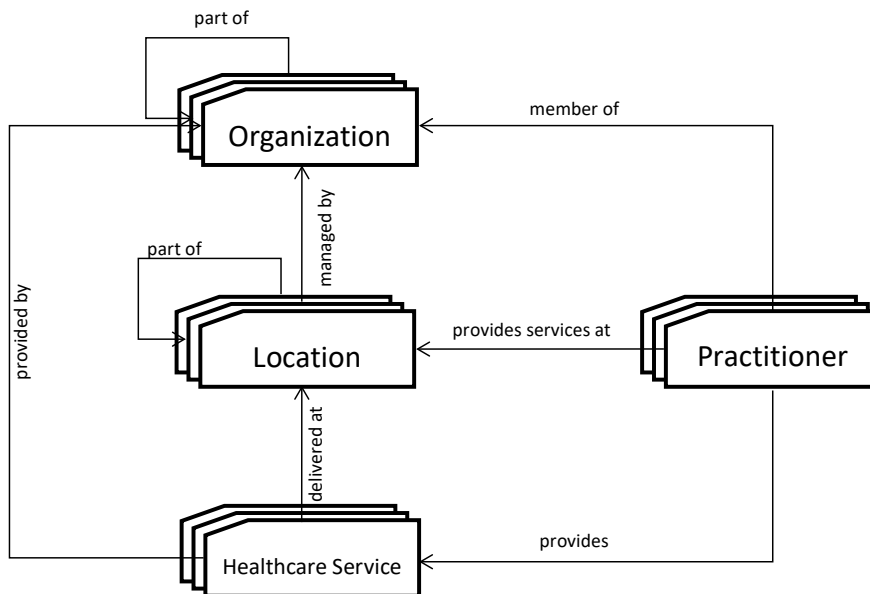


Figure 46.4.1-1: Top-level Relationships between Care Services Entities

46.4.1.1 Create, Update, and Delete Services

420 This profile enables tracking of changes to, searching for, and retrieval of, a set of resources. The creation, update, deletion and other maintenance activities of those resources is out of the scope of this profile.

46.4.2 Use Cases

46.4.2.1 Use Case #1: Practitioner Query

425 **46.4.2.1.1 Practitioner Query Use Case Description**

The patient, Vera Brooks, consults with her physician who recommends surgery. The physician can assist the patient in finding a suitable surgeon, taking into consideration the location and specialty of the surgeon.

46.4.2.1.2 Practitioner Query Process Flow

- 430
- Vera Brooks sees her family physician, Dr. West, regarding a recent knee injury.

- Dr. West diagnoses the problem as a torn ACL and decides to refer Vera to an orthopedic surgeon.
- Dr. West uses her EMR query tool, which implements a Care Services Selective Consumer to search for orthopedic surgeons within 30km of Vera’s home.
- 435 • The EMR retrieves the information from a Healthcare Worker Registry (HWR) and displays it to Dr. West.
- Vera and Dr. West decide on an orthopedic surgeon; Dr. West prepares a referral.

The interactions between the various actors in this use case are shown in Figure 46.4.2.1.2-1.

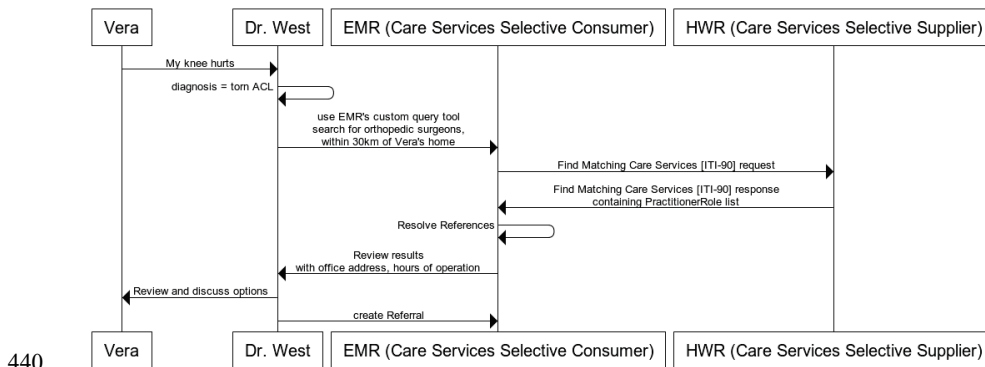


Figure 46.4.2.1.2-1: Provider Query Use Case

The text in Figure 46.4.2.1.2-2 was used to generate the diagram in Figure 46.4.2.1.2-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```
445 @startuml
Vera -> Dr. West: My knee hurts
Dr. West -> Dr. West: diagnosis = torn ACL
Dr. West -> EMR (Care Services Selective Consumer): use EMR's custom query tool \nsearch for
450 orthopedic surgeons, \nwithin 30km of Vera's home
EMR (Care Services Selective Consumer) -> HWR (Care Services Selective Supplier): Find Matching
Care Services [ITI-90] request
HWR (Care Services Selective Supplier) -> EMR (Care Services Selective Consumer): Find Matching
455 Care Services [ITI-90] response\ncontaining PractitionerRole list
EMR (Care Services Selective Consumer) -> EMR (Care Services Selective Consumer) : Resolve
References
EMR (Care Services Selective Consumer) -> Dr. West : Review results\nwith office address, hours
460 of operation
Dr. West -> Vera: Review and discuss options
Dr. West -> EMR (Care Services Selective Consumer): create Referral
@enduml
```

Figure 46.4.2.1.2-2: Provider Query Use Case Diagram Pseudocode

46.4.2.2 Use Case #2: Provider Lookup During an Emergency Event

46.4.2.2.1 Provider Lookup During an Emergency Event Use Case Description

During an emergency event, medical volunteers may report to assist. At an emergency site, the mCSD service can be queried to quickly identify and grant permission to credentialed providers to enter the scene.

470 During Hurricane Katrina, health care volunteers were turned away from disaster sites because there was no means available to verify their credentials. During the Ebola outbreak in West Africa, it was unclear which health workers were available and had been trained in clinical care techniques.

Resources from jurisdictional areas can be reported up to a central location so there is a single point of access. This would make it easier for responders on location to verify the credentials of a reporting health worker.

46.4.2.2.2 Provider Lookup During an Emergency Event Process Flow

- A jurisdictional (state/district) Care Services Update Supplier will provide data to a central Care Services Update Consumer (National HIE).
- The National HIE will be a Care Services Update Consumer grouped with a Care Services Selective Supplier.
- An emergency responder (e.g., police on site controlling access) can use a Care Services Selective Consumer to validate the credentials of a reporting health worker from the central Care Services Update Supplier.
- Based on the result, the emergency responder can allow or deny access to the reporting health worker.

The interactions between the various actors in this use case are shown in Figure 46.4.2.2-1.

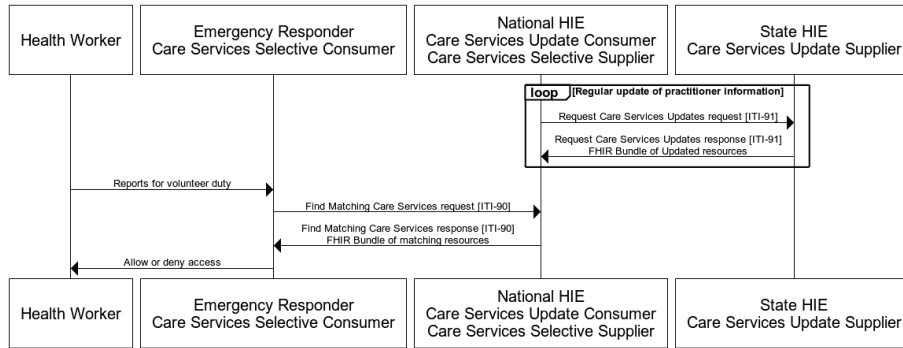


Figure 46.4.2.2.2-1: Federated Data Site Management Workflow

490 The text in Figure 46.4.2.2.2-2 was used to generate the diagram in Figure 46.4.2.2.2-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```

495 @startuml
496 participant Health Worker
497 participant Emergency Responder\nCare Services Selective Consumer
498 participant National HIE\nCare Services Update Consumer\nCare Services Selective Supplier
499 participant State HIE\nCare Services Update Supplier
500
501 loop Regular update of practitioner information
502 National HIE\nCare Services Update Consumer\nCare Services Selective Supplier -> State HIE\nCare Services Update Supplier : Request Care Services Updates request [ITI-91]
503 State HIE\nCare Services Update Supplier -> National HIE\nCare Services Update Consumer\nCare Services Selective Supplier : Request Care Services Updates response [ITI-91]\nFHIR Bundle of Updated resources
504 end
505
506 Health Worker -> Emergency Responder\nCare Services Selective Consumer : Reports for volunteer duty
507 Emergency Responder\nCare Services Selective Consumer -> National HIE\nCare Services Update Consumer\nCare Services Selective Supplier : Find Matching Care Services request [ITI-90]
508 National HIE\nCare Services Update Consumer\nCare Services Selective Supplier -> Emergency Responder\nCare Services Selective Consumer : Find Matching Care Services response [ITI-90]\nFHIR Bundle of matching resources
509 Emergency Responder\nCare Services Selective Consumer -> Health Worker : Allow or deny access
510
511 @enduml
    
```

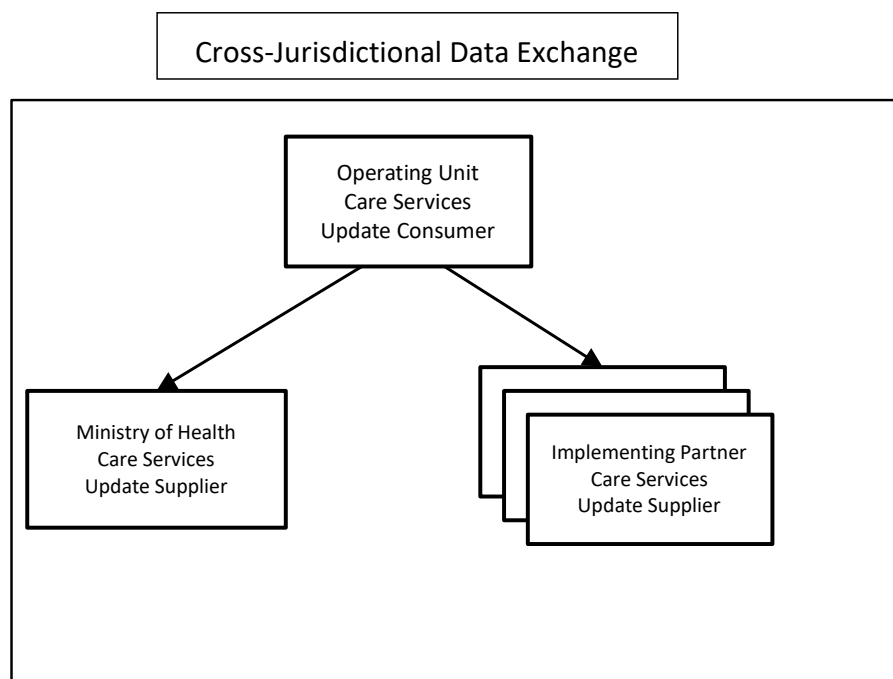
Figure 46.4.2.2.2-2: Federated Data Site Management Workflow Diagram Pseudocode

46.4.2.3 Use Case #3: Cross-jurisdictional Site Management

46.4.2.3.1 Cross-jurisdictional Site Management Description

520 Projects like the U.S. President's Emergency Plan for AIDS Relief (PEPFAR)'s Data for Accountability, Transparency, and Impact (DATIM) need to have public health and service delivery indicators reported from a large number of sites (health facilities, communities, warehouses) within an Operating Unit (country/region). Within an Operating Unit, there are

525 multiple, possibly overlapping, jurisdictions in operation which are managed by multiple organizations (e.g., ministries of health (MoH), faith based organizations, international non-governmental organizations). The project needs to receive indicator submissions from pre-existing data systems hosted by these organizations. This data exchange requires a way to share site lists and implement identifier mapping between the sites in these lists.



530 **Figure 46.4.2.3.1-1: Cross-Jurisdictional Data Exchange**

46.4.2.3.2 Cross-jurisdictional Site Management Process Flow

535 An Operating Unit (OU) will run a Care Services Update Consumer and Care Services Update Supplier for a specific geographic area (e.g., country). This Update Consumer will query other organizations (ministries of health, partners) operating in the geographic area to get updated site data for the sites managed by the OU.

- An OU Update Consumer will query a sub-unit Care Services Update Suppliers (e.g., MoH) to get an updated list of sites under the sub-unit.

- An OU Update Consumer will query a sub unit Care Services Update Suppliers (e.g., partner) to get an updated list of sites under the sub-unit.
- The OU Update Consumer will use entity matching to determine if there are duplicated sites in the combined data and flag them for review. (See <https://wiki.ohie.org/display/documents/OpenHIE+Entity+Matching+Service>)

The interactions between the various actors in this use case are shown in Figure 46.4.2.3.2-1.

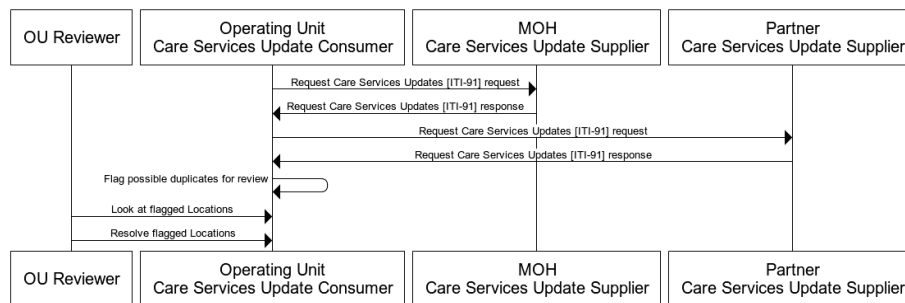


Figure 46.4.2.3.2-1: Cross-jurisdictional Site Management Workflow

The text in Figure 46.4.2.3.2-2 was used to generate the diagram in Figure 46.4.2.3.2-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```

550 @startuml
    participant OU Reviewer
    participant Operating Unit\nCare Services Update Consumer
    participant MOH\nCare Services Update Supplier
    participant Partner\nCare Services Update Supplier
555
    Operating Unit\nCare Services Update Consumer->MOH\nCare Services Update Supplier: Request Care
    Services Updates [ITI-91] request
    MOH\nCare Services Update Supplier->Operating Unit\nCare Services Update Consumer: Request Care
    Services Updates [ITI-91] response
560
    Operating Unit\nCare Services Update Consumer->Partner\nCare Services Update Supplier: Request
    Care Services Updates [ITI-91] request
    Partner\nCare Services Update Supplier->Operating Unit\nCare Services Update Consumer: Request
    Care Services Updates [ITI-91] response
565
    Operating Unit\nCare Services Update Consumer->Operating Unit\nCare Services Update Consumer:
    Flag possible duplicates for review
    OU Reviewer->Operating Unit\nCare Services Update Consumer: Look at flagged Locations
    OU Reviewer->Operating Unit\nCare Services Update Consumer: Resolve flagged Locations
570
    @enduml@startuml
    participant OU Reviewer
    participant Operating Unit\nCare Services Update Consumer
    participant MOH\nCare Services Update Supplier
    participant Partner\nCare Services Update Supplier
575
    Operating Unit\nCare Services Update Consumer->MOH\nCare Services Update Supplier: Request Care
    Services Updates [ITI-91] request\nLocation option
    MOH\nCare Services Update Supplier->Operating Unit\nCare Services Update Consumer: Request Care
    Services Updates [ITI-91] response\nBundle of FHIR Locations
580
    Operating Unit\nCare Services Update Consumer->Partner\nCare Services Update Supplier: Request
    Care Services Updates [ITI-91] request\nLocation option
    Partner\nCare Services Update Supplier->Operating Unit\nCare Services Update Consumer: Request
    Care Services Updates [ITI-91] response\nBundle of FHIR Locations
585
    Operating Unit\nCare Services Update Consumer->Operating Unit\nCare Services Update Consumer:
    Flag possible duplicates for review
    OU Reviewer->Operating Unit\nCare Services Update Consumer: Look at flagged Locations
    OU Reviewer->Operating Unit\nCare Services Update Consumer: Resolve flagged Locations
    @enduml
    
```

Figure 46.4.2.3.2-2: Cross-jurisdictional Site Management Workflow Diagram Pseudocode

590 **46.4.2.4 Use Case #4: Master Facility List**

46.4.2.4.1 Master Facility List Description

595 A developing country has decided to implement a Master Facility List (MFL) based on recommendations from the WHO in the MFL Resource Package (https://www.who.int/healthinfo/country_monitoring_evaluation/mfl/en/). This resource includes a minimum data set to uniquely identify, location, and contact a specific facility. Since this will be a single source of information for the country, there may be differing hierarchies that need to be supported for the facilities. For example, one hierarchy would be the administrative hierarchy for the country (region, district, county). Another would be the supply chain hierarchy where hubs may be located separately from administrative regions. Yet another could be a reporting hierarchy used to send data to international organizations.

46.4.2.4.2 Master Facility List Process Flow

600 A Master Facility List (MFL) will run a Care Services Update Supplier and Care Services

605 Selective Supplier for an entire country. A Human Resources Information System (HRIS) will run a Care Services Update Consumer to retrieve the list of facilities. A Logistics Management Information System (LMIS) will run a Care Services Update Consumer to retrieve the list of facilities.

- An HRIS will query the MFL for an updated list of facilities where Practitioners can provide care.
- An LMIS will query the MFL for an updated list of facilities for the supply chain to deliver health care supplies.
- The MFL will return updated facilities to each of these systems with multiple hierarchies.

The interactions between the various actors in this use case are shown in Figure 46.4.2.4.1-1.

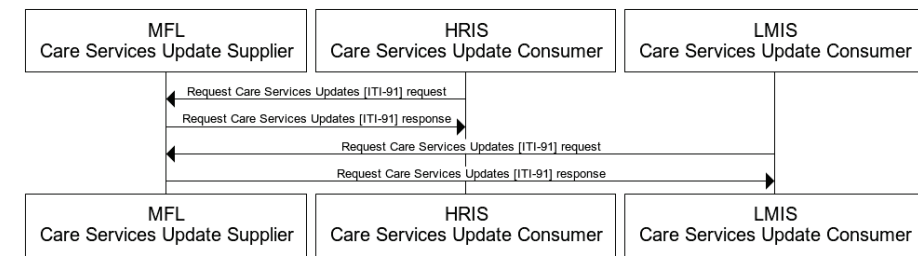


Figure 46.4.2.4.2-1: Master Facility List Workflow

615 The text in Figure 46.4.2.4.2-2 was used to generate the diagram in Figure 46.4.2.4.2-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```

@startuml
participant MFL as MFL\Care Services Update Supplier
participant HRIS as HRIS\Care Services Update Consumer
participant LMIS as LMIS\Care Services Update Consumer

HRIS\Care Services Update Consumer->>MFL\Care Services Update Supplier: Request Care Services Updates [ITI-91] request
MFL\Care Services Update Supplier->>HRIS\Care Services Update Consumer: Request Care Services Updates [ITI-91] response

LMIS\Care Services Update Consumer->>MFL\Care Services Update Supplier: Request Care Services Updates [ITI-91] request
MFL\Care Services Update Supplier->>LMIS\Care Services Update Consumer: Request Care Services Updates [ITI-91] response
@enduml
    
```

Figure 46.4.2.4.2-2: Master Facility List Workflow Diagram Pseudocode

46.5 mCSD Security Considerations

635 The resources exchanged in this profile may contain information which pose a privacy risk, or in some cases, a safety risk, to providers and other personnel, as well as patients. For example,

practitioner phone numbers and home addresses may be conveyed. Implementers should determine what data will be exposed by the system and what level of public access there will be if any.

640 There are many reasonable methods of security for interoperability transactions which can be implemented without modifying the characteristics of the transactions in the mCSD Profile. The use of TLS is encouraged, specifically the use of the ATNA Profile (see ITI TF-1:9).

645 User authentication on mobile devices and browsers is typically handled by more lightweight authentication schemes such as HTTP Authentication, OAuth 2.0, or OpenID Connect. IHE has a set of profiles for user authentication including Internet User Authentication (IUA) for REST-based authentication. The network communication security and user authentication are layered in the HTTP transport layer.

46.6 mCSD Cross Profile Considerations

46.6.1 Aggregate Data Exchange – ADX

650 The IHE QRPH Aggregate Data Exchange (ADX) Profile enables reporting of public health and service delivery indicators in various locations. A reporting system may play the role of a Care Services Update Consumer to ensure that it has an updated list of the resources for the reporting locations.

655 Additionally, a service that contains information on practitioners (and may be a Care Services Selective Supplier or Care Services Update Supplier) can also be used to generate an ADX message to satisfy the use case of a district health manager running an aggregate report on staffing levels by facility and health worker type from the ITI Care Services Discovery (CSD) Profile.

46.6.2 Care Services Discovery – CSD

660 A Care Services Directory in the CSD Profile can be grouped with the Care Services Update Supplier from mCSD. The CSD Care Services InfoManager could implement the mCSD Care Services Update Consumer and the Care Services Selective Supplier Actors. The CSD Service Finder could implement the mCSD Care Services Selective Consumer. This enables the CSD actors to allow RESTful transactions without having to change the underlying data store.

46.6.3 Health Provider Directory – HPD

670 A Provider Information Source in HPD can also implement the Care Services Update Supplier from mCSD. Note that in this case the Provider Information Source would be queried for updates instead of pushing the updates to the Consumer. The HPD Provider Information Directory could implement the mCSD Care Services Update Consumer and the Care Services Selective Supplier Actors. The HPD Provider Information Consumer could implement the mCSD Care Services Selective Consumer. This enables the HPD actors to allow RESTful transactions without having to change the underlying data store.

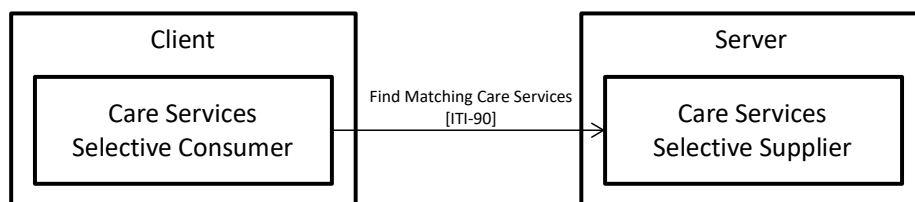
46.6.4 Mobile Alert Communication Management – mACM

675 The mACM Profile defines the means to send an alert to practitioners. The mCSD Profile provides a way to query that list of practitioners. A mACM Alert Reporter can be grouped with a Care Services Update Consumer or a Care Services Selective Consumer to ensure that it has an updated list of practitioners.

46.7 mCSD Deployment Considerations

46.7.1 Simple Deployment

680 A deployment may only have a single server that will maintain a list of resources based on the supported options (Organization, Location, Practitioner, and/or Healthcare Service). In this case, you would only need the Care Services Selective Supplier (or Care Services Update Supplier) to send search results back to one or more Care Services Selective Consumers (or Care Services Update Consumer). See Figure 46.7.1-1.



685 **Figure 46.7.1-1: Simple Deployment**

46.7.2 Federated and Cross-Jurisdictional Deployments

A Federated Deployment has multiple levels of the Care Services Update Suppliers linked to Care Services Update Consumers. These Update Consumers may also support being Care Services Update Suppliers so that higher level Update Consumers can receive their updates.

690 They may also support being a Care Services Selective Supplier so that Selective Consumer clients can query that level of information. See Figure 46.7.2-1.

Interrelated content is maintained by the Care Services Update Consumer. The Care Services Update Consumer routinely obtains new or updated content from Care Services Update Suppliers by polling them. These updates may refresh a data cache which the Update Consumer maintains. 695 The Update Consumer's cache is refreshed at an appropriate interval specified by the implementing jurisdiction. The implementing jurisdiction will consider the implications of out of date information when setting the refresh interval between cache updates. The normal delays in updating listings will also be part of this consideration.

700 The various data sources would maintain definitive data regarding one or more of: Organization, Location, Healthcare Service, or Practitioner and implement the Care Services Update Supplier.

705 These Care Services Update Suppliers would respond to a Care Services Update Consumer's request for new or updated content since a specified date and time. To support this capability, a Care Services Update Supplier should support time stamped updates. Data elements that are deprecated should not simply be deleted, but rather are updated to an appropriate status indicating their deprecation.

710 This deployment may also have cross-jurisdictional considerations if any of the Update Suppliers have overlap in the data they manage. In this instance, the Care Services Update Consumer would need to resolve any conflicts before sharing this information as either a Care Services Update Supplier or a Care Services Selective Supplier. The way in which these conflicts are resolved is defined by the implementing jurisdiction of the Care Services Update Consumer.

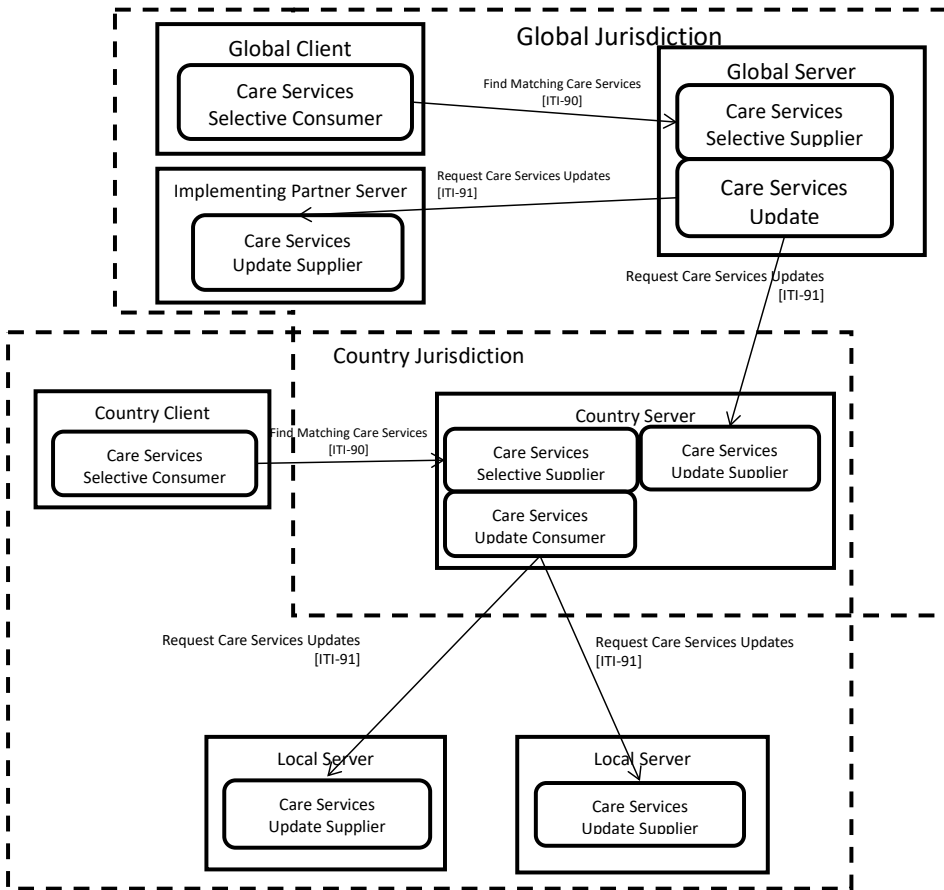


Figure 46.7.2-1: Federated and Cross Jurisdictional Deployment

715 The Care Services Selective Consumer is the actor that queries for information about interrelated care services. These queries are sent to the Care Services Selective Supplier who develops a response based on the content in its local data store. When a Care Services Selective Supplier is combined with a Care Services Update Consumer (Global and Country servers from Figure 46.7.2-1), it should maintain a cache of the aggregated information from all the configured Care Services Update Suppliers it is linked to.

720 In order for the Care Services Update Consumer's (Global and Country servers) cached content to be able to serve its role as an interlinked data source, the following conditions should be met by Care Services Update Suppliers who maintain content.

- 725 1. Implementing jurisdictions may mandate terminologies for Organization Type, Service Type, Location Type, Location Status, Practitioner Type, Practitioner Status, Contact Point Type, Credential Type, Specialization Code, and language code. Care Services Update Suppliers would be configurable to use these terminologies, where mandated. In the case of a cross jurisdictional deployment, mapping between the terminology used by the various jurisdictions may need to be maintained.
- 730 2. Implementing jurisdictions may mandate conventions regarding the types, components and formatting of Name, Address and Address Line elements. Care Services Update Suppliers would be configurable to use these formatting conventions, where mandated.
- 735 3. Implementing jurisdictions may mandate the source of truth regarding Organization ID, Healthcare Service ID, Location ID and Practitioner ID. Care Services Update Suppliers would ensure that all cross referenced IDs match corresponding resources in the jurisdictionally mandated sources of truth.

735 For guidance on handling challenges regarding the representation of names across multiple languages and in different cultures, refer to the ITI TF-2a: 3.24.5.2.3.1. This section in the ITI Technical Framework describes the use of the language tag as documented in IETF RFC1766 and the HL7 XCN name data type.

46.7.2.1 Terminology Services

740 All referenced terminologies from a Care Services Selective Supplier or Care Services Update Supplier may be pre-coordinated or they may be resolvable from one or more terminology services. Though it is out of scope of the mCSD Profile to define the means of interacting with a terminology service, this could be provided, for example, through the Sharing Value Sets (SVS) Profile or using appropriate FHIR resources (e.g., ValueSet).

745

Volume 2 – Transactions

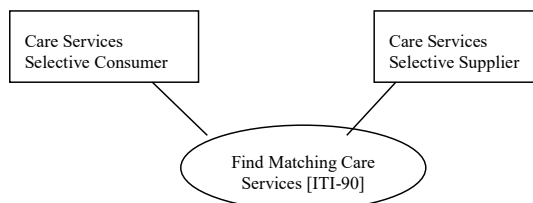
Add Section 3.90

3.90 Find Matching Care Services [ITI-90]

3.90.1 Scope

750 The Find Matching Care Services transaction returns a list of matching care services resources based on the query sent. A Care Services Selective Consumer initiates a Find Matching Care Services transaction against a Care Services Selective Supplier.

3.90.2 Actor Roles



755 **Figure 3.90.2-1: Use Case Diagram**

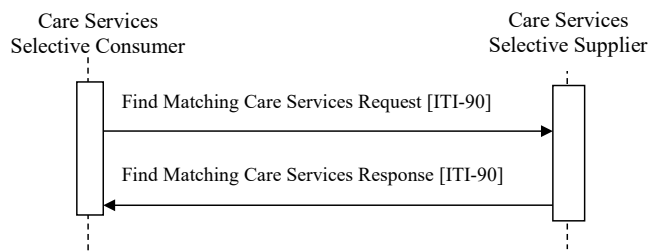
Table 3.90.2-1: Actor Roles

Actor:	Care Services Selective Consumer
Role:	Requests a list of resources from the Care Services Selective Supplier based on query parameters
Actor:	Care Services Selective Supplier
Role:	Accepts the query request and returns a list of matching resources.

3.90.3 Referenced Standards

- 760
- HL7 FHIR standard Release 4 <http://hl7.org/fhir/R4/index.html>
 - JSON – IETF RFC7159
 - XML
 - HTTP 1.1

3.90.4 Interaction Diagram



3.90.4.1 Find Matching Care Services Request Message

765 The Find Matching Care Services message is a FHIR search operation on the Organization, Location, Practitioner, PractitionerRole, and/or HealthcareService Resources.

3.90.4.1.1 Trigger Events

A Care Services Selective Consumer triggers a Find Matching Care Services Request to a Care Services Selective Supplier according to the business rules for the query. These business rules are outside the scope of this transaction.

3.90.4.1.2 Message Semantics

775 A Care Services Selective Consumer initiates a search request using HTTP GET as defined at <http://hl7.org/fhir/R4/http.html#search> on the Organization, Location, Practitioner, PractitionerRole, or HealthcareService Resources ~~depending on which Option is supported~~. The query parameters are identified below. A Care Services Selective Consumer may query any combination or subset of the parameters.

A Care Services Selective Supplier shall support combinations of search parameters as defined at <http://hl7.org/fhir/R4/search.html#combining>, “Composite Search Parameters.”

780 A Care Services Selective Supplier shall support responding to a request for both the JSON and the XML messaging formats as defined in FHIR. A Care Services Selective Consumer shall accept either the JSON or the XML messaging formats as defined in FHIR. See ITI TF-2x: Appendix Z.6 for more details.

785 A Care Services Selective Supplier shall implement the parameters described below. A Care Services Selective Supplier may choose to support additional query parameters beyond the subset listed below. Any additional query parameters supported shall be supported according to the core FHIR specification.

See ITI TF-2x: Appendix W for informative implementation material for this transaction.

3.90.4.1.2.1 Common Parameters

790 The Care Services Selective Supplier shall support the `:contains` and `:exact` modifiers in all of the string query parameters below.

The Care Services Selective Supplier shall support the following search parameters as defined at <http://hl7.org/fhir/R4/search.html#all>.

795 `_id`
`_lastUpdated`
`_profile`

The Care Services Selective Supplier shall also support the following prefixes for the `_lastUpdated` parameter: `gt`, `lt`, `ge`, `le`, `sa`, and `eb`.

3.90.4.1.2.2 Organization ~~Option-Resource~~ Message Semantics

800 The Care Services Selective Supplier ~~supporting the Organization Option~~ shall support the following search parameters on the `Organization` Resource as defined at <http://hl7.org/fhir/R4/organization.html#search>. String parameter modifiers are defined at <http://hl7.org/fhir/R4/search.html#string>. ~~The `ihe-mcsd-hierarchy-*` search parameters query the hierarchy extension defined at http://ihe.net/fhir/StructureDefinition/IHE_mCSD_hierarchy_extension for additional organizational hierarchies.~~

805

`active`
`identifier`
`name`
810 `partof`
`partof:above`
`partof:below`
`type`
`partof.identifier`
815 `partof.name`

`_revInclude=Location:managingOrganization`
`ihe-mcsd-hierarchy-type`
`ihe-mcsd-hierarchy-partof`
`ihe-mcsd-hierarchy-partof:above`
820 `ihe-mcsd-hierarchy-partof:below`

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3.90.4.1.2.3 Location ~~Option-Resource~~ Message Semantics

The Care Services Selective Supplier ~~supporting the Location Option~~ shall support the following search parameters on the Location Resource as defined at

825 <http://hl7.org/fhir/R4/location.html#search>. String parameter modifiers are defined at <http://hl7.org/fhir/R4/search.html#string>.

identifier

name

organization

830 partof

~~partof:above~~

~~partof:below~~

status

type

835 partof.identifier

partof.name

~~If the Care Services Selective Supplier also supports the Organization Option, it shall support the following search parameters on the Location Resource.~~

organization.active

840 organization.identifier

organization.name

~~_include=Location:managingOrganization~~

3.90.4.1.2.4 Practitioner ~~Option-Resource~~ Message Semantics

The Care Services Selective Supplier ~~supporting the Practitioner Option~~ shall support the following search parameters on the Practitioner Resource as defined at

845 <http://hl7.org/fhir/R4/practitioner.html#search>. String parameter modifiers are defined at <http://hl7.org/fhir/R4/search.html#string>.

active

identifier

850 name

given

family

3.90.4.1.2.5 PractitionerRole Resource Message Semantics

The Care Services Selective Supplier

855 ~~It~~ shall ~~also~~ support the following search parameters on the PractitionerRole Resource as defined at <http://hl7.org/fhir/R4/practitionerrole.html#search>.

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active
location
organization
860 practitioner
role
service
specialty
practitioner.identifier
865 practitioner.name
practitioner.given
practitioner.family
_include=PractitionerRole:practitioner

870 ~~If the Care Services Selective Supplier also supports the Organization Option, it shall support the following search parameters on the PractitionerRole Resource.~~

organization.active
organization.identifier
organization.name

875 ~~If the Care Services Selective Supplier also supports the Location Option, it shall support the following search parameters on the PractitionerRole Resource.~~

location.status
location.identifier
location.name

880 ~~If the Care Services Selective Supplier also supports the Healthcare Service Option, it shall support the following search parameters on the PractitionerRole Resource.~~

885 service.active
service.identifier
service.location
service.name
service.organization

3.90.4.1.2.65 Healthcare-Service ~~Option-Resource~~ Message Semantics

The Care Services Selective Supplier ~~supporting the Healthcare Service Option~~ shall support the following search parameters on the HealthcareService Resource as defined at <http://hl7.org/fhir/R4/healthcareservice.html#search>. String parameter modifiers are defined at <http://hl7.org/fhir/R4/search.html#string>.

890 active

identifier
location
name
895 organization
service-type

~~If the Care Services Selective Supplier also supports the Organization Option, it shall support the following search parameters on the HealthcareService Resource.~~

900 organization.active
organization.identifier
organization.name

~~If the Care Services Selective Supplier also supports the Location Option, it shall support the following search parameters on the HealthcareService Resource.~~

905 location.status
location.identifier
location.name

3.90.4.1.2.76 Location Distance Option Message Semantics

910 The Care Services Selective Supplier supporting the Location Distance Option shall support the following search parameters on the Location Resource as defined at <http://hl7.org/fhir/R4/location.html#search>.

near

3.90.4.1.3 Expected Actions

915 The Care Services Selective Supplier shall process the query to discover the resources that match the search parameters given, and return a response as per Section 3.90.4.2 or an error as per <http://hl7.org/fhir/R4/search.html#errors>.

3.90.4.2 Find Matching Care Services Response Message

3.90.4.2.1 Trigger Events

920 The Care Services Selective Supplier sends the Find Matching Care Services Response to the Care Services Selective Consumer when results to the query are ready.

3.90.4.2.2 Message Semantics

925 The Care Services Selective Supplier shall support the search response message as defined at <http://hl7.org/fhir/R4/http.html#search> on the following resources depending on the supported options.

- Organization, as defined at <http://hl7.org/fhir/R4/organization.html>

- Location, as defined at <http://hl7.org/fhir/R4/location.html>
- Practitioner, as defined at <http://hl7.org/fhir/R4/practitioner.html>
- PractitionerRole, as defined at <http://hl7.org/fhir/R4/practitionerrole.html>
- 930 • HealthcareService, as defined at <http://hl7.org/fhir/R4/healthcareservice.html>

All References (reference.reference element) to Resources defined in this transaction shall be populated with an accessible URL (see <https://www.hl7.org/fhir/references-definitions.html#Reference.reference>), unless the referenced resource is not present on a server accessible to the client.

3.90.4.2.2.1 FHIR Organization Resource Constraints

A Care Services Selective Consumer and a Care Services Selective Supplier shall query or return an Organization Resource ~~when supporting the Organization Option~~. The Organization Resource shall be further constrained as described in Table 3.90.4.2.2.1-1. The Element column in Table 3.90.4.2.2.1-1 references the object model defined at <http://hl7.org/fhir/R4/organization.html#resource>.

If the Organization belongs to a single hierarchy, the part-of element shall be used. If the Organization belongs to additional hierarchies (such as funding source), the extension at http://ihe.net/fhir/StructureDefinition/IHE_mCSD_hierarchy_extension shall be used for the additional hierarchies. This extension defines a hierarchy-type code (e.g., funding) and part-of, a reference to the parent Organization.

Table 3.90.4.2.2.1-1: Organization Resource Constraints

Element & Cardinality	Data Type
<u>meta.profile</u> [1..*]	<u>There shall be at least one entry with the value:</u> <u>http://ihe.net/fhir/StructureDefinition/IHE_mCSD_Organization</u>
type [1..*]	<u>A code that describes the type of Organization.</u> CodeableConcept
name [1..1]	string

Element & Cardinality	Data Type
<u>extension</u> [0..*]	<p><u>If there are additional hierarchies, include the extension with the following details:</u></p> <p><u>url =</u> "http://ihe.net/fhir/StructureDefinition/IHE_mCSD_hierarchy_extension"</p> <p><u>hierarchy-type = valueCodeableConcept</u></p> <p><u>part-of = valueReference(Organization)</u></p>

950 A Care Services Selective Consumer and a Care Services Selective Supplier shall query or return a FHIR Organization Resource when working with Facilities. In addition to the constraints in 3.90.4.2.2.1, the FHIR Organization Resource shall be further constrained as described in Table 3.90.4.2.2.1-2. The Element column in Table 3.90.4.2.2.1-2 references the object model defined at <http://hl7.org/fhir/R4/organization.html#resource>.

Table 3.90.4.2.2.1-2: Organization Resource Constraints for Facilities

<u>Element & Cardinality</u>	<u>Data Type</u>
<u>meta.profile</u> [2..*]	<p><u>In addition, there shall be one entry with the value:</u> http://ihe.net/fhir/StructureDefinition/IHE_mCSD_FacilityOrganization</p>
<u>type</u> [2..*]	<p><u>In addition, there shall be one type with the following value:</u> <u>system = "urn:ietf:rhc:3986"</u> <u>code = "urn:ihe:iti:mcsd:2019:facility"</u></p>

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3.90.4.2.2.2 FHIR Location Resource Constraints

960 A Care Services Selective Consumer and a Care Services Selective Supplier shall query or return a Location Resource ~~when supporting the Location Option~~. The Location Resource shall be further constrained as described in Table 3.90.4.2.2.2-1. The Element column in Table 3.90.4.2.2.2-1 references the object model defined at <http://hl7.org/fhir/R4/location.html#resource>.

Table 3.90.4.2.2.2-1: Location Resource Constraints

Element & Cardinality	Data Type
meta.profile [1..*]	There shall be at least one entry with the value: http://ihe.net/fhir/StructureDefinition/IHE_mCSD_Location
type [1..*]	A code that describes the type of Organization . CodeableConcept
physicalType [1..1]	A code that describes the physical type of Organization . CodeableConcept
name [1..1]	string
status [1..1]	code (active suspended inactive)

965

When the resource is a Facility, the Location resource must be paired with an [Organization Resource](#) using the [managingOrganization](#) element in Location. A Care Services Selective Consumer and a Care Services Selective Supplier shall query or return a FHIR [Location Resource](#) when working with Facilities. In addition to the constraints in 3.90.4.2.2.2, the FHIR [Location Resource](#) shall be further constrained as described in Table 3.90.4.2.2.2-2. The [Element](#) column in Table 3.90.4.2.2.2-2 references the object model defined at <http://hl7.org/fhir/R4/location.html#resource>.

970

Table 3.90.4.2.2.2-2: Location Resource Constraints for Facilities

Element & Cardinality	Data Type
meta.profile [2..*]	In addition, there shall be one entry with the value: http://ihe.net/fhir/StructureDefinition/IHE_mCSD_FacilityLocation
type [2..*]	In addition, there shall be one type with the following value: system = "urn:ietf:rhc:3986" code = "urn:ihe:iti:mcsd:2019:facility"

<u>Element & Cardinality</u>	<u>Data Type</u>
<u>managingOrganization</u> [1..1]	The reference to the Organization resource for this facility. <u>Reference (Organization)</u>

975 When supporting the Location Distance Option. The Location Resource shall be further constrained as described in Table 3.90.4.2.2.2-32. The Element column in Table 3.90.4.2.2.2-32 references the object model defined at <http://hl7.org/fhir/R4/location.html#resource>.

Table 3.90.4.2.2.2-32: Location Resource Constraints with Location Distance Option

<u>Element & Cardinality</u>	<u>Data Type</u>
<u>meta.profile</u> [2..*]	There shall be at least one entry with the value: <u>http://ihe.net/fhir/StructureDefinition/IHE_mCSD_LocationDistance</u>
position [1..1]	BackboneElement

3.90.4.2.2.3 FHIR Practitioner Resource Constraints

980 A Care Services Selective Consumer and a Care Services Selective Supplier shall query or return a Practitioner Resource ~~when supporting the Practitioner Option~~. The Practitioner Resource shall be further constrained as described in Table 3.90.4.2.2.3-1. The Element column in Table 3.90.4.2.2.3-1 references the object model defined at <http://hl7.org/fhir/R4/practitioner.html#resource>.

Table 3.90.4.2.2.3-1: Practitioner Resource Constraints

<u>Element & Cardinality</u>	<u>Data Type</u>
<u>meta.profile</u> [1..*]	There shall be at least one entry with the value: <u>http://ihe.net/fhir/StructureDefinition/IHE_mCSD_Practitioner</u>
name [1..*]	HumanName

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3.90.4.2.2.4 FHIR PractitionerRole Resource Constraints

A Care Services Selective Consumer and a Care Services Selective Supplier shall query or return a PractitionerRole Resource ~~when supporting the Practitioner Option~~. The

990

PractitionerRole Resource shall be further constrained as described in Table 3.90.4.2.2.4-1. The Element column in Table 3.90.4.2.2.4-1 references the object model defined at <http://hl7.org/fhir/R4/practitionerrole.html#resource>.

Table 3.90.4.2.2.4-1: PractitionerRole Resource Constraints

Element & Cardinality	Data Type
meta.profile [1..*]	<u>There shall be at least one entry with the value:</u> http://ihe.net/fhir/StructureDefinition/IHE_mCSD_PractitionerRole
code [1..*]	CodeableConcept

3.90.4.2.2.5 FHIR HealthcareService Resource Constraints

995

A Care Services Selective Consumer and a Care Services Selective Supplier shall query or return a HealthcareService Resource ~~when supporting the Healthcare Service Option~~. The

HealthcareService Resource shall be further constrained as described in Table 3.90.4.2.2.5-1. The Element column in Table 3.90.4.2.2.5-1 references the object model defined at <http://hl7.org/fhir/R4/healthcareservice.html#resource>.

1000

Table 3.90.4.2.2.5-1: HealthcareService Resource Constraints

Element & Cardinality	Data Type
meta.profile [1..*]	<u>There shall be at least one entry with the value:</u> http://ihe.net/fhir/StructureDefinition/IHE_mCSD_HealthcareService
type [1..*]	CodeableConcept

Element & Cardinality	Data Type
name [1..1]	string

3.90.4.2.3 Expected Actions

The Care Services Selective Consumer has received the response and continues with its workflow.

1005 3.90.5 Security Considerations

See ITI TF-1: 46.5 for security considerations for the mCSD Profile.

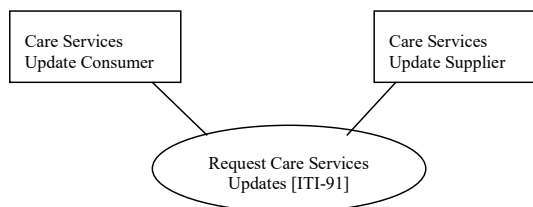
See ITI TF-2x: Appendix Z.8 for common mobile security considerations.

3.91 Request Care Services Updates [ITI-91]

3.91.1 Scope

1010 The Request Care Services Updates transaction is used to return a list of updated care services resources. A Care Services Update Consumer initiates a Request Care Services Updates transaction against a Care Services Update Supplier.

3.91.2 Actor Roles



1015 **Figure 3.91.2-1: Use Case Diagram**

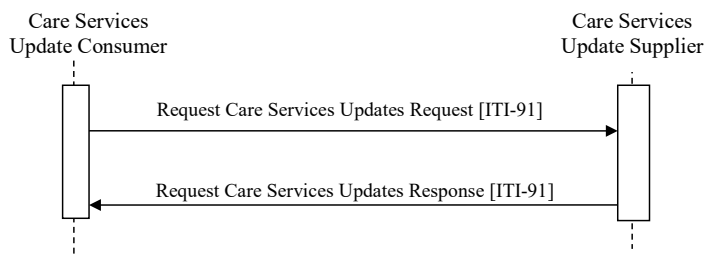
Table 3.91.2-1: Actor Roles

Actor:	Care Services Update Consumer
Role:	Requests a list of updated resources from the Care Services Update Supplier.
Actor:	Care Services Update Supplier
Role:	Accepts the update request and returns a list of updated resources.

3.91.3 Referenced Standards

- HL7 FHIR standard Release 4 <http://hl7.org/fhir/R4/index.html>
- 1020 • JSON – IETF RFC7159
- XML
- HTTP 1.1

3.91.4 Interaction Diagram



1025 3.91.4.1 Request Care Services Updates Request Message

A Request Care Services Updates message is a FHIR history operation, optionally using the `_since` parameter, on the `Organization`, `Location`, `Practitioner`, `PractitionerRole`, or `HealthcareService` Resources.

3.91.4.1.1 Trigger Events

1030 A Care Services Update Consumer triggers a Request Care Services Updates Request to a Care Services Update Supplier according to the business rules for the query. These business rules are outside the scope of this transaction.

3.91.4.1.2 Message Semantics

1035 A Care Services Update Consumer initiates a history request using HTTP GET as defined at <http://hl7.org/fhir/R4/http.html#history> on the `Organization`, `Location`, `Practitioner`, `PractitionerRole`, or `HealthcareService` Resources.

A Care Services Update Supplier and Care Services Update Consumer shall support the following parameters.

_since

1040 They shall also support the requirements in ITI TF-2x: Z.6, Populating the Expected Response Format.

A Care Services Update Supplier shall support receiving a request for both the JSON and the XML messaging formats as defined in FHIR. A Care Services Update Consumer shall accept either the JSON or the XML messaging formats as defined in FHIR.

1045 See ITI TF-2x: Appendix W for informative implementation material for this transaction.

3.91.4.1.3 Expected Actions

The Care Services Update Supplier shall process the query to discover the resources that match the search parameters given, and gives a response as per Section 3.91.4.2 or an error as per <http://hl7.org/fhir/R4/search.html#errors>.

1050 3.91.4.2 Request Care Services Updates Response Message

The Request Care Services Updates [ITI-91] transaction uses the response semantics as defined at <http://hl7.org/fhir/R4/http.html#history> as applicable for the resources depending on the supported options.

3.91.4.2.1 Trigger Events

1055 The Care Services Update Supplier sends the Request Care Services Updates Response to the Care Services Update Consumer when results are ready.

3.91.4.2.2 Message Semantics

The Care Services Update Supplier shall support the history response message as defined at <http://hl7.org/fhir/R4/http.html#history> on the following resources:

- 1060
- Organization, as defined at <http://hl7.org/fhir/R4/organization.html>
 - Location, as defined at <http://hl7.org/fhir/R4/location.html>
 - Practitioner, as defined at <http://hl7.org/fhir/R4/practitioner.html>
 - PractitionerRole, as defined at <http://hl7.org/fhir/R4/practitionerrole.html>
 - HealthcareService, as defined at <http://hl7.org/fhir/R4/healthcareservice.html>

1065

All References (*reference.reference* element) to Resources defined in this transaction shall be populated with an accessible URL (see <https://www.hl7.org/fhir/references-definitions.html#Reference.reference>), unless the referenced resource is not present on a server accessible to the client.

1070 **3.91.4.2.2.1 FHIR Organization Resource Constraints**

A Care Services Update Consumer and a Care Services Update Supplier shall query or return an Organization Resource ~~when supporting the Organization Option~~. The Organization Resource shall be further constrained as described in Table 3.90.4.2.2.1-1. The Element column in Table 3.90.4.2.2.1-1 references the object model defined at

1075 <http://hl7.org/fhir/R4/organization.html#resource>.

~~When the Organization represents a Facility and is paired with a Location, the FHIR Organization Resource shall be further constrained as described in Table 3.90.4.2.2.1-2. The Element column in Table 3.90.4.2.2.1-2 references the object model defined at~~
~~<http://hl7.org/fhir/R4/organization.html#resource>.~~

1080 **3.91.4.2.2.2 FHIR Location Resource Constraints**

A Care Services Update Consumer and a Care Services Update Supplier shall query or return a Location Resource ~~when supporting the Location Option~~. The Location Resource shall be further constrained as described in Table 3.90.4.2.2.2-1. The Element column in Table 3.90.4.2.2.2-1 references the object model defined at

1085 <http://hl7.org/fhir/R4/location.html#resource>.

~~When the Location represents a Facility and is paired with an Organization, the FHIR Location Resource shall be further constrained as described in Table 3.90.4.2.2.2-2. The Element column in Table 3.90.4.2.2.2-2 references the object model defined at~~
~~<http://hl7.org/fhir/R4/location.html#resource>.~~

1090 ~~When supporting the Location Distance Option, the FHIR Location Resource shall be further constrained as described in Table 3.90.4.2.2.2-3. The Element column in Table 3.90.4.2.2.2-3 references the object model defined at <http://hl7.org/fhir/R4/location.html#resource>.~~

3.91.4.2.2.3 FHIR Practitioner Resource Constraints

A Care Services Update Consumer and a Care Services Update Supplier shall query or return a Practitioner Resource ~~when supporting the Practitioner Option~~. The Practitioner Resource shall be further constrained as described in Table 3.90.4.2.2.3-1. The Element column in Table 3.90.4.2.2.3-1 references the object model defined at

1095 <http://hl7.org/fhir/R4/practitioner.html#resource>.

3.91.4.2.2.4 FHIR PractitionerRole Resource Constraints

A Care Services Update Consumer and a Care Services Update Supplier shall query or return a PractitionerRole Resource ~~when supporting the Practitioner Option~~. The PractitionerRole Resource shall be further constrained as described in Table 3.90.4.2.2.4-1. The Element column in Table 3.90.4.2.2.4-1 references the object model defined at

1100 <http://hl7.org/fhir/R4/practitionerrole.html#resource>.

1105 **3.91.4.2.2.5 FHIR HealthcareService Resource Constraints**

A Care Services Update Consumer and a Care Services Update Supplier shall query or return a HealthcareService Resource ~~when supporting the Healthcare Service Option~~. The HealthcareService Resource shall be further constrained as described in Table 3.90.4.2.2.5-1. The Element column in Table 3.90.4.2.2.5-1 references the object model defined at

1110 <http://hl7.org/fhir/R4/healthcareservice.html#resource>.

3.91.4.2.3 Expected Actions

The Care Services Update Consumer has received the response and continues with its workflow.

3.91.5 Security Considerations

See ITI TF-1: 46.5 for security considerations for the mCSD Profile.

1115 See ITI TF-2x: Appendix Z.8 for common mobile security considerations.

Volume 3 – Content Modules

No new content modules defined by this supplement.

1120

Volume 4 – National Extensions

Add appropriate Country section

None