Integrating the Healthcare Enterprise

IHE

IHE IT Infrastructure
Technical Framework Supplement

Mobile Care Services Discovery
(mCSD)

HL7® FHIR® Release 4

Using FHIR Resources at FMM Level 2-3

Rev. 3.3 – Trial Implementation

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Foreword

This is a supplement to the IHE IT Infrastructure Technical Framework V17.0. Each supplement undergoes a process of public comment and trial implementation before being incorporated into
30   the volumes of the Technical Frameworks.

This supplement is published on July 2, 2021 for trial implementation and may be available for testing at subsequent IHE Connectathons. The supplement may be amended based on the results of testing. Following successful testing it will be incorporated into the IT Infrastructure Technical Framework. Comments are invited and can be submitted at
35   http://www.ihe.net/ITI_Public_Comments.

This supplement describes changes to the existing technical framework documents.

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

Amend Section X.X by the following:

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.

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

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

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

The current version of the IHE IT Infrastructure Technical Framework can be found at
50   https://profiles.ihe.net/ITI/TF/index.html.

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Introduction to this Supplement

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 incorporates content from Release 4 of the HL7® FHIR® 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

150　　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
155　　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.

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   3. **Location** – Locations are physical places where care can be delivered such as facilities, buildings, wards, rooms, or vehicles. Locations also include jurisdictions such as village districts or regions. A Location has a unique identifier and may have geographic attributes (address, geocode), attributes regarding its hours of operation, etc. Each Location may be related to one Organization. A location may have a hierarchical relationship with other locations.

170   4. **Jurisdiction** – Jurisdictions are political administrative units or other territories over which authority is exercised. A Jurisdiction has a unique identifier, geographic attributes, etc. Jurisdictions include political administrative units such as village districts or regions. Each Jurisdiction is defined by a pairing of Location and Organization.

175   5. **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.

180   6. **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.

The mCSD Profile describes four actors and the transactions between them. The Find Matching
185 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.

     1. **Care Services Selective Consumer** – the Care Services Selective Consumer submits search queries to the Care Services Selective Supplier, which returns the requested
190   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
195   from one or more Care Services Update Suppliers.

     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.

200 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?

205
- 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

210 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.

mCSD_8. IHE has updated mCSD to add support for organizational facilities. As part of this
215 revision of mCSD, we 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
220 defined. If there is concern with the removal of these options, please submit a Public Comment.

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
225 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

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.

230 *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.*

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

235   *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.*

240   *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):

245   - *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*

250   - *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*

255   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.

260   *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.*

    As per the request, FHIR has added a standard extension to address this:
265   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.

270   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.

IHE Technical Frameworks General Introduction

275 The [IHE Technical Framework General Introduction](#) is shared by all of the IHE domain technical frameworks. Each technical framework volume contains links to this document where appropriate.

9 Copyright Licenses

IHE technical documents refer to, and make use of, a number of standards developed and
280 published by several standards development organizations. Please refer to the IHE Technical Frameworks General Introduction, [Chapter 9 - Copyright Licenses](#) for copyright license information for frequently referenced base standards. Information pertaining to the use of IHE International copyrighted materials is also available there.

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285 IHE® and the IHE logo are trademarks of the Healthcare Information Management Systems Society in the United States and trademarks of IHE Europe in the European Community. Please refer to the IHE Technical Frameworks General Introduction, [Chapter 10 - Trademark](#) for information on their use.

290 # IHE Technical Frameworks General Introduction Appendices

The [IHE Technical Framework General Introduction Appendices](#) are components shared by all of the IHE domain technical frameworks. Each technical framework volume contains links to these documents where appropriate.

295 | *Update the following appendices to the General Introduction as indicated below. Note that these are **not** appendices to this domain's Technical Framework (TF-1, TF-2, TF-3 or TF-4) but rather, they are appendices to the IHE Technical Frameworks General Introduction located [here](#).* |
|---|

300 ## **Appendix A** – Actors

*Add the following **new or modified** actors to the [IHE Technical Frameworks General Introduction Appendix A](#):*

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.

305

310

Appendix B – Transactions

315 *Add the following **new or modified** transactions to the IHE Technical Frameworks General Introduction Appendix B:*

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.

Appendix D – Glossary

320 *Add the following **new or modified glossary** terms to the IHE Technical Frameworks General Introduction Appendix D.*

No new Glossary terms.

Volume 1 – Profiles

325

Add Section 46

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46 Mobile Care Services Discovery (mCSD) Profile

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

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

335 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

340 parent Organization.

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.

345 3. **Location** – Locations are physical places where care can be delivered such as facilities, buildings, wards, rooms, or vehicles. Locations also include jurisdictions such as a village districts or regions. A Location has a unique identifier and may have geographic attributes (address, geocode), attributes regarding its hours of operation, etc. Each Location may be related to one Organization. A location may have a hierarchical

350 relationship with other locations.

4. **Jurisdiction** – Jurisdictions are political administrative units or other territories over which authority is exercised. A Jurisdiction has a unique identifier, geographic attributes, etc. Jurisdictions include political administrative units such as village districts or regions. Each Jurisdiction is defined by a pairing of Location and Organization.

355 5. **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

360 attributes may be associated with the Practitioner relationship with these other entities.

---

6. **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.

365   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

370   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 Standards and Interoperability Framework (http://wiki.siframework.org/file/view/ESI Query and Response.pdf).

The loosely coupled design and flexible querying capability of the mCSD Profile means it can be

375   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.

380   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.
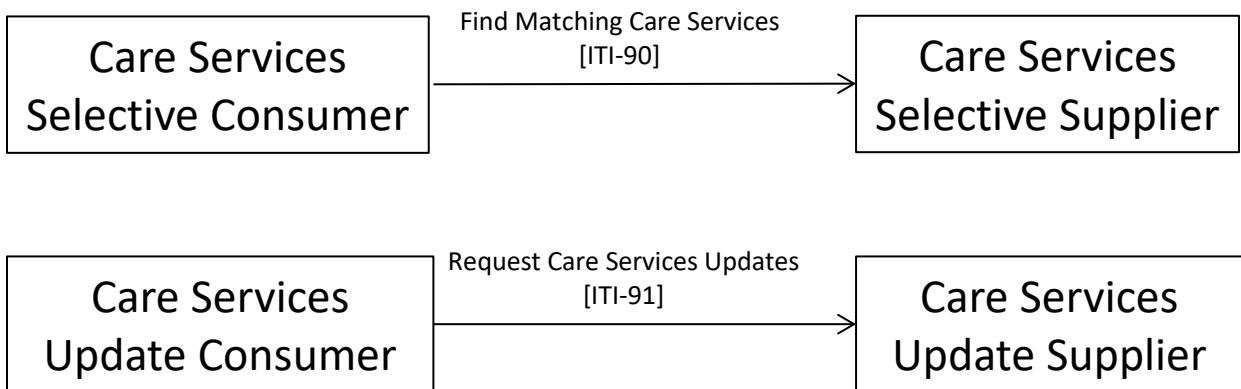
Figure 46.1-1: mCSD Actor Diagram

385   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	Initiator or Responder	Optionality	Reference
Care Services Selective Consumer	Find Matching Care Services [ITI-90]	Initiator	R	ITI TF-2: 3.90
Care Services Selective Supplier	Find Matching Care Services [ITI-90]	Responder	R	ITI TF-2: 3.90
Care Services Update Consumer	Request Care Services Updates [ITI-91]	Initiator	R	ITI TF-2: 3.91
Care Services Update Supplier	Request Care Services Updates [ITI-91]	Responder	R	ITI TF-2: 3.91

390   ### 46.1.1 Actor Descriptions and Actor Profile Requirements

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

mCSD supports querying for Organization, Facility, Location, Practitioner, and Healthcare Service. However, a Care Services Selective Supplier or Care Service Update Supplier is not
395   required to contain data on all of these.

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	Location Distance Option	Section 46.2.1
Care Services Selective Supplier	Location Distance Option	Section 46.2.1
Care Services Update Consumer	No options defined	--
Care Services Update Supplier	No options defined	--

400

46.2.1 Location Distance Option

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

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

405   Find Matching Care Services [ITI-90] transaction. See ITI TF-2: 3.90.4.1.2.2 and ITI TF-2: 3.90.4.2.2.2.

46.3 mCSD Required Actor Groupings

An actor from this profile (Column 1) shall implement all of the required transactions and/or content modules in this profile *in addition to **all*** of the requirements for the grouped actor

410   (Column 2).

Section 46.5 describes some optional groupings that may be of interest for security considerations and Section 46.6 describes some optional groupings in other related profiles.

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	--	--

415   ## 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.
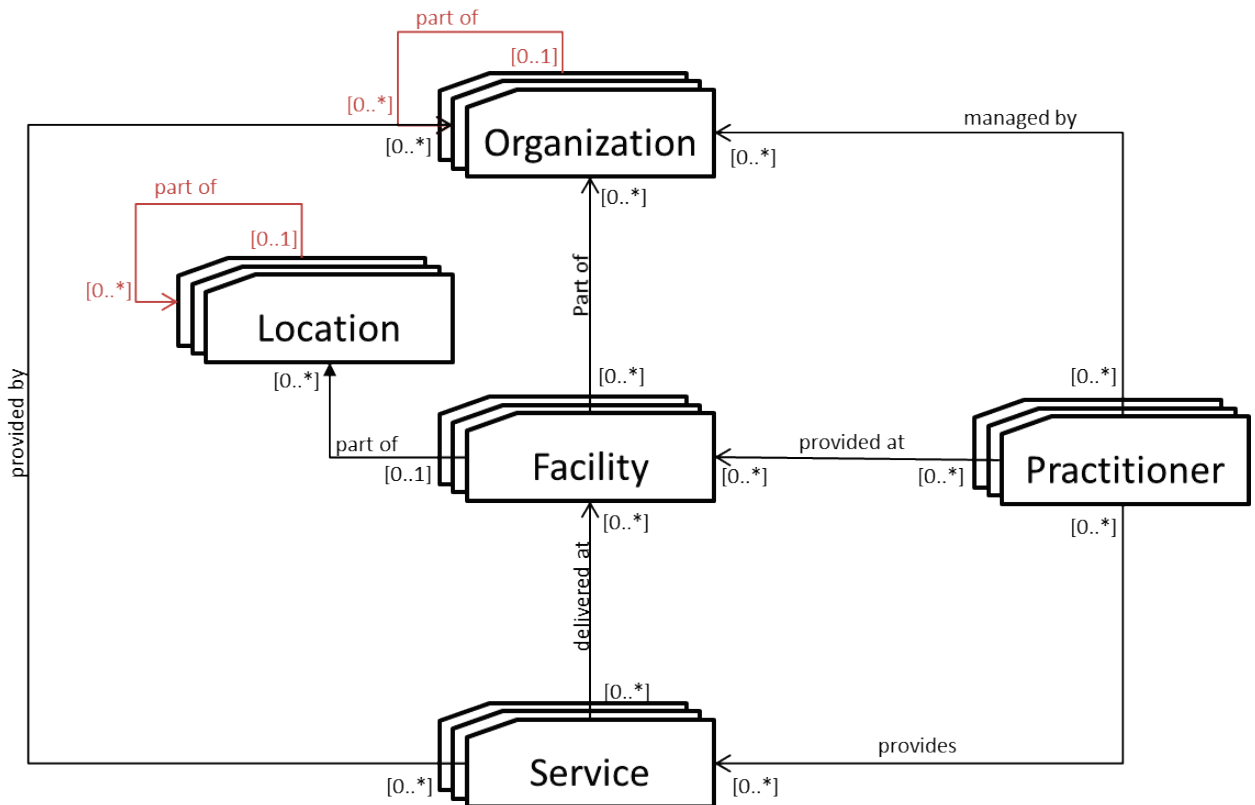
Figure 46.4.1-1: Top-level Relationships between Care Services Entities

46.4.1.1 Create, Update, and Delete Services

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

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

- 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.

- The EMR retrieves the information from a Healthcare Worker Registry (HWR) and displays it to Dr. West.

440
- 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.
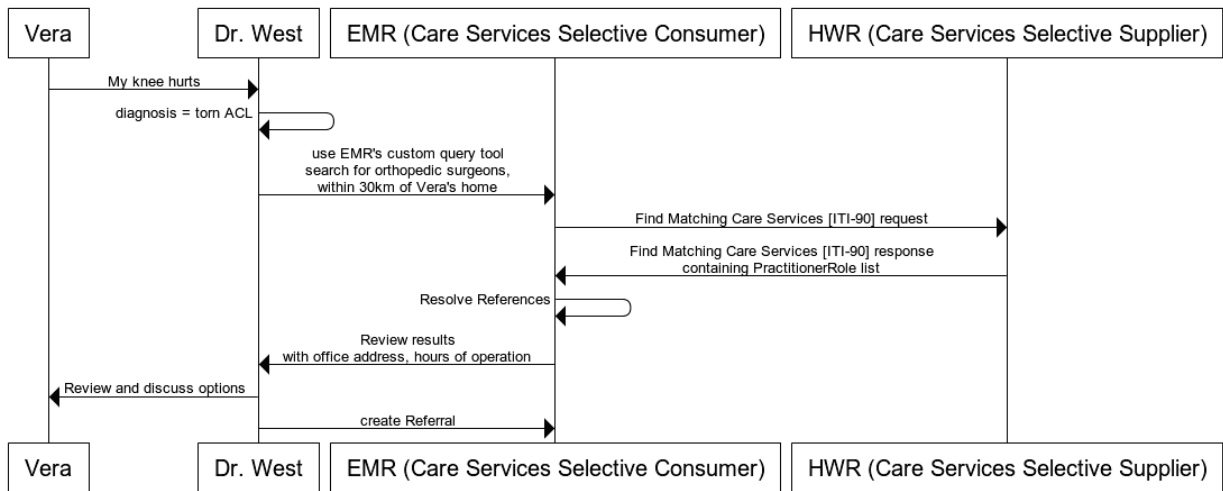
Figure 46.4.2.1.2-1: Provider Query Use Case

445   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.

```
@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
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
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
of operation

Dr. West -> Vera: Review and discuss options
Dr. West -> EMR (Care Services Selective Consumer): create Referral
@enduml
```

465
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.

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 46.4.2.2.2-1.
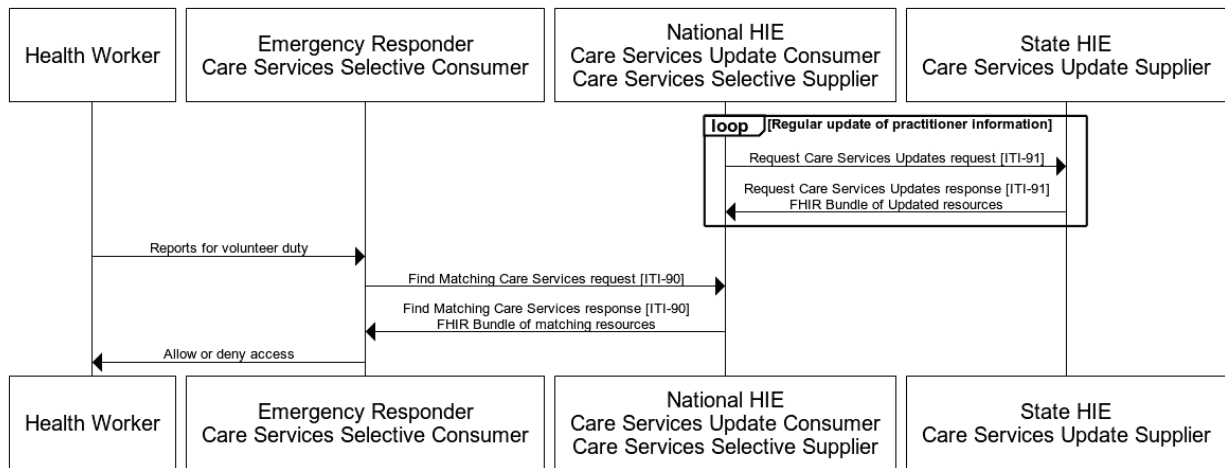
Figure 46.4.2.2.2-1: Federated Data Site Management Workflow

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.

```
@startuml
participant Health Worker
participant Emergency Responder\nCare Services Selective Consumer
participant National HIE\nCare Services Update Consumer\nCare Services Selective Supplier
participant State HIE\nCare Services Update Supplier

loop Regular update of practitioner information
National HIE\nCare Services Update Consumer\nCare Services Selective Supplier -> State HIE\nCare
Services Update Supplier : Request Care Services Updates request [ITI-91]
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
end

Health Worker -> Emergency Responder\nCare Services Selective Consumer : Reports for volunteer
duty
Emergency Responder\nCare Services Selective Consumer -> National HIE\nCare Services Update
Consumer\nCare Services Selective Supplier : Find Matching Care Services request [ITI-90]
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
Emergency Responder\nCare Services Selective Consumer -> Health Worker : Allow or deny access
@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

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

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
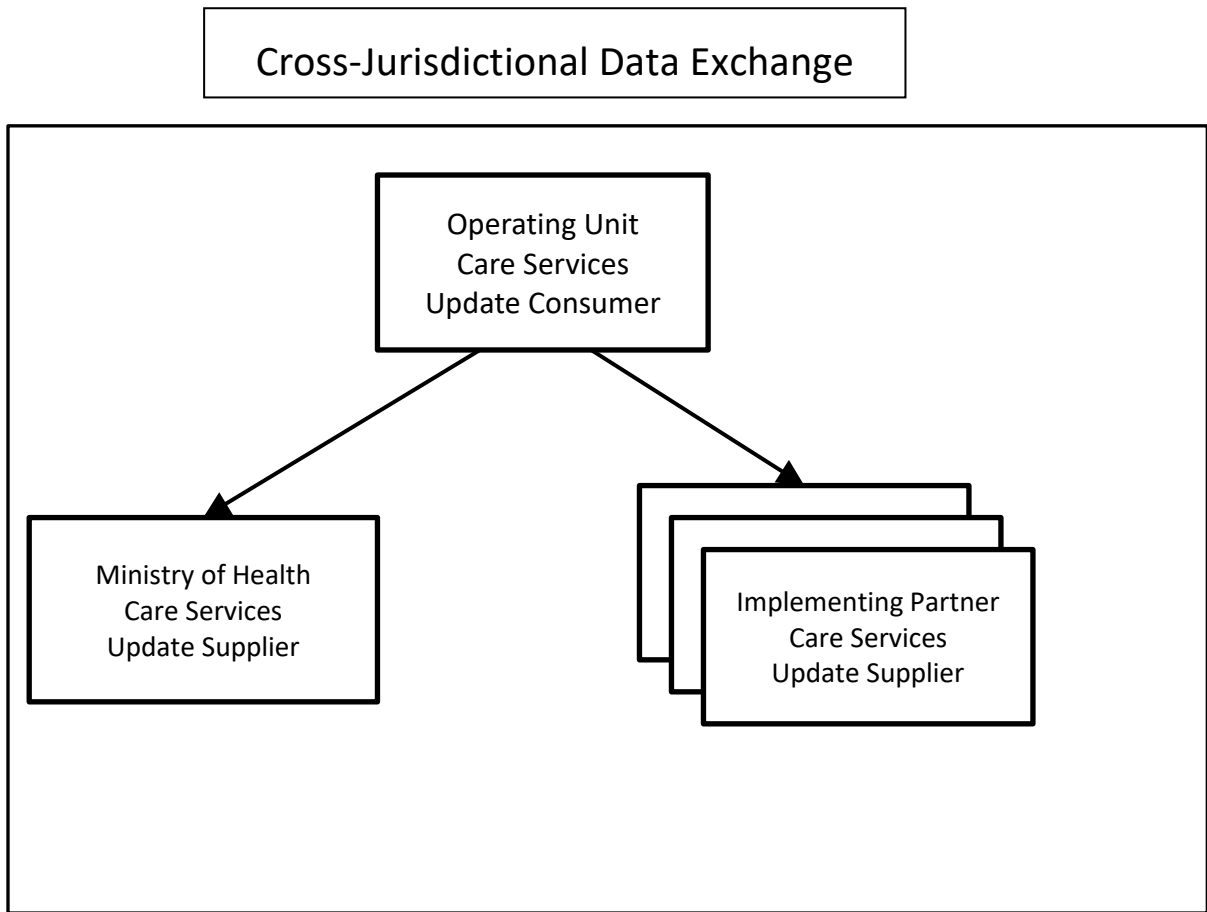
Figure 46.4.2.3.1-1: Cross-Jurisdictional Data Exchange

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.

540

- 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 subunit Care Services Update Suppliers (e.g., partner) to get an updated list of sites under the subunit.

545
- 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.
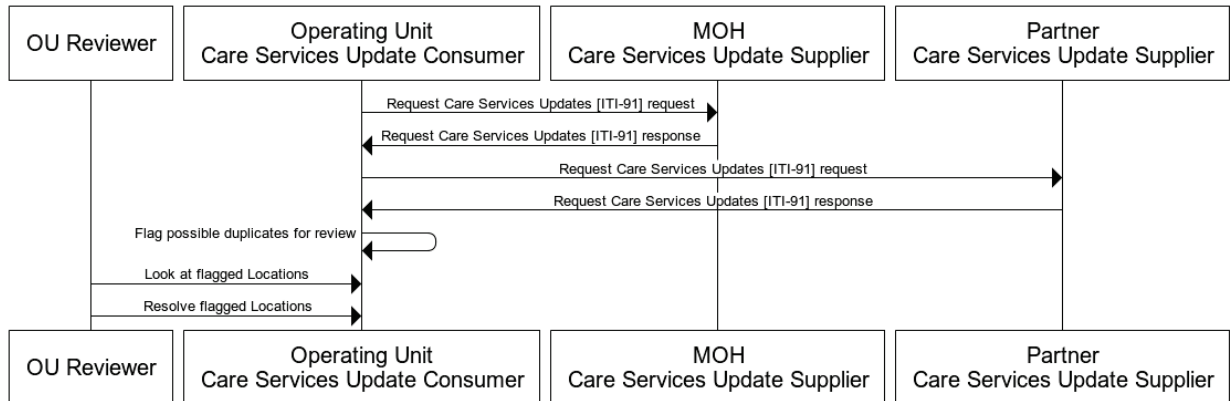
Figure 46.4.2.3.2-1: Cross-jurisdictional Site Management Workflow

550 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.

555

560

565

570

```
@startuml
participant OU Reviewer
participant Operating Unit\nCare Services Update Consumer
participant MOH\nCare Services Update Supplier
participant Partner\nCare Services Update Supplier

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

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
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

46.4.2.4 Use Case #4: Master Facility List

46.4.2.4.1 Master Facility List Description

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, locate, 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

A Master Facility List (MFL) will run a Care Services Update Supplier and Care Services 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.
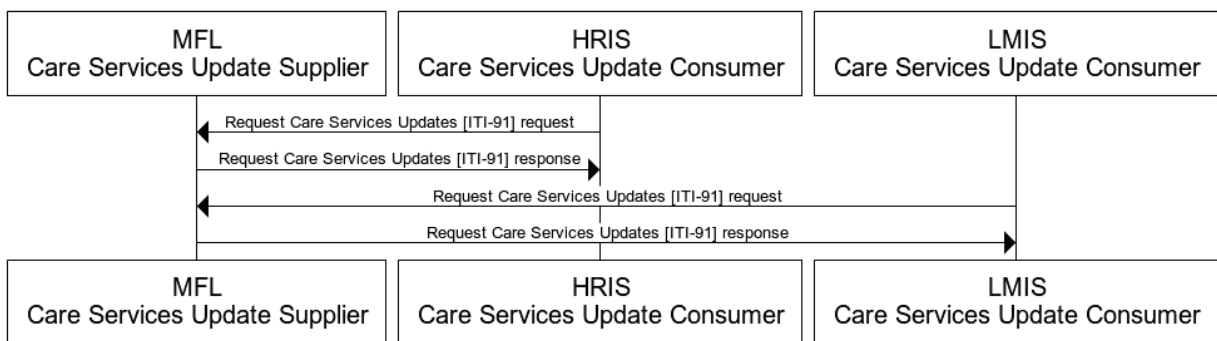
Figure 46.4.2.4.2-1: Master Facility List Workflow

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\nCare Services Update Supplier
participant HRIS\nCare Services Update Consumer
participant LMIS\nCare Services Update Consumer

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

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

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.

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).

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 Authorization (IUA). 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

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.

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

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

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

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

A deployment may only have a single server that will maintain data (Organization, Location, Facility, 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.
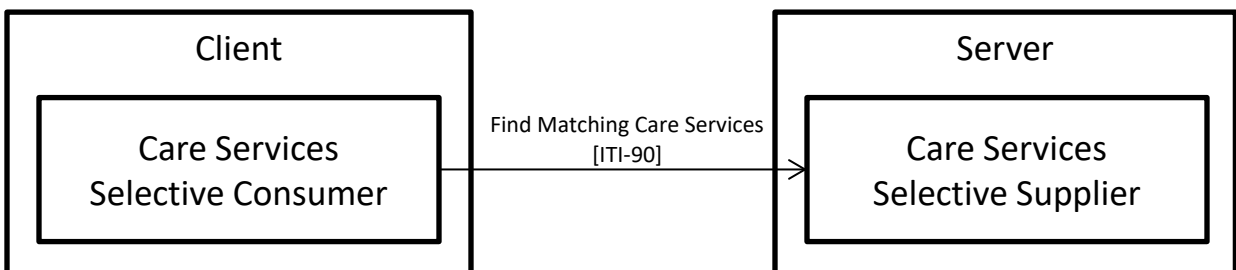

Figure 46.7.1-1: Simple Deployment

46.7.2 Federated and Cross-Jurisdictional Deployments

670 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. 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.

675 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. 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

680 date information when setting the refresh interval between cache updates. The normal delays in updating listings will also be part of this consideration.

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. These Care Services Update Suppliers would respond to a Care Services Update Consumer's

685 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.

This deployment may also have cross-jurisdictional considerations if any of the Update Suppliers

690 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.
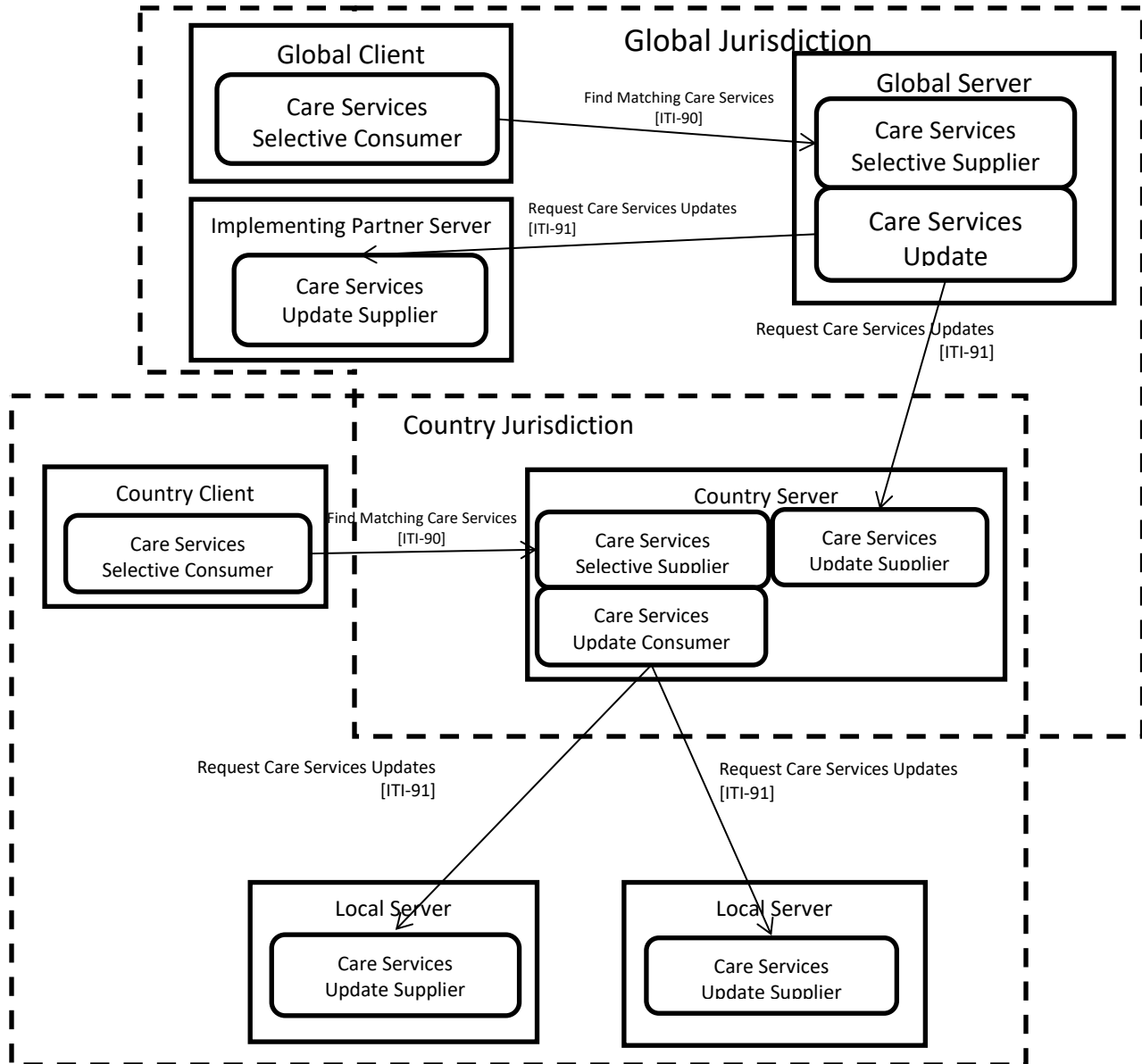
Figure 46.7.2-1: Federated and Cross Jurisdictional Deployment

695   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
700   Services Update Suppliers it is linked to.

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.

705
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.

710
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.

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.

715

For guidance on handling challenges regarding the representation of names across multiple languages and in different cultures, refer to the ITI TF-2: 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.

720

46.7.2.1 Terminology Services

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).

725

Volume 2 – Transactions

730 *Add Section 3.90*

3.90 Find Matching Care Services [ITI-90]

3.90.1 Scope

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
735 Services transaction against a Care Services Selective Supplier.

3.90.2 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

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

3.90.4 Messages
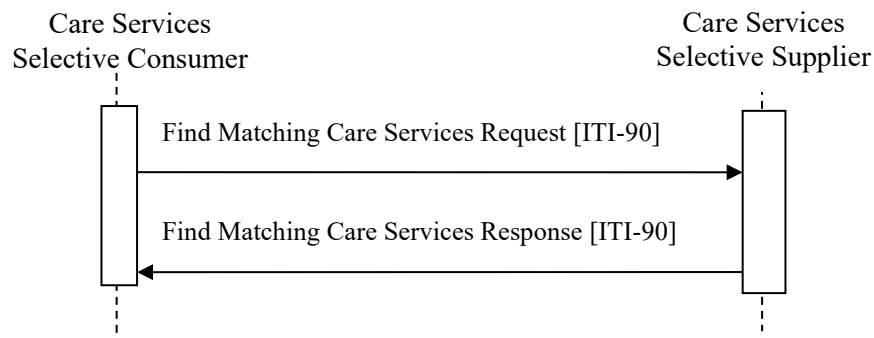
Figure 3.90.4-1: Interaction Diagram

745

3.90.4.1 Find Matching Care Services Request Message

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

750 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

A Care Services Selective Consumer initiates a search request using HTTP GET as defined at
755 http://hl7.org/fhir/R4/http.html#search on the Organization, Location, Practitioner, PractitionerRole, or HealthcareService Resources. 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."

760 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-2: Appendix Z.6 for more details.

A Care Services Selective Supplier shall implement the parameters described below. A Care
765 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-2: Appendix W for informative implementation material for this transaction.

3.90.4.1.2.1 Common Parameters

770 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.

`_id`

775 `_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 Resource Message Semantics

780 The Care Services Selective Supplier 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 identified by the following canonical URI

785 `http://ihe.net/fhir/StructureDefinition/IHE_mCSD_hierarchy_extension.`

`active`

`identifier`

`name`

`partof`

790 `partof:above`

`partof:below`

`type`

`partof.identifier`

`partof.name`

795 `_revInclude=Location:organization`

`ihe-mcsd-hierarchy-type`

`ihe-mcsd-hierarchy-partof`

`ihe-mcsd-hierarchy-partof:above`

`ihe-mcsd-hierarchy-partof:below`

800 3.90.4.1.2.3 Location Resource Message Semantics

The Care Services Selective Supplier shall support the following search parameters on the Location Resource as defined at http://hl7.org/fhir/R4/location.html#search. String parameter modifiers are defined at http://hl7.org/fhir/R4/search.html#string.

`identifier`

805 `name`

`organization`

`partof`

`partof:above`

`partof:below`

810 `status`

`type`

`partof.identifier`

`partof.name`

`organization.active`

815 `organization.identifier`

`organization.name`

`_include=Location:organization`

3.90.4.1.2.4 Practitioner Resource Message Semantics

820 The Care Services Selective Supplier shall support the following search parameters on the Practitioner Resource as defined at http://hl7.org/fhir/R4/practitioner.html#search. String parameter modifiers are defined at http://hl7.org/fhir/R4/search.html#string.

`active`

`identifier`

`name`

825 `given`

`family`

3.90.4.1.2.5 PractitionerRole Resource Message Semantics

The Care Services Selective Supplier shall support the following search parameters on the PractitionerRole Resource as defined at http://hl7.org/fhir/R4/practitionerrole.html#search.

830 `active`

`location`

`organization`

`practitioner`

`role`

835 `service`

`specialty`

`practitioner.identifier`

`practitioner.name`

`practitioner.given`

840 `practitioner.family`

`_include=PractitionerRole:practitioner`

`organization.active`

`organization.identifier`

`organization.name`

845 `location.status`

`location.identifier`

`location.name`

`service.active`

`service.indentifier`

850 `service.location`

`service.name`

`service.organization`

3.90.4.1.2.6 HealthcareService Resource Message Semantics

855 The Care Services Selective Supplier 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.

`active`

`identifier`

`location`

860 `name`

`organization`

`service-type`

`organization.active`

`organization.identifier`

865 `organization.name`

`location.status`

`location.identifier`

`location.name`

3.90.4.1.2.7 Location Distance Option Message Semantics

870 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

875 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

880 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

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.

885
- 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

890

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.

895 **3.90.4.2.2.1 FHIR Organization Resource Constraints**

A Care Services Selective Consumer may query on Organization Resources. A Care Services Selective Supplier shall return a Bundle of matching Organization Resources. 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
900 http://hl7.org/fhir/R4/organization.html#resource.

Table 3.90.4.2.2.1-1: Organization 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_Organization`
`type` `[1..*]`	A code that describes the type of Organization. `CodeableConcept`
`name` `[1..1]`	`string`
`partOf` `[0..1]`	If the Organization belongs to a single hierarchy, the partOf element shall be used. `Reference (Organization)`

Element & Cardinality	Data Type

extension [0..*]	If there are additional hierarchies (such as funding source), include them in the extension with the following details:
	
	Set the url to the canonical URI for this extension
	`url = "http://ihe.net/fhir/StructureDefinition/IHE_mCSD_hierarchy_extension"`
	
	Set the sub-extension values
	`hierarchy-type = valueCodeableConcept`
	`part-of = valueReference(Organization)`

905 A Care Services Selective Consumer may query on Organization Resources when working with Facilities. A Care Services Selective Supplier shall return a Bundle of matching Organization Resources when working with Facilities. In addition to the constraints in Table 3.90.4.2.2.1-1, 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: Additional Organization 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_FacilityOrganization`

type [2..*]	In addition, there shall be one type with the following value:
	`system = "urn:ietf:rfc:3986"`
	`code = "urn:ihe:iti:mcsd:2019:facility"`

910

A Care Services Selective Consumer may query on Organization Resources when working with Jurisdictions. A Care Services Selective Supplier shall return a Bundle of matching Organization Resources when working with Jurisdictions. In addition to the constraints in Table 3.90.4.2.2.1-1, the FHIR Organization Resource shall be further constrained as described in Table

915 3.90.4.2.2.1-3. The Element column in Table 3.90.4.2.2.1-3 references the object model defined at http://hl7.org/fhir/R4/organization.html#resource.

Table 3.90.4.2.2.1-3: Additional Organization Resource Constraints for Jurisdictions

Element & Cardinality	Data Type

meta.profile
[2..*]
	In addition, there shall be one entry with the value:
	`http://ihe.net/fhir/StructureDefinition/IHE_mCSD_`
	`JurisdictionsOrganization`

type
[2..*]
	In addition, there shall be one type with the following value:
	`system = "urn:ietf:rfc:3986"`
	`code = "urn:ihe:iti:mcsd:2019:jurisdiction"`

3.90.4.2.2.2 FHIR Location Resource Constraints

920 A Care Services Selective Consumer may query on Location Resources. A Care Services Selective Supplier shall return a Bundle of matching Location Resources. 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.

925 **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/StructureDefinit`
	`ion/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)`

When the resource is a Facility, the Location Resource shall be paired with an Organization Resource using the managingOrganization element in Location. A Care Services Selective Consumer may query on Location Resources when working with Facilities. A Care Services Selective Supplier shall return a Bundle of matching Location Resources when working with Facilities. In addition to the constraints in Table 3.90.4.2.2.2-1, 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.

Table 3.90.4.2.2.2-2: Additional 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:rfc:3986"`
	`code = "urn:ihe:iti:mcsd:2019:facility"`

managingOrganization [1..1]	The reference to the Organization resource for this facility. `Reference(Organization)`

When the resource is a Jurisdiction, the Location Resource shall be paired with an Organization Resource using the managingOrganization element in Location. A Care Services Selective Consumer may query on Location Resources when working with Jurisdictions. A Care Services Selective Supplier shall return a Bundle of matching Location Resources when working with Jurisdictions. In addition to the constraints in Table 3.90.4.2.2.2-1, 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.

When a geographic boundary is available for the Jurisdiction Location, the location-boundary-geojson extension defined at http://hl7.org/fhir/extension-location-boundary-geojson.html shall be used to store this information.

Table 3.90.4.2.2.2-3: Additional Location Resource Constraints for Jurisdictions

Element & Cardinality	Data Type
`meta.profile` `[2..*]`	In addition, there shall be one entry with the value: `http://ihe.net/fhir/StructureDefinition/IHE_mCSD_JurisdictionLocation`
`extension` `[0..*]`	When a boundary is available, the location-boundary-geojson extension should be used with the given url, contentType, and data: `url = http://hl7.org/fhir/StructureDefinition/location-boundary-geojson` `valueAttachment.contentType = "application/geo+json"` `valueAttachment.data = base64 encoded GeoJSON boundary data`
`type` `[2..*]`	In addition, there shall be one type with the following value: `system = "urn:ietf:rfc:3986"` `code = "urn:ihe:iti:mcsd:2019:jurisdiction"`
`managingOrganization` `[1..1]`	The reference to the Organization resource for this jurisdiction. `Reference(Organization)`

950

When supporting the Location Distance Option. The Location Resource shall be further constrained as described in Table 3.90.4.2.2.2-4. The Element column in Table 3.90.4.2.2.2-4 references the object model defined at http://hl7.org/fhir/R4/location.html#resource.

Table 3.90.4.2.2.2-4: Location Resource Constraints with Location Distance Option

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

Element & Cardinality	Data Type
position [1..1]	BackboneElement

955

3.90.4.2.2.3 FHIR Practitioner Resource Constraints

A Care Services Selective Consumer may query on Practitioner Resources. A Care Services
Selective Supplier shall return a Bundle of matching Practitioner Resources. The Practitioner
Resource shall be further constrained as described in Table 3.90.4.2.2.3-1. The Element column
960   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

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

3.90.4.2.2.4 FHIR PractitionerRole Resource Constraints

965   A Care Services Selective Consumer may query on PractitionerRole Resources. A Care Services
Selective Supplier shall return a Bundle of matching PractitionerRole Resources. 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
http://hl7.org/fhir/R4/practitionerrole.html#resource.

970   **Table 3.90.4.2.2.4-1: PractitionerRole 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_PractitionerRole`

Element & Cardinality	Data Type
code [1..*]	CodeableConcept

3.90.4.2.2.5 FHIR HealthcareService Resource Constraints

A Care Services Selective Consumer may query on HealthcareService Resources. A Care Services Selective Supplier shall return a Bundle of matching HealthcareService Resources. 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.

Table 3.90.4.2.2.5-1: HealthcareService 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_HealthcareService
type [1..*]	CodeableConcept
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.

3.90.5 Security Considerations

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

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

3.91 Request Care Services Updates [ITI-91]

3.91.1 Scope

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.

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3.91.2 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

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

3.91.4 Messages
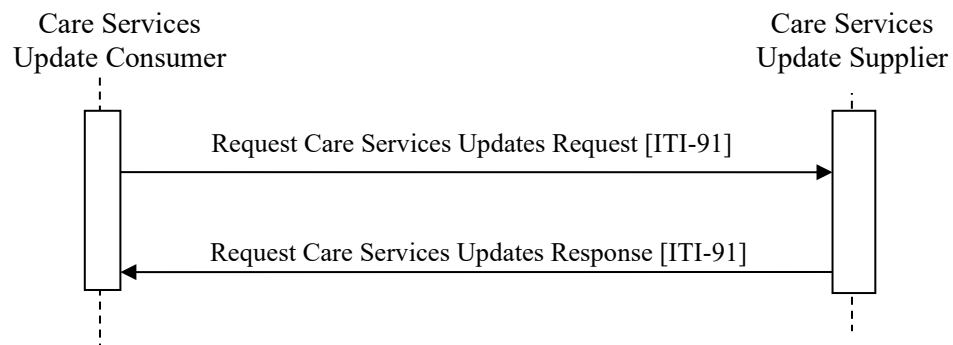
1000

Figure 3.91.4-1: Interaction Diagram

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

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

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`

They shall also support the requirements in ITI TF-2: Appendix 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.

See ITI TF-2: 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.

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.

3.91.4.2.1 Trigger Events

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:

- 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

1040   - 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
1045   accessible to the client.

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. 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
1050   defined at 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.

1055   When the Organization represents a Jurisdiction and is paired with a Location, the FHIR Organization Resource shall be further constrained as described in Table 3.90.4.2.2.1-3. The Element column in Table 3.90.4.2.2.1-3 references the object model defined at http://hl7.org/fhir/R4/organization.html#resource.

3.91.4.2.2.2 FHIR Location Resource Constraints

1060   A Care Services Update Consumer and a Care Services Update Supplier shall query or return a Location Resource. 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.

When the Location represents a Facility and is paired with an Organization, the FHIR Location
1065   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.

When the Location represents a Jurisdiction and is paired with an Organization, the FHIR Location Resource shall be further constrained as described in Table 3.90.4.2.2.2-3. The Element
1070   column in Table 3.90.4.2.2.2-3 references the object model defined at http://hl7.org/fhir/R4/location.html#resource.

When supporting the Location Distance Option, the FHIR Location Resource shall be further constrained as described in Table 3.90.4.2.2.2-4. The Element column in Table 3.90.4.2.2.2-4 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. 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.

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

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. 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.

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.

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

Volume 3 – Content Modules

1095

No new content modules defined by this supplement.

Volume 4 – National Extensions

1100

Add appropriate Country section

None