Integrating the Healthcare Enterprise

IHE IT Infrastructure Technical Framework Supplement

Mobile Care Services Discovery (mCSD)

Rev. 1.0 – Draft for Public Comment

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Foreword

This is a supplement to the IHE IT Infrastructure Technical Framework V13.0. 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 May 17, 2017 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 June 16, 2017.

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:

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.

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.

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Introduction to this Supplement

The Mobile Care Services Discovery (mCSD) Profile supports RESTful queries across the following related care services 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 family practice. An organization has a unique identifier and may have additional administrative attributes such as contact person, mailing address, etc. An organization may have a parent-child relationship with another organization.
2. Location – Locations are physical care delivery sites such as hospitals, clinics, health outposts, physician offices, labs, pharmacies. Locations also include political administrative units such as a village districts or region. 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 relationship with another location.
3. 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.
4. 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:

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.
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

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

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?
- 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 mCSD Profile's loosely coupled design and flexible querying capability means it can be deployed within a number of eHealth architectures and support a wide array of care workflows.

Open Issues and Questions

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 CSD or remove with a reference to ADX in cross profile considerations?

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

mCSD_3. How do we capture community health workers? There are community health workers that are associated to our facility but don't actually work there. They have a catchment area of villages that they rotate through to provide community-based care. This catchment area is within the catchment area of a Health facility and (if present) the supervisor of this community health worker is based at that facility.

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):

- 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

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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

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).

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.

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.

Closed Issues

None.

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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:

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 to 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-Y1]	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 for Care Services Updates [ITI-Y2]	The Request for 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 for Care Services Updates is initiated by the Care Services Update Consumer against the Care Services Update Supplier.

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Glossary

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

None.

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Volume 1 – Profiles

Copyright Licenses

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

None

Add Section X

X 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.

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. An organization may have a hierarchical relationship with other organizations.
2. Location – Locations are physical care delivery sites such as hospitals, clinics, health outposts, physician offices, labs, pharmacies. Locations also include political administrative units such as a village districts or region. 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.
3. 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.
4. 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 capabilities detailed in this profile support consumer-centric queries such as finding "where is the closest youth mental health services clinic" or "when is the earliest time I could schedule an appointment with 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." Lastly, the mCSD Profile may be employed to support line-of-business queries such as "what is the enterprise location ID for this location" or "what is the encryption certificate and electronic endpoint for this provider." 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).

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The mCSD Profile uses a loosely-coupled design and flexible querying capability, so that it can be deployed within a number of eHealth architectures and support a wide array of care workflows.

X.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 http://ihe.net/TF_Intro_Appendices.aspx. Please note that new actors are added to Appendix A once a profile reaches trial implementation.

Figure X.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.

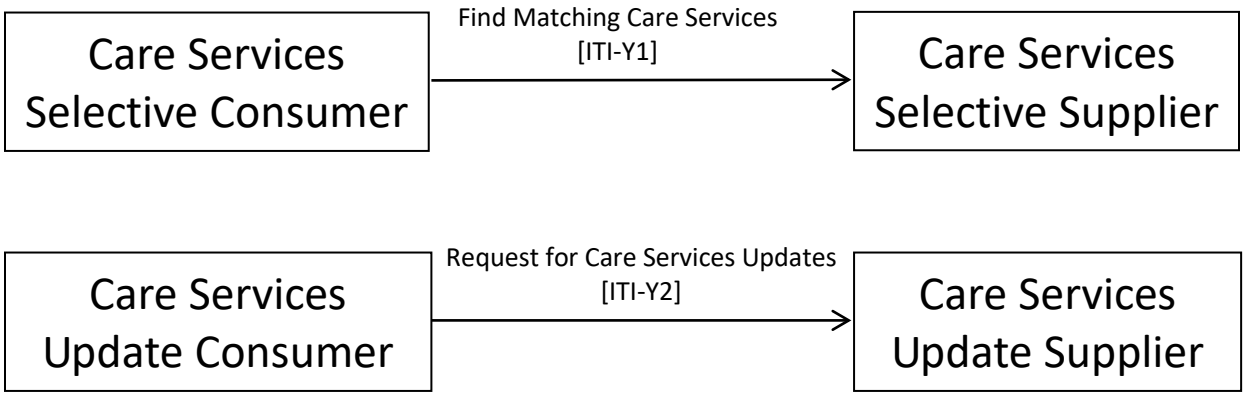

Figure X.1-1: mCSD Actor Diagram

Table X.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 X.1-1: mCSD Profile - Actors and Transactions

Actors	Transactions	Optionality	Reference
Care Services Selective Consumer	Find Matching Care Services [ITI-Y1]	R	ITI TF-2c: 3.Y1
Care Services Selective Supplier	Find Matching Care Services [ITI-Y1]	R	ITI TF-2c: 3.Y1

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Actors	Transactions	Optionality	Reference
Care Services Update Consumer	Request for Care Services Updates [ITI-Y2]	R	ITI TF-2c: 3.Y2
Care Services Update Supplier	Request for Care Services Updates [ITI-Y2]	R	ITI TF-2c: 3.Y2

X.2 mCSD Actor Options

315 Options that may be selected for each actor in this profile, if any, are listed in the Table X.2-1. Dependencies between options when applicable are specified in notes. Any actor must support at least one option.

Table X.2-1: mCSD - Actors and Options

Actor	Option Name	Reference
Care Services Selective Consumer (Note 1)	Organization Option	Section X.2.1
	Location Option	Section X.2.2
	Practitioner Option	Section X.2.3
	Healthcare Service Option	Section X.2.4
Care Services Selective Supplier (Note 1)	Organization Option	Section X.2.1
	Location Option	Section X.2.2
	Practitioner Option	Section X.2.3
	Healthcare Service Option	Section X.2.4
Care Services Update Consumer (Note 1)	Organization Option	Section X.2.1
	Location Option	Section X.2.2
	Practitioner Option	Section X.2.3
	Healthcare Service Option	Section X.2.4
Care Services Update Supplier (Note 1)	Organization Option	Section X.2.1
	Location Option	Section X.2.2
	Practitioner Option	Section X.2.3
	Healthcare Service Option	Section X.2.4

Note 1: The actor shall support at least one option.

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X.2.1 Organization Option

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-Y1] transaction. See ITI TF-2c: 3.Y1.4.2.2.1.

325 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 for Care Services Updates [ITI-Y2] transaction. See ITI TF-2c: 3.Y2.4.2.2.1.

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X.2.2 Location Option

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-Y1] transaction. See ITI TF-2c: 3.Y1.4.2.2.2.

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 for Care Services Updates [ITI-Y2] transaction. See ITI TF-2c: 3.Y2.4.2.2.2.

X.2.3 Practitioner Option

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-Y1] transaction. See ITI TF-2c: 3.Y1.4.2.2.3 and ITI TF-2c: 3.Y1.4.2.2.4.

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 for Care Services Updates [ITI-Y2] transaction. See ITI TF-2c: 3.Y2.4.2.2.3 and ITI TF-2c: 3.Y1.4.2.2.4.

X.2.4 Healthcare Service Option

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-Y1] transaction. See ITI TF-2c: 3.Y1.4.2.2.5.

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 for Care Services Updates [ITI-Y2] transaction. See ITI TF-2c: 3.Y2.4.2.2.5.

X.3 mCSD Required Actor Groupings

Table X.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	--	--

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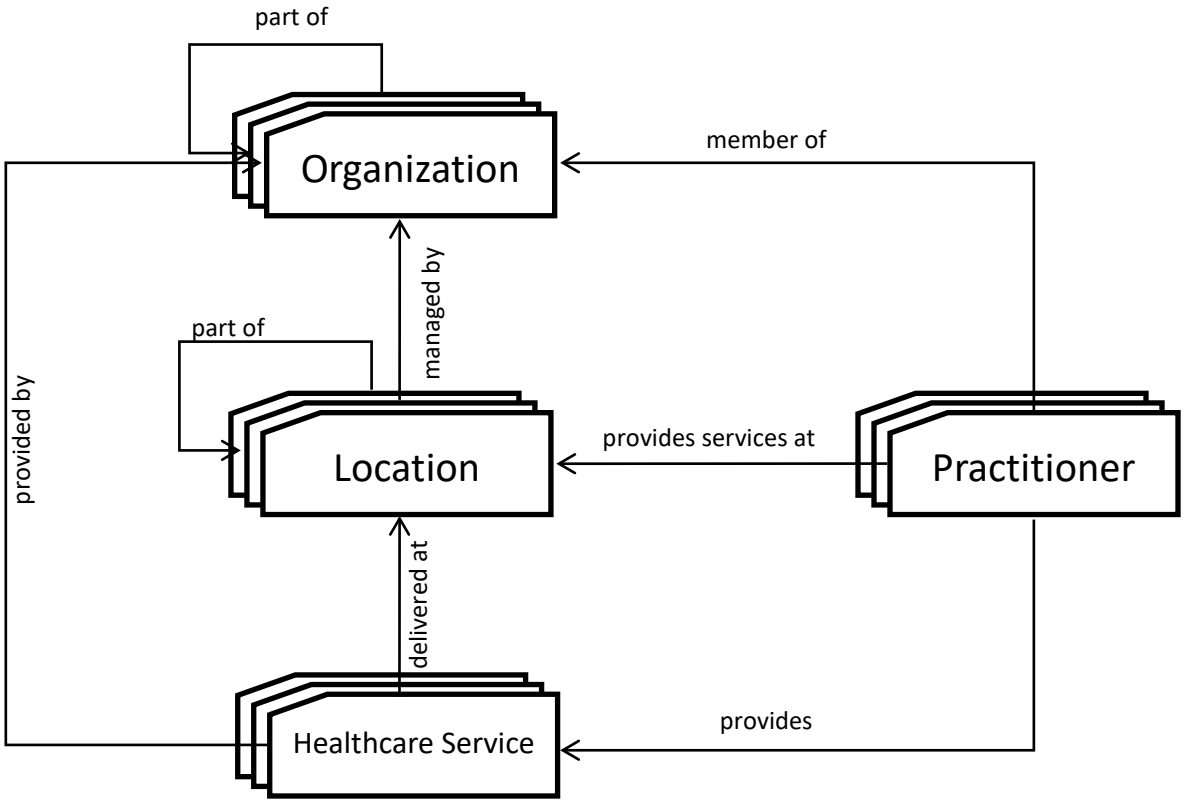
X.4 mCSD Overview

X.4.1 Concepts

355 The Mobile Care Services Discovery (mCSD) Profile supports queries for organizations, locations, practitioners and healthcare services. The relationship between these data is illustrated in Figure X.4.1-1.



360 **Figure X.4.1-1 Top-level Relationships between Care Services Resources**

X.4.1.1 Create, Read, Update, Delete (CRUD) Services

It is out of scope of this profile to define CRUD operations for the resources under consideration.

X.4.2 Use Cases

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X.4.2.1 Use Case #1: Practitioner Query

X.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.

X.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.
- 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 X.4.2.1.2-1.

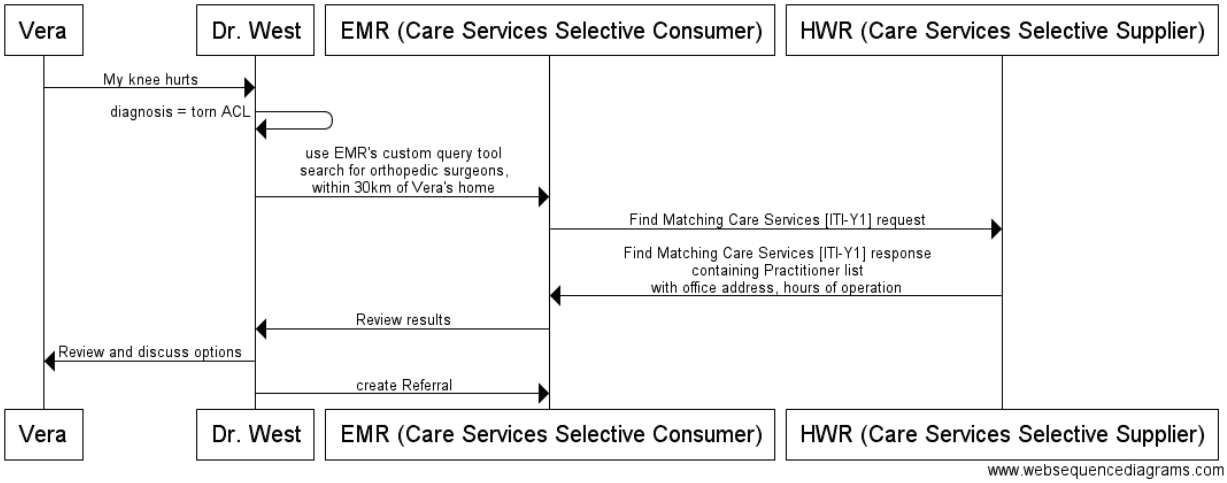

Figure X.4.2.1.2-1: Provider Query Use Case

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```
@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-Y1] request
HWR (Care Services Selective Supplier) -> EMR (Care Services Selective Consumer): Find Matching
Care Services [ITI-Y1] response\ncontaining Practitioner list\nwith office address, hours of
operation
EMR (Care Services Selective Consumer) -> Dr. West : Review results

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

X.4.2.2 Use Case #2: Provider Lookup During an Emergency Event

X.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.

X.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 X.4.2.2.2-1.

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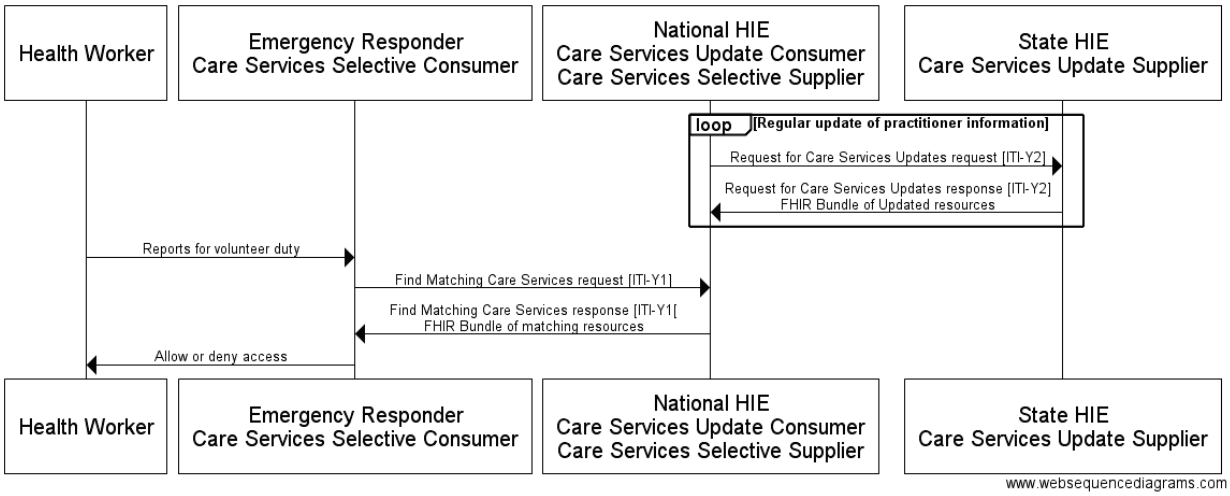

Figure X.4.2.2.2-1: Federated Data Site Management Workflow

```
@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 for Care Services Updates request [ITI-Y2]
State HIE\nCare Services Update Supplier -> National HIE\nCare Services Update Consumer\nCare
Services Selective Supplier : Request for Care Services Updates response [ITI-Y2]\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-Y1]
National HIE\nCare Services Update Consumer\nCare Services Selective Supplier -> Emergency
Responder\nCare Services Selective Consumer : Find Matching Care Services response [ITI-Y1[\nFHIR
Bundle of matching resources
Emergency Responder\nCare Services Selective Consumer -> Health Worker : Allow or deny access
@enduml
```

X.4.2.3 Use Case #3: Cross-jurisdictional Site Management

X.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-

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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.

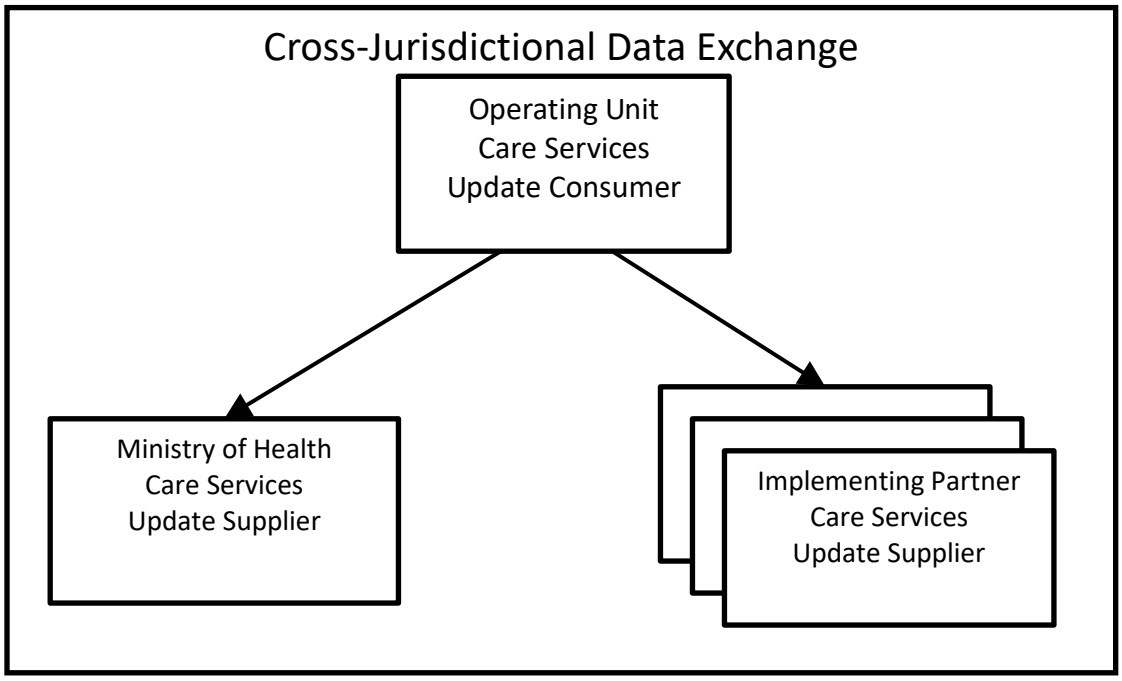

Figure X.4.2.3.1-1: Cross-Jurisdictional Data Exchange

X.4.2.3.2 Cross-jurisdictional Site Management Process Flow

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 X.4.2.3.2-1.

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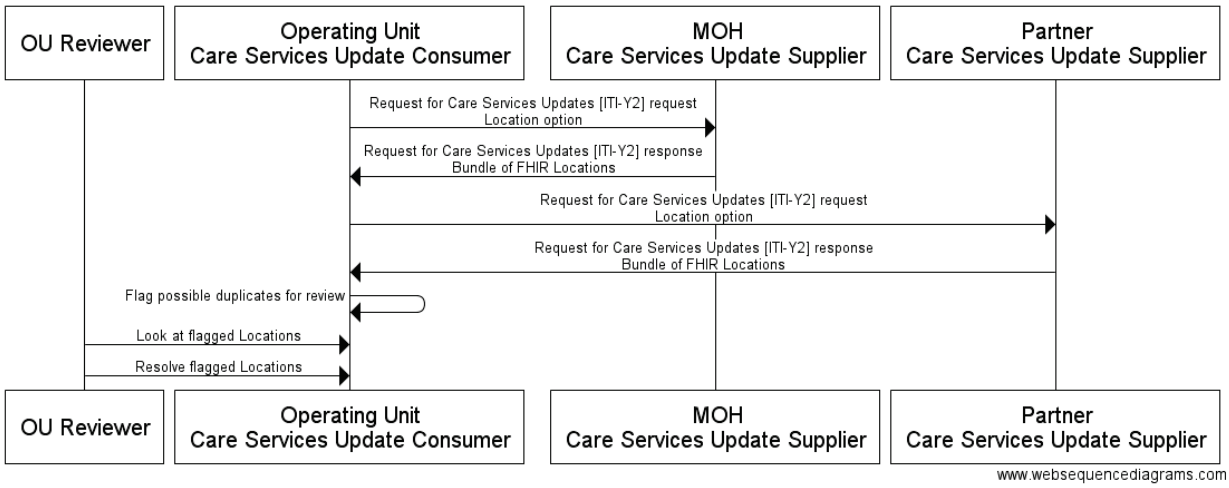

Figure X.4.2.3.2-1: Cross-jurisdictional Site Management Workflow

```
@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 for
Care Services Updates [ITI-Y2] request\nLocation option
MOH\nCare Services Update Supplier->Operating Unit\nCare Services Update Consumer: Request for
Care Services Updates [ITI-Y2] response\nBundle of FHIR Locations

Operating Unit\nCare Services Update Consumer->Partner\nCare Services Update Supplier: Request
for Care Services Updates [ITI-Y2] request\nLocation option
Partner\nCare Services Update Supplier->Operating Unit\nCare Services Update Consumer: Request
for Care Services Updates [ITI-Y2] response\nBundle of FHIR Locations
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
```

X.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, provider 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 mCSD Profile transactions. 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 Authentication (IUA) for REST-

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based authentication. The network communication security and user authentication are layered in the HTTP transport layer and do not modify the interoperability characteristics defined in the mCSD Profile.

X.6 mCSD Cross Profile Considerations

X.6.1 Aggregate Data Exchange – ADX

The QRPH 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 CSD use case of a district health manager running an aggregate report on staffing levels by facility and health worker type.

X.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 allows the CSD actors to allow RESTful transactions without having to change the underlying data store.

X.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 allows the HPD actors to allow RESTful transactions without having to change the underlying data store.

X.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. An mACM 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.

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X.7 mCSD Deployment Considerations

X.7.1 Simple Deployment

In a simple deployment, you 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 X.7.1-1.

Figure X.7.1-1: Simple Deployment

X.7.2 Federated and Cross-Jurisdictional Deployments

In a Federated Deployment you will have multiple levels of the Care Services Update Suppliers linked to Care Services Update Consumers. These Update Consumers may also support being a 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 Selective Consumer clients can query that level of information. See Figure X.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. 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.

A Care Services Update Supplier Actor shall maintain definitive data regarding one or more of: Organization, Location, Healthcare Service, or Practitioner. A Care Services Update Supplier shall be able to 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

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Supplier should support time stamped updates. In this way, for example, data elements that are deprecated are not simply 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 have overlap in the data they manage. In this instance the Care Services Update Consumer will need to resolve any conflicts before sharing onwards this information as either a Care Services Update Supplier or a Care Services Query Supplier. The way in which these conflicts are resolved is defined by the implementing jurisdiction of the Care Services Update Consumer.

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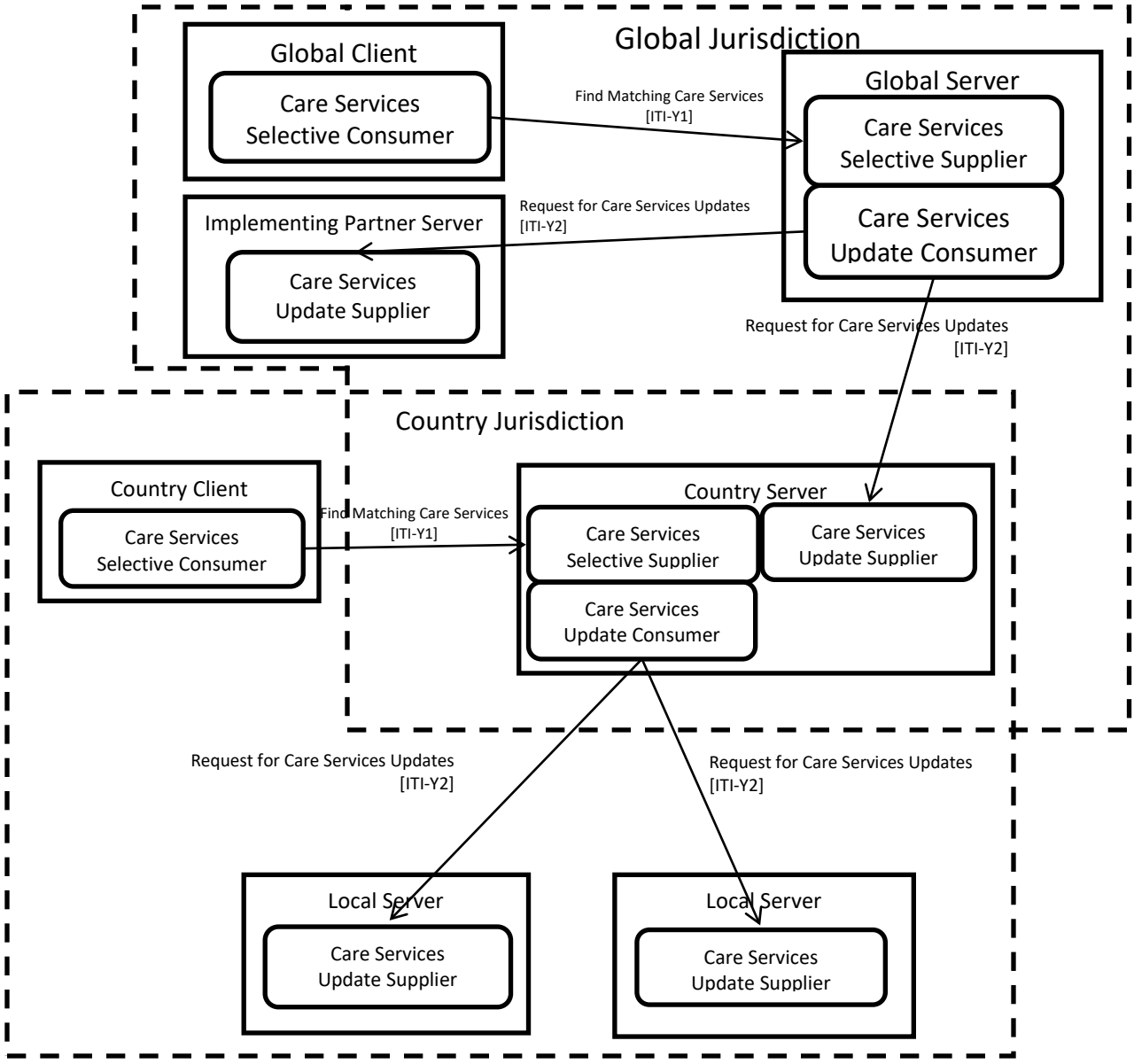

Figure X.7.2-1: Federated and Cross Jurisdictional Deployment

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

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X.7.2-1) it will maintain a cache of the aggregated information from all the configured Care 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.

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 shall 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.
2. Implementing jurisdictions may mandate conventions regarding the types, components and formatting of Name, Address and Address Line elements. Care Services Update Suppliers shall 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 shall ensure that all cross referenced IDs match corresponding resources in the jurisdictionally mandated sources of truth.

Because of the particular challenges regarding the representation of names across multiple languages and in different cultures, attention is drawn 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®[1] XCN name data type.

X.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 SVS Profile or through the use of appropriate FHIR®[2] resources (e.g., ValueSet).

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

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

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Appendices

None

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Volume 2 – Transactions

Add Section 3.Y1

3.Y1 Find Matching Care Services [ITI-Y1]

3.Y1.1 Scope

The Find Matching Care Services transaction is used to return 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.Y1.2 Actor Roles

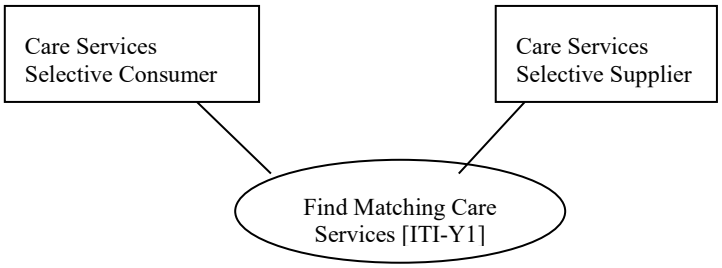

Figure 3.Y1.2-1: Use Case Diagram

Table 3.Y1.2-1: 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.Y1.3 Referenced Standards

- HL7 FHIR standard STU3 http://hl7.org/fhir/STU3/index.html
- HL7 - Health Level 7 Version 2.6 Ch7 Observation Reporting
- ISO/IEEE 11073-10201 Domain Information Model
- ISO/IEEE 11073-10101 Nomenclature

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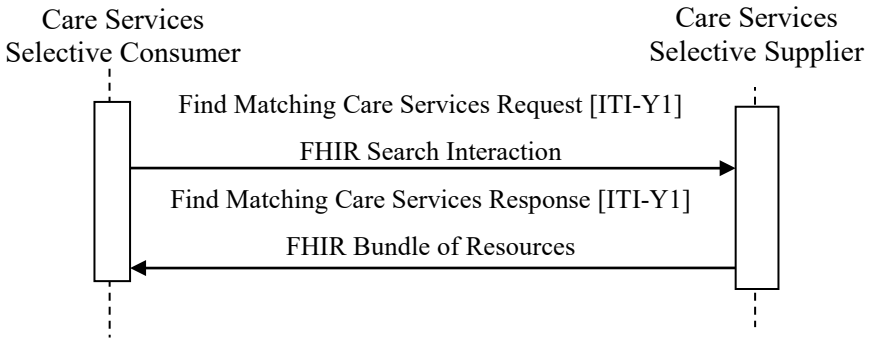
- JSON – IETF RFC7159
- XML
- HTTP 1.1
- XML Schema 1.1
- Tags for Identifying Languages – IETF RFC5646

3.Y1.4 Interaction Diagram



3.Y1.4.1 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.Y1.4.1.1 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 out of scope for this profile.

3.Y1.4.1.2 Message Semantics

A Care Services Selective Consumer initiates a search request using HTTP GET as defined at http://hl7.org/fhir/STU3/http.html#search on the `Organization`, `Location`, `Practitioner`, `PractitionerRole`, and/or `HealthcareService` Resources depending on which Options are supported.

A Care Services Selective Supplier shall support combinations of search parameters as defined at http://hl7.org/fhir/STU3/search.html#combining, "Composite Search Parameters."

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

3.Y1.4.1.2.1 Common Parameters

The Care Services Selective Supplier shall support the following search parameters as defined at http://hl7.org/fhir/STU3/search.html#all.

- _id
- _profile

3.Y1.4.1.2.2 Organization Option Message Semantics

The Care Services Selective Supplier supporting the Organization Option shall support the following search parameters as defined at http://hl7.org/fhir/STU3/organization.html#search.

- active
- identifier
- name
- partof
- type

3.Y1.4.1.2.3 Location Option Message Semantics

The Care Services Selective Supplier supporting the Location Option shall support the following search parameters as defined at http://hl7.org/fhir/STU3/location.html#search.

- identifier
- name
- organization
- partof
- status
- type

3.Y1.4.1.2.4 Practitioner Option Message Semantics

The Care Services Selective Supplier supporting the Practitioner Option shall support the following search parameters as defined at http://hl7.org/fhir/STU3/practitioner.html#search.

- active

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- identifier
- name
- given
- family

It shall also support the following search parameters as defined at http://hl7.org/fhir/STU3/practitionerrole.html#search.

- active
- location
- organization
- practitioner
- role
- service
- specialty

3.Y1.4.1.2.5 Healthcare Service Option Message Semantics

The Care Services Selective Supplier supporting the Healthcare Service Option shall support the following search parameters as defined at http://hl7.org/fhir/STU3/healthcareservice.html#search.

- active
- identifier
- location
- name
- organization
- type

3.Y1.4.1.3 Expected Actions

The Care Services Selective Supplier shall process the query to discover the resources that match the search parameters given, and gives a response as per 3.Y1.4.2 or an error as per http://hl7.org/fhir/STU3/search.html#errors.

3.Y1.4.2 Find Matching Care Services Response Message

The Find Matching Care Services [ITI-Y1] transaction uses the response semantics as defined at http://hl7.org/fhir/STU3/http.html#search as applicable for the resources depending on the supported options.

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3.Y1.4.2.1 Trigger Events

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.Y1.4.2.2 Message Semantics

The Care Services Selective Supplier shall support the search response message as defined at http://hl7.org/fhir/STU3/http.html#search on the following resources depending on the supported options.

- `Organization`, as defined at http://hl7.org/fhir/STU3/organization.html
- `Location`, as defined at http://hl7.org/fhir/STU3/location.html
- `Practitioner`, as defined at http://hl7.org/fhir/STU3/practitioner.html
- `PractitionerRole`, as defined at http://hl7.org/fhir/STU3/practitionerrole.html
- `HealthcareService`, as defined at http://hl7.org/fhir/STU3/healthcareservice.html

3.Y1.4.2.2.1 FHIR Organization Resource Constraints

A Care Services Selective Consumer and a Care Services Selective Supplier shall use a FHIR `Organization` Resource when supporting the Organization Option. The FHIR `Organization` Resource shall be further constrained as described in Table 3.Y1.4.2.2.1-1. The Data Field column in Table 3.Y1.4.2.2.1-1 references the object model defined at http://hl7.org/fhir/STU3/organization.html#resource.

Table 3.Y1.4.2.2.1-1: `Organization` Resource Constraints

Data Field & Cardinality	Description & Constraints	FHIR Data Type
`meta.profile [1..*]`	Shall have a value set to "http://ihe.net/fhir/tag/ITI-Y1"	`uri`
`type [1..*]`	The type field shall have at least one entry.	`CodeableConcept`
`name [1..1]`	The name field shall be set.	`string`

3.Y1.4.2.2.2 FHIR Location Resource Constraints

A Care Services Selective Consumer and a Care Services Selective Supplier shall use a FHIR `Location` Resource when supporting the Location Option. The FHIR `Location` Resource shall be further constrained as described in Table 3.Y1.4.2.2.2-1. The Data Field column in Table

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3.Y1.4.2.2.2-1 references the object model defined at http://hl7.org/fhir/STU3/location.html#resource.

Table 3.Y1.4.2.2.2-1: `Location` Resource Constraints

Data Field & Cardinality	Description & Constraints	FHIR Data Type
`meta.profile` `[1..*]`	Shall have a value set to "http://ihe.net/fhir/tag/ITI-Y1"	`uri`
`type` `[1..1]`	Signifies the service delivery type of the location. It must be set.	`CodeableConcept`
`physicalType` `[1..1]`	Signifies the physical type of the location. It must be set.	`CodeableConcept`
`name` `[1..1]`	The name field must be set.	`string`
`status` `[1..1]`	The status field must be set.	`code (active| suspended| inactive)`

3.Y1.4.2.2.3 FHIR Practitioner Resource Constraints

A Care Services Selective Consumer and a Care Services Selective Supplier shall use a FHIR `Practitioner` Resource when supporting the Practitioner Option. The FHIR `Practitioner` Resource shall be further constrained as described in Table 3.Y1.4.2.2.3-1. The Data Field column in Table 3.Y1.4.2.2.3-1 references the object model defined at http://hl7.org/fhir/STU3/practitioner.html#resource.

Table 3.Y1.4.2.2.3-1: `Practitioner` Resource Constraints

Data Field & Cardinality	Description & Constraints	FHIR Data Type
`meta.profile` `[1..*]`	Shall have a value set to "http://ihe.net/fhir/tag/ITI-Y1"	`uri`
`name` `[1..1]`	The name field must be set.	`HumanName`

3.Y1.4.2.2.4 FHIR PractitionerRole Resource Constraints

A Care Services Selective Consumer and a Care Services Selective Supplier shall use a FHIR `PractitionerRole` Resource when supporting the Practitioner Option. The FHIR `PractitionerRole` Resource shall be further constrained as described in Table 3.Y1.4.2.2.4-1.

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The Data Field column in Table 3.Y1.4.2.2.4-1 references the object model defined at http://hl7.org/fhir/STU3/practitionerrole.html#resource.

Table 3.Y1.4.2.2.4-1: `PractitionerRole` Resource Constraints

Data Field & Cardinality	Description & Constraints	FHIR Data Type
`meta.profile [1..*]`	Shall have a value set to "http://ihe.net/fhir/tag/ITI-Y1"	`uri`
`code [1..*]`	Signifies the role of the practitioner. At least one code must be set.	`CodeableConcept`

3.Y1.4.2.2.5 FHIR HealthcareService Resource Constraints

A Care Services Selective Consumer and a Care Services Selective Supplier shall use a FHIR `HealthcareService` Resource when supporting the HealthcareService Option. The FHIR `HealthcareService` Resource shall be further constrained as described in Table 3.Y1.4.2.2.5-1. The Data Field column in Table 3.Y1.4.2.2.5-1 references the object model defined at http://hl7.org/fhir/STU3/healthcareservice.html#resource.

Table 3.Y1.4.2.2.5-1: `HealthcareService` Resource Constraints

Data Field & Cardinality	Description & Constraints	FHIR Data Type
`meta.profile [1..*]`	Shall have a value set to "http://ihe.net/fhir/tag/ITI-Y1"	`uri`
`type [1..*]`	Signifies the service delivery type of the location. At least one type must be set.	`CodeableConcept`
`name [1..1]`	The name field must be set.	`string`

3.Y1.4.2.3 Expected Actions

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

3.Y1.5 Security Considerations

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

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3.Y2 Request for Care Services Updates [ITI-Y2]

3.Y2.1 Scope

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

3.Y2.2 Actor Roles

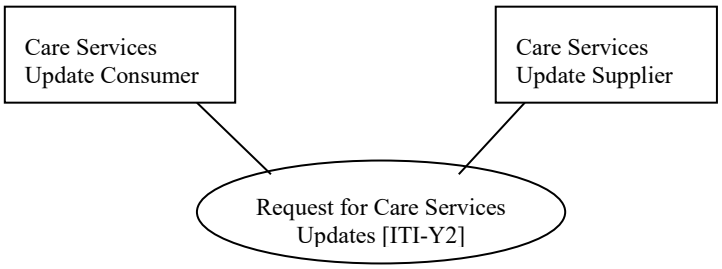

Figure 3.Y2.2-1: Use Case Diagram

Table 3.Y2.2-1: 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.Y2.3 Referenced Standards

- HL7 FHIR standard STU3 http://hl7.org/fhir/STU3/index.html
- HL7 - Health Level 7 Version 2.6 Ch7 Observation Reporting
- ISO/IEEE 11073-10201 Domain Information Model
- ISO/IEEE 11073-10101 Nomenclature
- JSON – IETF RFC7159
- XML
- HTTP 1.1
- XML Schema 1.1

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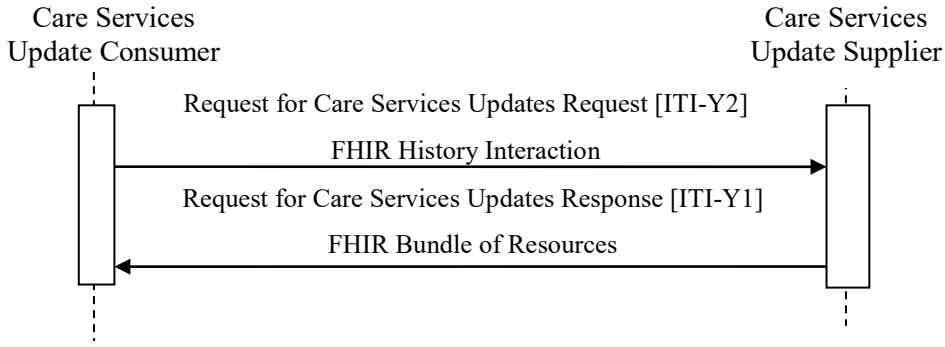
- Tags for Identifying Languages – IETF RFC5646

3.Y2.4 Interaction Diagram



3.Y2.4.1 Request for Care Services Updates Request Message

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

3.Y2.4.1.1 Trigger Events

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

3.Y2.4.1.2 Message Semantics

A Care Services Update Consumer initiates a history request using HTTP GET as defined at http://hl7.org/fhir/STU3/http.html#history on the `Organization`, `Location`, `Practitioner`, `PractitionerRole`, and/or `HealthcareService` Resources.

A Care Services Update Supplier shall support the requirements in ITI TF-2x: Z.6 and the _since parameter.

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 use either the JSON or the XML messaging formats as defined in FHIR. See ITI TF-2x: Appendix Z.6 for more details.

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3.Y2.4.1.3 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 3.Y2.4.2 or an error as per http://hl7.org/fhir/STU3/search.html#errors.

3.Y2.4.2 Request for Care Services Updates Response Message

The Request for Care Services Updates [ITI-Y2] transaction uses the response semantics as defined at http://hl7.org/fhir/STU3/http.html#history as applicable for the resources depending on the supported options.

3.Y2.4.2.1 Trigger Events

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

3.Y2.4.2.2 Message Semantics

The Care Services Update Supplier shall support the history response message as defined at http://hl7.org.fhir/STU3/http.html#history on the following resources:

- `Organization`, as defined at http://hl7.org/fhir/STU3/organization.html
- `Location`, as defined at http://hl7.org/fhir/STU3/location.html
- `Practitioner`, as defined at http://hl7.org/fhir/STU3/practitioner.html
- `PractitionerRole`, as defined at http://hl7.org/fhir/STU3/practitionerrole.html
- `HealthcareService`, as defined at http://hl7.org/fhir/STU3/healthcareservice.html

3.Y2.4.2.2.1 FHIR Organization Resource Constraints

A Care Services Update Consumer and a Care Services Update Supplier shall use a FHIR `Organization` Resource when supporting the Organization Option. The FHIR `Organization` Resource shall be further constrained as described in Table 3.Y1.4.2.2.1-1. The Data Field column in Table 3.Y1.4.2.2.1-1 references the object model defined at http://hl7.org/fhir/STU3/organization.html#resource.

3.Y2.4.2.2.2 FHIR Location Resource Constraints

A Care Services Update Consumer and a Care Services Update Supplier shall use a FHIR `Location` Resource when supporting the Location Option. The FHIR `Location` Resource shall be further constrained as described in Table 3.Y1.4.2.2.2-1. The Data Field column in Table 3.Y1.4.2.2.2-1 references the object model defined at http://hl7.org/fhir/STU3/location.html#resource.

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3.Y2.4.2.2.3 FHIR Practitioner Resource Constraints

A Care Services Update Consumer and a Care Services Update Supplier shall use a FHIR `Practitioner` Resource when supporting the Practitioner Option. The FHIR `Practitioner` Resource shall be further constrained as described in Table 3.Y1.4.2.2.3-1. The Data Field column in Table 3.Y1.4.2.2.3-1 references the object model defined at http://hl7.org/fhir/STU3/practitioner.html#resource.

3.Y2.4.2.2.4 FHIR PractitionerRole Resource Constraints

A Care Services Update Consumer and a Care Services Update Supplier shall use a FHIR `PractitionerRole` Resource when supporting the Pracitioner Option. The FHIR `PractitionerRole` Resource shall be further constrained as described in Table 3.Y1.4.2.2.4-1. The Data Field column in Table 3.Y1.4.2.2.4-1 references the object model defined at http://hl7.org/fhir/STU3/practitionerrole.html#resource.

3.Y2.4.2.2.5 FHIR HealthcareService Resource Constraints

A Care Services Update Consumer and a Care Services Update Supplier shall use a FHIR `HealthcareService` Resource when supporting the Healthcare Service Option. The FHIR `HealthcareService` Resource shall be further constrained as described in Table 3.Y1.4.2.2.5-1. The Data Field column in Table 3.Y1.4.2.2.5-1 references the object model defined at http://hl7.org/fhir/STU3/healthcareservice.html#resource.

3.Y2.4.2.3 Expected Actions

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

3.Y2.5 Security Considerations

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

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Appendices

None

Volume 2 Namespace Additions

None

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Volume 3 – Content Modules

No new content modules defined by this supplement.

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Appendices

None

Volume 4 – National Extensions

Add appropriate Country section

4 National Extensions

None

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