**Integrating the Healthcare Enterprise**



IHE Patient Care Coordination

Technical Framework Supplement

**Retrieve Clinical Knowledge  
(RCK)**

Draft in preparation for Public Comment

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**Foreword**

This is a supplement to the IHE <Domain Name> Technical Framework <VX.X>. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

*<For Public Comment:>* This supplement is published on <Month XX, 201x> for Public Comment. Comments are invited and may be submitted athttp://www.ihe.net/Technical\_Framework/public\_comment.cfm. In order to be considered in development of the Trial Implementation version of the supplement comments must be received by <Month XX, 201X>.

*<For Trial Implementation:>* This supplement is published for Trial Implementation on <Month XX, 201X> 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 <Domain Name> Technical Framework. Comments are invited and may be submitted at <http://www.ihe.net/Technical_Framework/public_comment.cfm> .

This supplement describes changes to the existing technical framework documents and where indicated amends text by addition (bold underline) or removal (bold strikethrough), as well as addition of new sections introduced by editor’s instructions to “add new text” or similar, which for readability are not bolded or underlined.

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

Replace Section X.X by the following:

This Supplement Template is intended for the development of new Profiles. Simple changes or updates to existing Supplements or Profiles should be made using the Change Proposal process. However, the addition of formal Options and significant changes may not be made using the Change Proposal process. In this latter case, this Supplement Template should be used, but a paragraph should be added to the Forward and to the Introduction to the Supplement explaining the situation. Also, see the Technical Framework Development section at <http://wiki.ihe.net/index.php?title=Process#Technical_Framework_Development> for more guidance on CPs versus new Supplements.

All of the sections in this document are required. Sections may not be deleted. The outline numbering is intended to be consistent across Profiles and across Domains, so do not adjust the outline numbering. If there is no relevant content for a section, simply state “Section not applicable.”, but leave the numbering intact. Sub-sections may be added for clarity.

This Supplement Template includes templates for Volumes 1 (Profiles), 2 (Transactions), 3 (Content Modules), and 4 (National Extensions). Volumes 1, 2, and/or 3 are developed together for Public Comment and Trial Implementation submission. Volume 4, National Extensions, are typically developed at a later point in time, usually at Trial Implemenation or later. Templates for all four volumes are included in this document for the sake of completeness. If you are beginning a new profile, you are strongly discouraged from using National Extensions and should instead focus on optional data sets or other alternatives. For more information, see <http://wiki.ihe.net/index.php?title=National_Extensions_Process> .

General information about IHE can be found at: [www.ihe.net](http://www.ihe.net)

Information about the IHE <Domain Name> can be found at: <http://www.ihe.net/Domains/index.cfm>

Information about the structure of IHE Technical Frameworks and Supplements can be found at: <http://www.ihe.net/About/process.cfm> and <http://www.ihe.net/profiles/index.cfm>

The current version of the IHE Technical Framework can be found at: <http://www.ihe.net/Technical_Framework/index.cfm>

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# Introduction to this Supplement

The HL7 Infobutton standard is widely deployed, but still requires a good deal of custom integration to support access to clinical knowledge, often using of proprietary vocabularies and a variety of different response formats. The Request for Clinical Knowledege Profile addresses

## Open Issues and Questions

1. What value set should be assigned to the ageGroup parameter? In the US, age greater than 79 is considered to be individually identifiable health information, and so some form of age group representation is needed to ensure that age can be sent when available and legal.
2. What value set should be used for subTopic? LOINC FDA Insert sections are suitable for many medication related queries, but no relationship such section list appears for lab compendia, procedures, problems, or other clinical concepts.

## Closed Issues

1. Should there be separate transactions for query vs. subscribe? No. One transaction can serve both purposes.
2. What standard should we use to format the response? The choices seem to be Atom or RSS. We used Atom because it has been used by other HL7 published implementation guides, is more cleanly extensible, and has a schema for validation. For additional comparison see <http://www.intertwingly.net/wiki/pie/Rss20AndAtom10Compared>
3. Should we support holder.assignedEntity.n and holder.assignedEntity.certificateText to pass authentication parameters? No, because this is incompatible with methods used to authenticate with other web resources, violates separation of security and application layers, and would result in inconsistent mechanisms for authentication between the two transactions.
4. What version of the HL7 Infobutton Standard should we reference? The latest Implementation guide (in DSTU status) is based on the current draft content rather than the last DSTU of the standard. We will reference the current draft (being balloted now), in the anticipation that it will be finished when this profile goes to trial implemenation. The guide is already at DSTU.
5. GET or POST? We agreed that POST is the best choice.
6. How much freedom should we give Clinical Knowledge Requester applications with the parameters? We should normalize the behaviors of the requester as much as possible to ensure that Clinical Knowledge Sources receive what they may need. Clinical Knowledge Sources are free to ignore information that isn’t needed in their implementation.
7. How should we deal with bibliographic citations and funding sources (to meet US Meaningful Use requirements). We addressed these by profiling the use of three Dublin Core terms as Atom feed extensions.

Volume 1 – Profiles

## *Copyright Permission*

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

Add to Section …

# X Retrieve Clinical Knowledge (RCK) Profile

This profile describes how Health IT systems, Person Health Records, and HIEs can retrieve clinical knowledge on a topic, suitable for presentation to a healthcare provider or patient.

There are a great number of web resources available that support access of Clinical Knowledge on a specific disease, medical condition, set of symptoms or complaints, medications, et cetera for both providers and patients. However, these resources have inconsistent representations of content, search APIs, and responses, making them difficult to integrate into Healthcare IT solutions. This profile provides a consistent set of rules for querying for information that is either patient or provider-oriented, and on how to return results so that EHRs and PHRs can process the results and display them in a uniform way.

## X.1 RCK Actors, Transactions, and Content Modules

Figure X.1-1 shows the actors directly involved in the RCK 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.

Request Clinical Knowledge [Y] ↑

Clinical Knowledge Source

Clinical Knowledge Requestor

Clinical Knowledge Repository

Retrieve Clinical Knowledge [Z] ↓

Figure X.1-1 RCK Actor Diagram

Table X.1-1 lists the transactions for each actor directly involved in the RCK Profile. In order to claim support of this Profile, an implementation of an actor must perform the required transactions (labeled “R”) and may support the optional transactions (labeled “O”). Actors groupings are further described in Section X.3.

Table X.1-1 RCK Profile - Actors and Transactions

| Actors | Transactions | Optionality | Section in Vol. 2 |
| --- | --- | --- | --- |
| Clinical Knowledge Source | Request Clinical Knowledge | R | 3.Y |
| Clinical Knowledge Requester | Request Clinical Knowledge | R | 3.Y |
| Retrieve Clinical Knowledge | R | 3.Z |
| Clinical Knowledge Repository | Retrieve Clinical Knowledge | R | 3.Z |

### X.1.1 Actor Descriptions and Actor Profile Requirements

Normative requirements are typically documented in Volume 2 (Transactions) and Volume 3 (Content Modules). Some Integration Profiles, however, contain requirements which link transactions, data, and/or behavior. Those Profile requirements are documented in this section as normative requirements (“shall”).

#### X.1.1.1 Clinical Knowledge Source

A clinical knowledge source receives queries and subscriptions for clinical knowledge. It returns a list of relevant clinical knowledge resources based on the content of the query or subscription.

#### X.1.1.2 Clinical Knowledge Requester

A Clinical Knowledge Requester collects appropriate clinical context and uses it to generate a clinical knowledge request.

Clinical Knowledge Sources and Repositories need not be housed in the same network as the Clinical Knowledge Requester actor. Given that these actors may be components of healthcare IT applications, such as electronic health records, they may be supported on networks that are firewalled from the outside world. To enable Clinical Knowledge Requesters to communicate with Sources and Repositories, the Clinical Knowledge Requester actor should be able to be configured such that its transactions can be routed through a proxy connection.

#### X.1.1.3 Clinical Knowledge Repository

A Clinical Knowledge Repository stores documents providing clinical knowledge and returns them to Requesters on demand.

## X.2 RCK Actor Options

Options that may be selected for this Profile are listed in the table X.2-1 along with the Actors to which they apply. Dependencies between options when applicable are specified in notes.

Table X.2-1 <Profile Name> - Actors and Options

| Actor | Options | Volume & Section |
| --- | --- | --- |
| Clinical Knowledge Source | *No options defined* | - - |
| Clinical Knowledge Requester | *No options defined* | - - |
| Clinical Knowledge Repository | *No options defined* | - - |

## X.3 RCK Actor Required Groupings

Actor(s) which are required to be grouped with another Actor(s) are listed in this section. The grouped Actor may be from this profile or a different domain/profile. These mandatory required groupings, plus further descriptions if necessary, are given in the table below.

An Actor from this profile (Column 1) must implement all of the required transactions in this profile in addition to all of the required transactions for the grouped profile/actor listed (Column 2).

Table X.3-1 <Profile Name> - Actors Required Groups

| RCK Actor | Required Grouping Actor | Technical  Framework Reference | Note |
| --- | --- | --- | --- |
| Clinical Knowledge Source | Secure Node or Secure Application | ITI TF-1:9 ATNA |  |
| Clinical Knowledge Requester | Secure Node or Secure Application | ITI TF-1:9 ATNA |  |
| Clinical Knowledge Repository | Secure Node or Secure Application | ITI TF-1:9 ATNA |  |

## X.5 RCK Overview

### X.5.1 Overview of the Request Context

The context of the request provides details about the clinical concept on which information is being sought. The context helps to determine the kind of information required, and may include:

* Patient Demographics (Age, Age Group or Gender)
* Location
* Audience (Patient or provider and preferred language)
* Type of Patient Encounter (inpatient, outpatient, emergency, et cetera)
* Query Topic
* Request Initiator (Provider, Patient)

The information being returned should be appropriate to the supplied context where possible.

#### X.5.1.1 Patient Demographics

Age and gender assist the clinical knowledge source in providing information that is most relevant for the patient. Age beyond certain limits is considered to be personally identifyable information, so the clinical knowledge source must be able to accept age ranges as well as a specific age. For neonates and infants, age must be able to be specified in units smaller than years, e.g., months, weeks or days.

In general, queries containing age should be specified it in units greater than two, e.g., for an infant under two years old, the age should be specified in months, under two months old should have age specified in weeks, and under two weeks, should be specified in days. Clinical knowledge Requesters should accept age values specified in years, months, weeks or days, and may normalize age depending on the type of information they provide.

Gender need only be specified as male, female or undetermined.

#### X.5.1.2 Location

The provider and/or patient location can be used to customize results based on location specific knowledge. Location information about either the patient, or where they seek treatment could be considered to be personally identifyable information, especially if highly detailed. For most use cases, location information can be limited to simple regional identifiers (postal codes, cities, states).

#### X.5.1.3 Audience

The information returned may be for consumption by either a patient, or a healthcare provider. The content may be requested in a specific language.

#### X.5.1.4 Query Topic

The topic being query can be divided up into at least three separate components. The main topic of interest is usually based upon a coded term, such as a diagnostic result, problem or diagnosis, medication or procedure.

The subtopics are common secondary index terms that commonly appear within the context of the main topic and identify the kind of information being requested on the main topic. The subtopic should come from a limited vocabulary.

The workflow task being performed can assist the clinical knowledge source in determining what kind of may be relevant. For example, a query on a diagnosis during medication order entry might return clinical knowledge sources describing suggested medications for treatment, whereas the same request during review of discharge notes might return information on that diagnosis and the discharge instructions associated with it. The behaviors associated with use of the workflow task and type of information returned is up to the clinical knowledge source.

### X.5.2 Use Case #1: Patient Education

In this use case, a provider uses the profile to access Patient oriented education information on a laboratory result, condition, diagnosis, or medication.

#### X.5.2.1 Patient Education Use Case Description

Upon completion of an encounter, a healthcare provider will request information based on diagnoses made, medications prescribed, or test results used during the encounter from his or her Electronic Health Record. The EHR will format a request, sending it to a clinical knowledge source. The clinical knowledge source will locate appropriate patient education materials and return a list of the these to the EHR. The EHR will display appropriate metadata about the information to the provider. The provide will then print appropriate articles and give them to the patient. The EHR will record the information provided to the patient.

### X.5.2.2 Patient Education Process Flow

*Request Clinical Knowledge [Y.1]*

Clinical Knowledge Source

Actor E

Clinical Knowledge Requestor

Actor B

*Select Topic*

*Retrieve Clinical Knowledge [Y.2]*

Clinical Knowledge Repository

Figure X.5.2.2-1 Basic Process Flow in RCK Profile

### X.5.2 Use Case #2: Public Health Alerting

Accessing provider oriented information on current public health alerts based on patient symptoms, demographics and location.

#### X.5.2.1 Public Health Alerting Use Case Description

### X.5.3 Use Case #3: Clinical Trial Subscription

Accessing clinical trial information on for specific diseases, patient demographics and location.

#### X.5.3.1 Clinical Trial Subscription Use Case Description

### X.5.3.2 Subscription Process Flow

*Request Clinical Knowledge [Y.1]*

Clinical Knowledge Source

Actor E

Clinical Knowledge Requestor

Actor B

*Select Topic*

*Retrieve Clinical Knowledge [Y.2]*

Clinical Knowledge Repository

*Request Clinical Knowledge [Y.1]*

## X.6 RCK Security Considerations

### X.6.1 Individually Identifiable Information and User Credentials

The context information may include age, gender and location information, which is often suffient to individually identify a single person or small group of persons. A clinical knowledge Requester could expose individually identifiable data to other systems nearby it or the recipient of the query, and to anyone with access to communications channels between the two systems. This might include exposure to nearby computers, maintainers of the IT infrastructure where the query is originated or received, and any intermediaries.

In order to protect the individually identifiable information, IHE requires that actors implementing the RCK profile also implement the ATNA Secure Node or Secure Application actor, and encrypt all communications. Use of ATNA will also ensure that any credentials required to access the Clinical Information Source are protected from exposure.

IHE mandates the use of ATNA in this profile to ensure that implementors and organizations aquiring these systems can appropriately secure the data. However, IHE cannot mandate that these capabilities be enabled for any given implementation. Organizations that choose to disable these features should take appropriate precautions to secure their systems.

### X.6.2 Configuration Information

Some systems used to support requests or retrieval of clinical knowledge (such as publically available feed readers) may not appropriately secure the URL parameters used to retrieve the feed. This can expose individually identifiable health information (e.g., person X is retrieving information on clinical trials for condition Y). Applications which make such subscription URLs readily available for access through a feed reader should provide adequate warnings to users about the possible exposures of PHI.

### X.6.3 Clinical Knowledge

Applications which support consumption of data from a clinical information source or repository may not be in a position to control the breadth, appropriateness, readability, availability, accuracy, currency, or overall quality of the content to which users of that data are exposed. Implementers are advised to either configure information systems accessing clinical knowledge with well-qualified clinical resources, or to warn users that the clinical information which they may retrieve is not guaranteed to be accurate, et cetera, and that the end-user is responsible for ensuring the validity of the information source.

The clinical knowledge managed and returned by the Clinical Knowledge Source and Clinical Knowledge Repository are both valuable and susceptible to a variety of threats, including theft and malicious or accidental corruption. They also may be offered to licensed or otherwise authorized users. To protect user credentials from exposure, IHE requires the use of the ATNA Secure Node and/or Secure Application actor with actors from the RCK profile. To ensure appropriate authorization to access content, application developers may wish to consider use of the IHE EUA or XUA profiles as appropriate.

The resposibility to manage server resources used to index and maintain the clinical content remains the responsibility of the organization implementing and/or deploying the Clinical Knowledge Source and Clinical Knowledge Repository actorws.

### X.6.4 Interfaces and Services

Clinical Knowledge Sources and Repositories can be implemented using standard HTTP services. These services are subject to the same kinds of attacks as other web servers. Implementers of these systems are advised to provide additional security due to the sensitivity of data which they gather and communicate. For example, server access logs typically gather information about the Requester, including the requested URL and the Requester’s IP address. These two information items together could contain individually identifiable information.

Loss of the server logs may be viewed as a privacy breach under laws and regulations of many regions, and could require public reporting, or other remedies to be provided to the individuals whose information was lost; resulting in potential loss of reputation and/or income, and/or increased expenses to remedy those impacted by the breach.

Other attacks, such as denial of service, may prevent services from being accessed, and must be protected against by means not described in this profile.

### X.6.5 Client Applications and Systems

Information returned from a query may be accessed and displayed using common browser technology and/or feed readers, and as such, is susceptible to the same variety attacks to which browsers are susceptible (e.g., trojans, viruses, scripting attacks, et cetera). Clinical Information Sources making information available to consumers through these applications should provide information about the security risks associated with accessing the information.

## X.7 RCK Cross Profile Considerations

The Retrieve Clinical Knowledge profile can be used to assist patients or providers in interpreting information found in clinical documents which are exchanged using templates described in the PCC Technical Framework. For example, it could retrieve appropriate patient education and follow-up instructions during creation of a discharge summary, history and physical examination. It could also be used by a PHR to assist a patient in understanding the content of information send using the XPHR profile, or provide more details about lab results reported using the Antepartum Laboratory Profile.

It might also be used to help educate those responsible for completing data capture forms used with the RFD profile.

Actor Summary Definitions

**Clinical Knowledge Source**

A clinical knowledge source receives queries and subscriptions for clinical knowledge. It returns a list of relevant clinical knowledge resources based on the content of the query or subscription.

**Clinical Knowledge Requester**

A Clinical Knowledge Requester collects appropriate clinical context and uses it to generate a clinical knowledge request.

**Clinical Knowledge Repository**

A Clinical Knowledge Repository stores documents providing clinical knowledge and returns them to Requesters on demand.

Transaction Summary Definitions

**Request Clinical Knowledge**

This transaction involves a request to locate clinical knowledge resources relevant to a particular term or collection of terms found on a patient’s chart, such as a problem, medication, allergy, laboratory result, et cetera.

**Retrieve Clinical Knowledge**

This transaction involves the retrieval of a single clinical knowledge resource previously identified to a system.

**Glossary**

**Infobutton**

An Infobutton is a graphical user interface element which allows the user of an application to quickly obtain information about a specialized term or value found on application displays. It is typically represented as a lowercase letter i in a blue circle . The term may also be used to refer to the HL7 Context Aware Information Retrieval standard, which is often used to implement the information retrieval side of interface.

Volume 2 – Transactions

Add section 3.Y

## 3.Y Request Clinical Knowledge

### 3.Y.1 Scope

This transaction involves the request for clinical knowledge resources for subsequent presentation purposes. This may occur when a user attempts to lookup information relevant to a particular term or collection of terms found on a patient’s chart, such as a problem, medication, allergy, laboratory result, et cetera.

To support access to a wide variety of information sources, information is returned as an Atom feed listing links to relevant resources.

### 3.Y.2 Use Case Roles

Clinical Knowledge Requestor

Clinical Knowledge Source

**Actor:** Clinical Knowledge Requester

**Role:** Electronic Health Record (REDS\_AR010002UV01)

**Actor:** Clinical Knowledge Source

**Role:** Decision Support System (REDS\_AR010001UV01)

### 3.Y.3 Referenced Standards

* Context-aware Information Retrieval (Infobutton) Draft for Ballot May 2012  
  <http://www.hl7.org/v3ballot/html/domains/uvds/uvds_Context-awareKnowledgeRetrieval(Infobutton).html>
* HL7 Version 3 Implementation Guide: URL-Based Implementations of the Context-Aware Information Retrieval (Infobutton) Domain, Release 3  
  <http://www.hl7.org/implement/standards/product_brief.cfm?product_id=22>
* RFC-4287 The Atom Syndication Format   
  <http://tools.ietf.org/html/rfc4287>
* DCMI Metadata Terms (Dublin Core)   
  <http://dublincore.org/documents/dcmi-terms/>

### 3.Y.4 Interaction Diagram

Clinical Knowledge Requestor

Infobutton Knowledge Request

Clinical Knowledge Source

Infobutton Knowledge Response

#### 3.Y.4.1 Infobutton Knowledge Request

##### 3.Y.4.1.1 Trigger Events

A context aware knowledge request event is triggered by the Clinical Knowledge Requester, e.g., in response to a user clicking on an Infobutton in an EHR.

##### 3.Y.4.1.2 Message Semantics

The Infobutton Knowledge Request is sent as a set of name-value pairs in an HTTP POST transaction. Table 3.Y.4-1 below lists the required and optional parameters and whether or not they are repeatable. The name of the first occurrence of a repeatable parameter is provided as shown in the table. Second and subsequent occurences of a repeatable parameter use the same name as the first, and append sequential numbers starting at 1. See the Infobutton URL Implementation guide for more details on numbering parameters.

Detailed requirements on each of the parameters follows the table.

Table 3.Y.4-1 Infobutton Request Parameters

|  |  |  |
| --- | --- | --- |
| **Parameter Name** | **Repeatable** | **Required/ Optional** |
| knowledgeRequestNotification.id.root | N | R |
| knowledgeRequestNotification.effectiveTime.v | N | O |
| assignedAuthorizedPerson.id.root | N | O |
| assignedAuthorizedPerson.id.extension |
| representedOrganization.id.root | N | O |
| representedOrganization.id.extension |
| patientPerson.administrativeGenderCode.c | N | R |
| age.v.v | N | C1 |
| age.v.u |
| ageGroup.v.c | N | C2 |
| taskContext.c.c | N | R |
| subTopic.v.c | N | R |
| subTopic.v.cs |
| mainSearchCriteria.v.c | Y | R |
| mainSearchCriteria.v.cs |
| mainSearchCriteria.v.ot | Y | R |
| informationRecipient | N | R |
| informationRecipient.healthCareProvider.c.c | N | O |
| informationRecipient.healthCareProvider.c.cs |
| informationRecipient.languageCode.c | Y | R |
| performer | N | O |
| performer.languageCode.c | Y | C3 |
| performer.healthCareProvider.c.c | N | O |
| performer.healthCareProvider.c.cs |
| encounter.c.c | N | O |
| serviceDeliveryLocation.id.root | Y | O |
| serviceDeliveryLocation.id.extension |

1 Age shall be sent when it is not considered to be individually identifiable information.

2 Age group shall be sent when age is considered to be individually identifiable information.

3 This parameter shall be sent when mainSearchCriteria.v.ot is present as a parameter.

###### knowledgeRequestNotification.id.root

1. The Clinical Knowledge Requester shall send this parameter for every retrieval. The value shall be an OID or UUID that uniquely identifies the individual request and shall not be repeated for any subsequent request.
2. The Clinical Knowledge Source shall report this identifier in its subequent responses.

###### knowledgeRequestNotification.effectiveTime.v

1. The Clinical Knowledge Requester may send this parameter.
2. When this parmater is present, the Clinical Knowledge Source may use this date and time to limit the search results, but is not required to.
3. When this parameter is used to limit the search, the Clinical Knowledge Source should not return any results which were updated after this date an time.
4. Clinical Knowledge Requesters shall not rely on this behavior.

###### ~~holder.assignedEntity.n holder.assignedEntity.certificateText~~

These parameters are designed to hold the user name and password used to authenticate with the Clinical Knowledge Source from the HL7 Version 3 message content. However, this violates the separation of the security and access control layer from the application layer, and provide for an alternate method to request access to content that is not supported by common web application frameworks and tools.

1. The Clinical Knowledge Requester Actor shall not used these parameters to authenticate with the Clinical Knowledge Source. There are numerous methods supported through the HTTP protocol to authenticate users with a web server, and one of these should be used instead.

###### assignedAuthorizedPerson.id.root assignedAuthorizedPerson.id.extension

1. The Clinical Knowledge Requester may use these parameter to pass the user id and assigning authority to the Clinical Knowledge Source.
2. When present, the Clinical Knowledge Source shall use this information in the audit log to identify the requester.

###### representedOrganization.id.root representedOrganization.id.extension

1. The Clinical Knowledge Requester may use these parameters to pass the organization’s id and assigning authority to the Clinical Knowledge Source.
2. When these parameters are present and the assignedAuthorizedPerson.id parameters are absent, the Clinical Knowledge Source shall use this information in the audit log to identify the requester.

###### patientPerson.administrativeGenderCode.c

1. The Clinical Knowledge Requester shall send the gender when it is known. When the gender is not known, this parameter may be omitted[[1]](#footnote-1).

The code system is fixed by the HL7 Infobutton Standard to be codes from the HL7 Administrative Gender domain. Table 3.Y.4-2 below lists the allowed codes.

Table 3.Y.4-2 Administrative Gender Codes

|  |  |
| --- | --- |
| Code | Description |
| M | Male |
| F | Female |
| UN | Undifferentiated, used when gender cannot be distinguished. This is commonly misinterpreted to be Unknown, but that interpretation is not correct. |

###### age.v.v age.v.u

1. The Clinical Knowledge Requester shall send age when it is known and not considered (e.g., due to advanced age) to be individually identifiable information. Age ranges that are considered individually identifiable are determined by local policy.
2. The values in Table 3.Y.4-3 Age Unit Codes are the only values allowed for the age unit found in age.v.u and shall be interpreted by the Clinical Knowledge Source according to the table below.
3. The Clinical Knowledge Requester should send the age in years when the patient is more than 2 years old, in months when the patient is is more than 2 months old but less than 2 years old, weeks when the patient is more than 2 weeks old but less than 2 months old, days when the patient is more than 2 days old but less than 2 weeks old, and in hours when the patient is less than 2 days in age.
4. The Clinical Knowledge Requester shall not send age as a decimal fraction.
5. The Clinical Knowledge Source shall appropriately interpret age specified in any unit.
6. The Clinical Knowledge Source may use appropriate mathematical approximations to convert between units.

Table 3.Y.4-3 Age Unit Codes

|  |  |
| --- | --- |
| Unit Code | Description |
| a | Year |
| m | Month |
| w | Week |
| d | Day |
| h | Hour |

Note: Gestational Age rather than age as days since birth is often quite relevant in neonatal contexts. However, this profile expects the Clinical Knowledge Requester to send the age since birth. Clinical Knowledge Sources should consider the range of possible gestational ages associated with the days since birth when searching for relevant content in these cases.

###### ageGroup.v.c ageGroup.v.cs

1. The Clinical Knowledge Requester shall send these parameters when age is known but is considered (e.g., due to advanced age) to be individually identifiable information.

Note: The code system is not profiled. We would welcome suggestions for an appropriate value set to apply for the ageGroup parameters.

###### taskContext.c.c

1. The Clinical Knowledge Requester shall send the task currently being performed using terms from the HL7 ActTaskCode value set of the ActCode vocabulary. The codes found in Table 3.Y.4-4 Task Context Codes are the only codes that may be sent in this parameter.
2. The Clinical Knowledge Source may use this parameter to filter relevant content for the user.

Table 3.Y.4-4 Task Context Codes

|  |  |  |
| --- | --- | --- |
| Code | Display Name | Description |
| OE | order entry task | A clinician creates a request for a service to be performed for a given patient. |
| LABOE | laboratory test order entry task | A clinician creates a request for a laboratory test to be done for a given patient. |
| MEDOE | medication order entry task | A clinician creates a request for the administration of one or more medications to a given patient. |
| PATDOC | patient documentation task | A person enters documentation about a given patient. |
| ALLERLREV | allergy list review | A person reviews a list of known allergies of a given patient. |
| CLINNOTEE | clinical note entry task | A clinician enters a clinical note about a given patient |
| DIAGLISTE | diagnosis list entry task | A clinician enters a diagnosis for a given patient. |
| DISCHSUME | discharge summary entry task | A clinician enters a discharge summary for a given patient. |
| PATREPE | pathology report entry task | A pathologist enters a report for a given patient. |
| PROBLISTE | problem list entry task | A clinician enters a problem for a given patient. |
| RADREPE | radiology report entry task | A radiologist enters a report for a given patient. |
| IMMLREV | immunization list review | A person reviews a list of immunizations due or received for a given patient. |
| REMLREV | reminder list review | A person reviews a list of health care reminders for a given patient. |
| WELLREMLREV | wellness reminder list review | A person reviews a list of wellness or preventive care reminders for a given patient. |
| PATINFO | patient information review task | A person (e.g., clinician, the patient herself) reviews patient information in the electronic medical record. |
| ALLERLE | allergy list entry | A person enters a known allergy for a given patient. |
| CLINNOTEREV | clinical note review task | A person reviews a clinical note of a given patient. |
| DISCHSUMREV | discharge summary review task | A person reviews a discharge summary of a given patient. |
| DIAGLISTREV | diagnosis list review task | A person reviews a list of diagnoses of a given patient. |
| IMMLE | immunization list entry | A person enters an immunization due or received for a given patient. |
| LABRREV | laboratory results review task | A person reviews a list of laboratory results of a given patient. |
| MICRORREV | microbiology results review task | A person reviews a list of microbiology results of a given patient. |
| MICROORGRREV | microbiology organisms results review task | A person reviews organisms of microbiology results of a given patient. |
| MICROSENSRREV | microbiology sensitivity test results review task | A person reviews the sensitivity test of microbiology results of a given patient. |
| MLREV | medication list review task | A person reviews a list of medication orders submitted to a given patient |
| MARWLREV | medication administration record work list review task | A clinician reviews a work list of medications to be administered to a given patient. |
| OREV | orders review task | A person reviews a list of orders submitted to a given patient. |
| PATREPREV | pathology report review task | A person reviews a pathology report of a given patient. |
| PROBLISTREV | problem list review task | A person reviews a list of problems of a given patient. |
| RADREPREV | radiology report review task | A person reviews a radiology report of a given patient. |
| REMLE | reminder list entry | A person enters a health care reminder for a given patient. |
| WELLREMLE | wellness reminder list entry | A person enters a wellness or preventive care reminder for a given patient. |
| RISKASSESS | risk assessment instrument task | A person reviews a Risk Assessment Instrument report of a given patient. |
| FALLRISK | falls risk assessment instrument task | A person reviews a Falls Risk Assessment Instrument report of a given patient. |

In the above, many tasks appear twice, once in the context of list entry, and a second time in the context of review. For example, there is a taks for medication order entry, and a second task for order review. In general, review tasks should be used with Infobuttons attached to information already entered or present in the patients chart. List entry tasks should be used with Infobuttons attached to pick lists or other data entry controls from which a provider could create a new entry.

###### mainSearchCriteria.v.c mainSearchCriteria.v.cs mainSearchCriteria.v.ot

The mainSearchCriteria parameters are used to send information about the term being queried. Usually this will be a coded term and be sent using the mainSearchCriteria.v.c and mainSearchCriteria.v.cs parameters. However, if there is no code associated with the search term, the string value of the term can be sent using the mainSearchCriteria.v.ot.

1. The Clinical Knowledge Source shall send at least one search term in mainSearchCriteria.v.c or mainSearchCriteria.v.ot.
2. If mainSearchCriteria.v.c is sent, the coding system used shall be sent in the mainSearchCriteria.v.cs parameter.

###### subTopic.v.c subTopic.v.cs

1. The subtopic parameter identifies the kind of information being sought using mainSearchCriteria above. The Clinical Knowledge Requestor shall use this parameter to represent the specific kind of content being sought.

Note: While we would like very much to recommend vocabularies for these parameters, however, we have not managed to find vocabularies supporting the kinds of content that is suggested by this parameter. Please read the section below and comment on it.

There are many common sections in clinical content used to provide information about problems, medications, lab tests, et cetera. However, there are few vocabularies which codify these concepts.

We note that LOINC includes a set of values used in FDA Package inserts which represent many concepts common to clinical content on medications. However, we have not found value sets associated with many other kinds of publications. A list of different kinds of publications appears below with some of the expected subsections.

Clinical Trial Descriptions

* Purpose
* Condition
* Intervention
* Eligibility
* Contacts and Locations

Lab Test Compendia

* Specimen (type, handling, et cetera)
* Indications
* Contraindications
* Interpretation
* Reference Range
* Method

Public Health Alerts

* Description
* Screening
* Diagnosis
* Treatment
* Prognosis
* Reporting

Problems and Allergies

* Description
* Risks
* Diagnosis
* Treatment
* Prognosis

Procedures

* Purpose
* Indications
* Contraindications
* Risks, Complications and Side Effects
* Prognosis

Vaccination Information

* Indications
* Contraindications
* Risks, Complications and Side Effects

###### informationRecipient

1. The Clinical Knowledge Requester shall send this parameter.
2. It shall have the value PAT if the final information recipient is to be the patient, or PROV if the final information recipient is to be a healthcare provider. No other values are permitted.

###### informationRecipient.languageCode.c

1. The Clinical Knowledge Requester shall send this parameter. It indicates the desired language of the informatioon recipient.
2. This parameter may be sent more than once if the information recipient is interested in content available in additional languages.
3. Each subsequent parameter shall have its ordinal appended according to the requirements of the Infobutton URL Implementation guide.
4. Clinical Knowledge Source should not return resources in languages other than specified by this parameter (it may do so if alternative resources are available in the requested language).
5. The value of this parameter shall be a language code as specified by RFC 1766 Tags for Identifying Languages.

###### informationRecipient.healthCareProvider.c.c informationRecipient.healthCareProvider.c.cs

1. When the information recipient is a healthcare provider, these parameters may be sent by the Clinical Knowledge Requester to identify the specialty or level or training of the healthcare provider.

###### performer

1. The Clinical Knowledge Requester may send this parameter.
2. It shall have the value PAT if the performer of the request is the patient, or PROV if the performer of the request is a healthcare provider. No other values are permitted.

###### performer.healthCareProvider.c.c performer.healthCareProvider.c.cs

1. The Clinical Knowledge Requester may send this parameter to identify the specialty and/or level of training of the performer of the request when performer contains the value PROV.
2. This parameter may be used by the Clinical Knowledge Source to locate appropriate resources facilitating communication between providers (e.g., with different specialties).

###### performer.languageCode.c

1. The Clinical Knowledge Requester shall send this parameter when mainSearchCriteria.v.ot is sent. This parameter indicates the human language of the text found in the mainSearchCriteria.v.ot parameter.
2. The Clinical Knowledge Source may use this parameter to assist in interpretation of the mainSearchCriteria.v.ot parameter (e.g., to select appropriate language specific processing algorithms).

###### encounter.c.c

1. The Clinical Knowledge Requester may send this parameter to indicate the type of encounter in which the request is being performed. Values shall be drawn from the list of codes found in Table 3.Y.4-5 below. These codes can be found in the HL7 ActCode Vocabulary.
2. The Clinical Knowledge Source may use this parameter to filter the resources returned.

Table 3.Y.4-5 Encounter Type Codes

|  |  |
| --- | --- |
| Code | Description |
| AMB | ambulatory |
| EMER | emergency |
| FLD | field |
| HH | home health |
| IMP | inpatient encounter |
| ACUTE | inpatient acute |
| NONAC | inpatient non-acute |
| SS | short stay |
| VR | virtual |

###### serviceDeliveryLocation.id.root serviceDeliveryLocation.id.extension

1. The Clinical Knowledge Requester may send this parameter to identify the location where care is being performed.
2. The Clinical Knowledge Source may use this parameter to locate relevant resources based on location.

Note: Traditional service delivery location identifiers may not be useful for many cases. However, postal codes (zip codes), county, state and country names can all be represented as identifiers within an appropriate assigning authority domain, and could be useful in filtering information passed on service delivery location, which is why this parameter has been included in the profile. Note that this location may not be the same as the location from where the request is being performed. Future editions of the Infobutton standard are expected to provide better support for use of location as a search criteria.

##### 3.Y.4.1.3 Expected Actions

1. The Clinical Knowledge Requester shall generate an HTTP POST request passing the Infobutton parameters described above.
2. This URL to which the request is made is left unspecified by this profile.
3. The Content-Type header of this request shall be application/x-www-form-urlencoded (just as if a form was being submitted using the POST method in an HTML web page).
4. The parameter values shall be URL-encoded (again, just as if a form was being submitted using the POST method in an HTML web page).
5. The Clinical Knowledge Requester Actor may send other HTTP headers (e.g., Authorization).
6. The Clinical Knowledge Requester Actor may specify the Accept-Language header to indicate the preferred language of the Atom feed content for human readable text (e.g., titles of articles, et cetera). This HTTP parameter does not have any affect on the preferred language of the resources returned by the Clinical Knowledge Source (see informationRecipient.languageCode.c above).
7. The Clinical Knowledge Requester Actor may specify the Accept-Charset header to indicate the preferred character set for the Atom feed content for human readable text (e.g., titles of articles, et cetera). This HTTP parameter does not have any affect on the character set used for the resources returned by the Clinical Knowledge Source.

##### 3.Y.4.1.4 Sample Infobutton Knowledge Request

The example in the figure below shows an example Infobutton Knowledge Request. It was generated with the assistance of the HTML Page described in Appendix A – Infobutton Knowledge Request from a common browser.

Figure 3.Y.4-1 Sample Request

POST / HTTP/1.1Host: sample.comConnection: keep-aliveContent-Type: application/x-www-form-urlencodedAccept: text/html,application/xhtml+xml,application/xml;q=0.9,\*/\*;q=0.8Accept-Encoding: gzip,deflate,sdchAccept-Language: en-US,en;q=0.8Accept-Charset: ISO-8859-1,utf-8;q=0.7,\*;q=0.3

knowledgeRequestNotification.id.root=67234cef-f312-49d3-bf62-eaa362db5bd0&knowledgeRequestNotific

ation.effectiveTime.v=20120503121700&assignedAuthorizedPerson.id.root=55f42dca-858f-4656-8d95-d53

250dc897f&assignedAuthorizedPerson.id.extension=KWB&patientPerson.administrativeGenderCode.c=M&age.v.v=47&age.v.u=a&taskContext.c.c=LABOE&mainSearchCriteria.v.c=55454-3&mainSearchCriteria.v.cs=2

.16.840.1.113883.6.1&informationRecipient=PAT&informationRecipient.languageCode.c=en&encounter.c.c=AMB

#### 3.Y.4.2 Infobutton Knowledge Response

##### 3.Y.4.2.1 Trigger Events

The Infobutton Knowledge Response is triggered in response to the receipt of the Infobutton Knowledge Request message.

##### 3.Y.4.2.2 Message Semantics

The Infobutton Knowledge Response is returned in the form of an atom feed pointing to appropriate clinical knowledge resources based on the parameters given in the request. Requirements upon how a Clinical Knowledge Source must interpret these parameters is given in section 3.Y.4.1.2 above. Requirements of the atom feed are described in the sections below.

Atom is an extensible format. This profile extends atom by drawing on three properties from the Dublin Core to provide a mechanims to optional record bibliographic citations, identifiers for cited resources, and other information relevant to the provenance of the content (e.g., funding sources).

Elements appearing in the text and examples below are bound to the http://www.w3.org/2005/Atom namespace if no namespace prefix is present. The namespace prefix dcterms is used for extension elements borrowed from the Dublin Core and are bound to the http://purl.org/dc/terms/ namespace.

###### 3.Y.4.2.2.1 <feed>

1. The response shall be contained within a single atom <feed> element.
2. It shall include a <category> element representing the values sentin the request for each of the subtopic, task context, encounter, age/age group, gender and information recipient parameters, and used by the clinical knowledge source to select appropriate content.
3. Other <category> elements may be present to represent additional query parameters at the option of the Clinical Knowledge Source (e.g., to indicate that the the response applies to a particular problem, medication, lab result, age group, or gender, for example).
4. The <id> element shall be present and may be a URL representing the endpoint to which the request was sent, or may be some other unique URI.
5. The response shall include a <link> element, where the href attribute is a representation of the endpoint URL and the clinically related query parameters formatted as a query. This <link> element shall include a rel attribute that has the value self.
6. The <title> element shall be present.
7. The <feed> element shall contain 0 or more <entry> elements conforming to the requirements below.
8. The <feed> element may contain legal Atom extension elements to communicate additional information.

###### 3.Y.4.2.2.2 <entry>

1. Each <entry> element shall contain at least one <author> element representing the organizational or individual author of the content.
2. The name or the person or organization shall be provided in the <name> element.
3. Each <entry> element may contain additional <author> or <contributor> elements to name additional authors and contributors.
4. Each <entry> element may contain a <content> element.
5. When present, the <content> element shall contain the content of the resource.
6. The type attribute of the <content> element should use the value xhtml.
7. Content should appear in an <xhtml:div> element beneath the <content> element.
8. The <entry> element shall contain at least one <link> element containing rel attribute set to alternate.
9. The href attribute shall point to a URL from which the content can be subsequently retrieved.
10. The type attribute used with the <link> element should be text/xhtml or application/pdf.
11. The <entry> shall include a <published> element giving the original publication date of the content.
12. If the content was modified or revised, the <entry> shall contain an <updated> element giving the date of last update of the content.
13. The <published> and <updated> time stamps should be reported with a time zone offset.
14. The <entry> element may contain an <dcterms:bibliographicCitation> element to provide a citation for the content being returned.
15. The <entry> may contain an <dcterms:isPartOf> element to provide a URI for the cited publication. That URI may be URL to a web page, a URN, an ISSN or ISBN encoded as a URN, or a DOI number prefixed with the doi: URL scheme.
16. The <entry> element may contain an <dcterms:provenance> element to provide statements about the provenance of a resource (e.g., source of funding, changes in ownership, et cetera).
17. The <entry> element may contain other legal Atom extension elements to communicate additional information about the entry (e.g., priority of a public health alert).

##### 3.Y.4.2.3 Expected Actions

1. Upon reception of the Infobutton Knowledge Request, the Clinical Knowledge Source Actor shall parse the request.
2. If there are no errors, it shall return the Infobutton Knowledge Response as specified in 3.Y.4.2.2 and HTTP response code 200 - OK.
3. If there are syntax errors in the request the Clinical Knowledge Source shall return a 400 - Bad Request response code.
4. If the Clinical Knowledge Requester is not authorized to access the Clinical Knowledge Source, it shall return an an 401 – Request Unauthorized failure.
5. If the Infobutton Knowledge Request supplied credentials in the HTTP request and they are not valid Clinical Knowledge Source shall log an authentication error in the audit log. If no credentials were supplied, an audit log entry should not be generated.
6. Other error codes may be returned by the Clinical Knowledge Source as needed.

Some web-based authentication mechanims use HTTP redirects to provide for user authentication (e.g., OAuth) or access controls. This IHE profile neither requires nor prohibits use of these mechanisms to enforce user authentication or enable access controls. The use of these methods for authentication or access control is out of the scope of this profile.

Note: A Clinical Knowledge Requester should fail gracefully upon receipt of an unrecognized return code in the HTTP response (e.g., such as a redirect request in the example above). Additional error return codes may be introduced by web intermediaries such as firewalls and caches that appear between the Clinical Knowledge Source and Clinical Knowledge Requester actors. These servers may introduce additional failure modes and failure codes.

Responses to the Infobutton Knowledge Request should not be cached[[2]](#footnote-2).

1. To ensure this, the Clinical Knowledge Source shall set the HTTP Cache-Control header to no-cache and also send an HTTP Pragma header to no-cache (for HTTP/1.0 caches).
2. The Clinical Knowledge Source shall report each parameter or set of related paremeters it used to filter information as a <category> in the Infobutton Knowledge Response.
3. The Clinical Knowledge Requester may ignore parameters that are not relevant. The ignored parameters shall not be included in a <category> element. For example, the administrativeGenderCode.v.c parameter is required to be sent by the Clinical Knowledge Requestor. However, it may not be relevant to an Infobutton Knowledge response when the mainSearchCritiera parameter is about an immunization.

The parameters in the Infobutton Knowledge Request are named based on the model elements and data type components associated with them in the HL7 model. Several model elements are associated with multiple parameters because the data type has several components. For the purpose of categorization the information about the model element should only appear in one <category> element. In order to collapse multiple parameters into one <category> element, the values associated multiple parameters must be combined. The rules for combining are based on the data type of the model element and can be found in Table 3.Y.4-5 Literal Representations below.

Table 3.Y.4-5 Literal Representations

|  |  |  |
| --- | --- | --- |
| Data Type | Suffix | Literal Representation |
| PQ | .v.v | concat(X.v.v, X.v.u) |
|  | .v.u |
| CD | .c, .c.c or .v.c | concat(X.c.cs, ":",X.c.c) or concat(X.v.cs, ":",X.v.c) |
|  | .c.cs or .v.cs |
|  | .v.ot | X.v.ot |
| II | .root | concat(X.root, ":",X.extension) |
|  | .extension |

1. The term attribute of the <category> element shall populated by the code, value or identifier associated with the parameter.
2. The scheme attribute of the <category> element shall be populated with the name of the parameter after removing the suffixes found in the table above. This generates the scheme names found in the table below.

Table 3.Y.4-6 Category scheme Names

|  |  |
| --- | --- |
| **Scheme Name** | **Suffixes** |
| patientPerson.administrativeGenderCode | .c.c |
| age | .v.v .v.u |
| ageGroup | .c.cs:.c.c |
| taskContext | .c.c |
| subTopic | .c.c |
| informationRecipient |  |
| informationRecipient.languageCode | .c.c |
| encounter | .c.c |
| serviceDeliveryLocation.id | .root:.extension |

##### 3.Y.4.2.4 Sample Infobutton Knowledge Response

Figure 3.Y.4-2 Sample Response

<?xml version="1.0" encoding="UTF-8"?>

<feed xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

xmlns:dcterms="http://purl.org/dc/terms/"

xsi:schemaLocation="http://www.w3.org/2005/Atom ../../atom.xsd"

xmlns="http://www.w3.org/2005/Atom">

<category term="47" scheme="age"/>

<category term="M" scheme="administrativeGenderCode"/>

<category term="PAT" scheme="informationRecipient"/>

<category term="en" scheme="informationRecipient.languageCode"/>

<category term="AMB" scheme="encounter"/>

<generator>Sample Generor</generator>

<id>http://sample.com</id>

  <link rel="self" href="http://endpointURI/InfoButton?knowledgeRequestNotification.id.root=67234cef‑f312‑49d3‑bf62‑eaa362db5bd0&amp;knowledgeRequestNotification.effectiveTime.v=20120503121700&amp;assignedAuthorizedPerson.id.root=55f42dca‑858f‑4656‑8d95‑d53250dc897f&amp;assignedAuthorizedPerson.id.extension=KWB&amp;patientPerson.administrativeGenderCode.c=M&amp;age.v.v=47&amp;age.v.u=a&amp;taskContext.c.c=LABOE&amp;mainSearchCriteria.v.c=55454‑3&amp;mainSearchCriteria.v.cs=2.16.840.1.113883.6.1&amp;informationRecipient=PAT&amp;informationRecipient.languageCode.c=en&amp;encounter.c.c=AMB"/>

<title>Sample Infobutton Response</title>

<entry>

<author>

<name>Keith W. Boone</name>

<uri>http://motorcycleguy.blogspot.com</uri>

</author>

<link rel="alternate"

href="http://motorcycleguy.blogspot.com/2012/05/two-ihe-profiles-for-meaningfuluse.html"/>

<published>2012-05-01T14:05:17-06:00</published>

<dcterms:bibliographicCitation> Boone, K. (May 1, 2012). Two IHE

Profiles for MeaningfulUse Stage2. Healthcare Standards. Retrieved

May 2, 2012 from

http://motorcycleguy.blogspot.com/2012/05/two-ihe-profiles-for-meaningfuluse.html

</dcterms:bibliographicCitation>

<dcterms:provenance> The opinions represented in this blog are my

own, and not that of my employer or the respective standards

organizations that I work with. </dcterms:provenance>

</entry>

</feed>

### 3.Y.5 Security Considerations

#### 3.Y.5.1 Security Audit Considerations

##### 3.Y.5.1.1 Clinical Knowledge Requester audit message:

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Field Name** | **Opt** | **Value Constraints** |
| **Event**  AuditMessage/ EventIdentification | EventID | M | EV(110112, DCM, “Query”) |
| EventActionCode | M | “E” (Execute) |
| *EventDateTime* | *M* | *not specialized* |
| *EventOutcomeIndicator* | *M* | *not specialized* |
| EventTypeCode | M | EV(“PCC-Y”, “IHE Transactions”, “Request Clinical Knowledge”) |
| Source (Clinical Knowledge Requester) (1) | | | |
| Human Requester (0..n) | | | |
| Destination (Clinical Knowledge Source) (1) | | | |
| Audit Source (Clinical Knowledge Requester) (1) | | | |
| Query Parameters(1) | | | |

Where:

|  |  |  |  |
| --- | --- | --- | --- |
| **Source**  AuditMessage/ ActiveParticipant | UserID | M | ???? |
| AlternativeUserID | M | the process ID as used within the local operating system in the local system logs. |
| *UserName* | *U* | *not specialized* |
| UserIsRequester | M | “true” |
| RoleIDCode | M | EV(110153, DCM, “Source”) |
| NetworkAccessPointTypeCode | M | “1” for machine (DNS) name, “2” for IP address |
| NetworkAccessPointID | M | The machine name or IP address, as specified in RFC 3881. |
| **Human Requester (if known)**  AuditMessage/ ActiveParticipant | UserID | M | Identity of the human that initiated the transaction. The content of the assignedAuthorizedPerson.id.root and assignedAuthorizedPerson.id.extension in the form: root^extension, or just root if extension is not present. |
| *AlternativeUserID* | *U* | *not specialized* |
| *UserName* | *U* | *not specialized* |
| UserIsRequester | M | “true” |
| RoleIDCode | U | Access Control role(s) the user holds that allows this transaction. |
| *NetworkAccessPointTypeCode* | *NA* |  |
| *NetworkAccessPointID* | *NA* |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Destination**  AuditMessage/ ActiveParticipant | UserID | M | HTTP endpoint URI. |
| *AlternativeUserID* | *U* | *not specialized* |
| *UserName* | *U* | *not specialized* |
| UserIsRequester | M | “false” |
| RoleIDCode | M | EV(110152, DCM, “Destination”) |
| NetworkAccessPointTypeCode | M | “1” for machine (DNS) name, “2” for IP address |
| NetworkAccessPointID | M | The machine name or IP address, as specified in RFC 3881. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Audit Source**  AuditMessage/ AuditSourceIdentification | *AuditSourceID* | *U* | *Not specialized.* |
| *AuditEnterpriseSiteID* | *U* | *not specialized* |
| *AuditSourceTypeCode* | *U* | *not specialized* |

|  |  |  |  |
| --- | --- | --- | --- |
| **Query Parameters**  (AudittMessage/ ParticipantObjectIdentification) | ParticipantObjectTypeCode | M | “2” (system object) |
| ParticipantObjectTypeCodeRole | M | “24” (query) |
| *ParticipantObjectDataLifeCycle* | *U* | *not specialized* |
| ParticipantObjectIDTypeCode | M | EV(“PCC-Y”, “IHE Transactions”, “Request Clinical Knowledge”) |
| *ParticipantObjectSensitivity* | *U* | *not specialized* |
| ParticipantObjectID | M | The content of knowledgeRequestNotification.id.root (a UUID or OID) |
| *ParticipantObjectQuery* | M | The content of the HTTP POST body base64 encoded. |

##### 3.Y.5.1.2 Clinical Knowledge Requester audit message:

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Field Name** | **Opt** | **Value Constraints** |
| **Event**  AuditMessage/ EventIdentification | EventID | M | EV(110112, DCM, “Query”) |
| EventActionCode | M | “E” (Execute) |
| *EventDateTime* | *M* | *not specialized* |
| *EventOutcomeIndicator* | *M* | *not specialized* |
| EventTypeCode | M | EV(“PCC-Y”, “IHE Transactions”, “Request Clinical Knowledge”) |
| Source (Document Consumer) (1) | | | |
| Destination (Document Registry) (1) | | | |
| Audit Source (Document Registry) (1) | | | |
| Patient (0..1) | | | |
| Query Parameters(1) | | | |

Where:

|  |  |  |  |
| --- | --- | --- | --- |
| **Source**  AuditMessage/ ActiveParticipant | UserID | M | ? |
| AlternativeUserID | *U* | *not specialized* |
| *UserName* | *U* | *not specialized* |
| UserIsRequester | M | “true” |
| RoleIDCode | M | EV(110153, DCM, “Source”) |
| NetworkAccessPointTypeCode | M | “1” for machine (DNS) name, “2” for IP address |
| NetworkAccessPointID | M | The machine name or IP address, as specified in RFC 3881. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Destination**  AuditMessage/ ActiveParticipant | UserID | M | HTTP endpoint URI. |
| *AlternativeUserID* | M | the process ID as used within the local operating system in the local system logs. |
| *UserName* | *U* | *not specialized* |
| UserIsRequester | M | “false” |
| RoleIDCode | M | EV(110152, DCM, “Destination”) |
| NetworkAccessPointTypeCode | M | “1” for machine (DNS) name, “2” for IP address |
| NetworkAccessPointID | M | The machine name or IP address, as specified in RFC 3881. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Audit Source**  AuditMessage/ AuditSourceIdentification | *AuditSourceID* | *U* | *Not specialized.* |
| *AuditEnterpriseSiteID* | *U* | *not specialized* |
| *AuditSourceTypeCode* | *U* | *not specialized* |

|  |  |  |  |
| --- | --- | --- | --- |
| **Query Parameters**  (AudittMessage/ ParticipantObjectIdentification) | ParticipantObjectTypeCode | M | “2” (system object) |
| ParticipantObjectTypeCodeRole | M | “24” (query) |
| *ParticipantObjectDataLifeCycle* | *U* | *not specialized* |
| ParticipantObjectIDTypeCode | M | EV(“PCC-Y”, “IHE Transactions”, “Request Clinical Knowledge”) |
| *ParticipantObjectSensitivity* | *U* | *not specialized* |
| ParticipantObjectID | M | The content of knowledgeRequestNotification.id.root (a UUID or OID) |
| *ParticipantObjectQuery* | M | The content of the HTTP POST body base64 encoded. |

##### 3.Y.5.1.(z) Actor Specific Security Considerations

When individually identifiable data is provided in an Infobutton request, additional security may be required by the Clinical Knowledge Source to protect information systems that have access to this information. For example, if locations are specified using the full zip code associated with a patient, or age is provided for patients older than 79, this is considered to be individually identifiable information in the US. Applications created by certain entities in the US that have access to such information must include additional security and access control measures. This can substantially increase the cost of deployment of a Clinical Knowledge Source by those entities. Careful consideration must be given to how much information is provided in an Clinical Knowledge Request transaction to ensure that applications can be designed in a cost effective manner.

## 3.Z Retrieve Clinical Knowledge

This section corresponds to Transaction PCC-Z of the IHE Technical Framework. The Clinical Knowledge Requester and Clinical Knowledge Repository actors use transaction PCC-Z.

### 3.Z.1 Scope

This transaction is used by the Clinical Knowledge Requester to retrieve a document from the Clinical Knowledge Repository. The Clinical Knowledge Requester has already obtained the URI information from the Clinical Knowledge Source by means of the Request Clinical Knowledge transaction.

### 3.Z.2 Use Case Roles



**Actor:** Clinical Knowledge Requester

**Role:** Obtains document.

**Actor:** Clinical Knowledge Repository

**Role:** Provides documents.

### 3.Z.3 Referenced Standard

|  |  |
| --- | --- |
| HTTP | Hyper Text Transfer Protocol HTTP 1.1 (RFC 2616) |
| MIME | Multipurpose Internet Message Extensions (RFC 2045 to RFC 2049) |

### 3.Z.4 Interaction Diagram



#### 3.Z.4.1 Retrieve Clinical Knowledge Request

##### 3.Z.4.1.1 Trigger Events

The Clinical Knowledge Requester has obtained a URI information from the Clinical Knowledge Source by means of the Request Clinical Knowledge transaction.

##### 3.Z.4.1.2 Message Semantics

The URI specifies the protocol and protocol parameters that are to be used to retrieve the document. The Clinical Knowledge Repository shall support the following parameters for protocol in the URI:

* HTTP
* HTTPS

The details of URI handling are specified in the HTTP standard (RFC 2616).

The Clinical Knowledge Repository shall fully implement support for any protocol parameters that are required by the HTTP standard.

###### 3.Z.4.1.2.1 Request Headers

The HTTP Protocol specifies a variety of request headers that can affect the result returned by the server. Clinical Knowledge Requesters may use any request header allowed by the HTTP Protocol[[3]](#footnote-3). However, Clinical Knowledge Repositories are not required to acknowledge or support of these headers not required by the protocol, and may be required in certain cases to ignore certain headers. See the table below for details.

Table 3.Z.4-1 Request Headers

|  |  |  |
| --- | --- | --- |
| Request Header | Repository Support | Comments |
| Accept Accept-Charset Accept-Language | O | These headers can alter the charset or language of the requested resource. |
| Accept-Encoding | O | This header requests that an encoded form the data be returned [e.g., gzip or compress]. Repositories may support this header, but are not required to. Clinical Knowledge Requesters must support responses that ignore this content header. |
| Authorization | O | This header may be sent in environments where EUA is used with XDS. See the EUA profile for more details. |
| If-Modified-Since | O | Since Repositories need not be expected to change documents once stored, they are free to ignore this header or respond as appropriate. |

##### 3.Z.4.1.3 Expected Actions

A Retrieve Clinical Knowledge Response will be generated in return. Details are specified in the HTTP standard.

#### 3.Z.4.2 Retrieve Clinical Knowledge Response

##### 3.Z.4.2.1 Trigger Events

This message is triggered by the Retrieve Clinical Knowledge Request.

##### 3.Z.4.2.2 Message Semantics

Clinical Knowledge Repositories are required to return the following values:

Table 3.Z.4-2 Response Codes

|  |  |  |
| --- | --- | --- |
| Response Code | When to Return | Support |
| 200 – OK | If the request is valid and data is available. | R |
| 304 – Not Modified | If the request is a valid conditional GET [see HTTP specification], and the document has not been modified since the requested modification date. | O |
| 400 – Bad Request | If the request is not valid. | R |
| 401 – Authorization Required | If the request requires authentication, and an Authorization header is not present, or is not valid. Used in conjunction with EUA. | O |
| 403 – Forbidden | If access needs to be denied for reasons other than authentication failure [e.g., because the request comes from a Node that is not allowed access to the document]. | R |
| 404 – Not Found | If the request is syntactically valid, but the document cannot be located, or does not otherwise exist [see RID]. | R |
| 410 – Gone | If the request is valid, and the document once existed, but is no longer available [e.g., the document may have been removed at the patients request]. | O |
| 5XX – Server Error | The server may return any error code beginning with the digit 5 to indicate a server error. | O |

###### 3.Z.4.2.2.1 Response Headers

The HTTP Protocol specifies a variety of response headers that provide more information about the response. The use of these headers is described in the table below:

Table 3.Z.4-3 Response Headers

|  |  |  |
| --- | --- | --- |
| Response Header | Repository Support | Comments |
| Expires | R | Any valid value according to RFC2616, or 0 [c.f. RID volume ] |
| Content-Encoding | O | If the Clinical Knowledge Requester requested encoding of the response, and the repository is able to fulfill that request, it must return the appropriate value in this header. |
| Content-Type | R | These headers correspond to the mimeType, languageCode, and size attributes of the Content. Content-Type is required in the response. The other two are optional. |
| Content-Language Content-Length | O |
| Last-Modified | R | This header should correspond to the date the document was last published or updated in the repository, and should be the same as the most recent of the published or updated element in the atom feed entry for the document. |
| WWW-Authenticate | O | If the Repository requires authentication and the request did not contain valid credentials, this header must be returned in the 401 response. |

##### 3.Z.4.2.3 Expected Actions

The Clinical Knowledge Requester now has the content of the document to process.

### 3.Z.5 Security Requirements

This transaction involves the retrieval of clinical knowledge. There is no individually identifiable health information being exchanged, and therefore no audit logging requirements. Encryption of the communication is still required because this transaction may pass authentication parameters, and/or communicate content that needs to be access controlled.

# Appendix A – HTML Test Page

The HTML page below can be used as a starting point to generate a messages conforming to the requirements of the Clinical Knowledge Requester Actor.

Note: This sample will likely be moved to Implementation Resources and be referenced rather than included in the Trial Implementation. It serves as a useful starting point for creating a conforming request, but unless all form fields are properly completed, the resulting output will not always conform to the specification of this profile.

<?xml version="1.0" encoding="UTF-8"?>

<html xmlns="http://www.w3.org/1999/xhtml">

<head>

<title>Request for Clinical Knowledge Test Page</title>

</head>

<body>

<form method="post" action="http://google.com">

<div>

<input type="hidden" name="knowledgeRequestNotification.id.root"

value="0" id="knowledgeRequestNotification.id.root"/>

<input type="hidden"

name="knowledgeRequestNotification.effectiveTime.v"

value="20120503121700"

id="knowledgeRequestNotification.effectiveTime.v"/>

<input type="hidden" name="assignedAuthorizedPerson.id.root"

value="0" id="assignedAuthorizedPerson.id.root"/>

<p>User ID: <input type="text"

name="assignedAuthorizedPerson.id.extension" value="KWB"

id="assignedAuthorizedPerson.id.extension"/>

</p>

<p>Gender: <select

name="patientPerson.administrativeGenderCode.c">

<option value="M">Male</option>

<option value="F">Female</option>

<option value="UN">Undifferentiated</option>

</select></p>

<p>Age: <input type="text" name="age.v.v"/> Units: <select

name="age.v.u">

<option value="a">Years</option>

<option value="m">Months</option>

<option value="w">Weeks</option>

<option value="d">Days</option>

<option value="h">Hours</option>

</select></p>

<p>Task: <select name="taskContext.c.c">

<option value="OE"

title="A clinician creates a request for a service to be performed for a given patient."

>order entry task</option>

<option value="LABOE"

title="A clinician creates a request for a laboratory test to be done for a given patient."

>laboratory test order entry task</option>

<option value="MEDOE"

title="A clinician creates a request for the administration of one or more medications to a given patient."

>medication order entry task</option>

<option value="PATDOC"

title="A person enters documentation about a given patient."

>patient documentation task</option>

<option value="ALLERLREV"

title="A person reviews a list of known allergies of a given patient."

>allergy list review</option>

<option value="CLINNOTEE"

title="A clinician enters a clinical note about a given patient"

>clinical note entry task</option>

<option value="DIAGLISTE"

title="A clinician enters a diagnosis for a given patient."

>diagnosis list entry task</option>

<option value="DISCHSUME"

title="A clinician enters a discharge summary for a given patient."

>discharge summary entry task</option>

<option value="PATREPE"

title="A pathologist enters a report for a given patient."

>pathology report entry task</option>

<option value="PROBLISTE"

title="A clinician enters a problem for a given patient."

>problem list entry task</option>

<option value="RADREPE"

title="A radiologist enters a report for a given patient."

>radiology report entry task</option>

<option value="IMMLREV"

title="A person reviews a list of immunizations due or received for a given patient."

>immunization list review</option>

<option value="REMLREV"

title="A person reviews a list of health care reminders for a given patient."

>reminder list review</option>

<option value="WELLREMLREV"

title="A person reviews a list of wellness or preventive care reminders for a given patient."

>wellness reminder list review</option>

<option value="PATINFO"

title="A person (e.g., clinician, the patient herself) reviews patient information in the electronic medical record."

>patient information review task</option>

<option value="ALLERLE"

title="A person enters a known allergy for a given patient."

>allergy list entry</option>

<option value="CLINNOTEREV"

title="A person reviews a clinical note of a given patient."

>clinical note review task</option>

<option value="DISCHSUMREV"

title="A person reviews a discharge summary of a given patient."

>discharge summary review task</option>

<option value="DIAGLISTREV"

title="A person reviews a list of diagnoses of a given patient."

>diagnosis list review task</option>

<option value="IMMLE"

title="A person enters an immunization due or received for a given patient."

>immunization list entry</option>

<option value="LABRREV"

title="A person reviews a list of laboratory results of a given patient."

>laboratory results review task</option>

<option value="MICRORREV"

title="A person reviews a list of microbiology results of a given patient."

>microbiology results review task</option>

<option value="MICROORGRREV"

title="A person reviews organisms of microbiology results of a given patient."

>microbiology organisms results review task</option>

<option value="MICROSENSRREV"

title="A person reviews the sensitivity test of microbiology results of a given patient."

>microbiology sensitivity test results review

task</option>

<option value="MLREV"

title="A person reviews a list of medication orders submitted to a given patient"

>medication list review task</option>

<option value="MARWLREV"

title="A clinician reviews a work list of medications to be administered to a given patient."

>medication administration record work list review

task</option>

<option value="OREV"

title="A person reviews a list of orders submitted to a given patient."

>orders review task</option>

<option value="PATREPREV"

title="A person reviews a pathology report of a given patient."

>pathology report review task</option>

<option value="PROBLISTREV"

title="A person reviews a list of problems of a given patient."

>problem list review task</option>

<option value="RADREPREV"

title="A person reviews a radiology report of a given patient."

>radiology report review task</option>

<option value="REMLE"

title="A person enters a health care reminder for a given patient."

>reminder list entry</option>

<option value="WELLREMLE"

title="A person enters a wellness or preventive care reminder for a given patient."

>wellness reminder list entry</option>

<option value="RISKASSESS"

title="A person reviews a Risk Assessment Instrument report of a given patient."

>risk assessment instrument task</option>

<option value="FALLRISK"

title="A person reviews a Falls Risk Assessment Instrument report of a given patient."

>falls risk assessment instrument task</option>

</select></p>

<p>Search Code: <input type="text" name="mainSearchCriteria.v.c"

/></p>

<p>Code System: <select name="mainSearchCriteria.v.cs">

<option value="2.16.840.1.113883.6.1">LOINC</option>

<option value="2.16.840.1.113883.6.96">SNOMED CT</option>

<option value="2.16.840.1.113883.6.103">ICD-9-CM

Diagnoses</option>

<option value="2.16.840.1.113883.6.104">ICD-9-CM

Procedures</option>

<option value="2.16.840.1.113883.6.12">CPT-4</option>

<option value="2.16.840.1.113883.6.88">RxNORM</option>

<option value="2.16.840.1.113883.6.69">NDC</option>

<option value="2.16.840.1.113883.6.90">ICD-10-CM</option>

<option value="2.16.840.1.113883.6.4">ICD-10-PCS</option>

</select>

</p>

<p>Search Text: <input type="text"

name="mainSearchCriteria.v.ot"/></p>

<p>SubTopic Code: <input type="text" name="subTopic.v.c"/></p>

<p>SubTopic Code System:

<select name="subTopic.v.cs">

<option value="2.16.840.1.113883.6.1">LOINC</option>

<option value="2.16.840.1.113883.6.96">SNOMED CT</option>

</select>

</p>

<p>Recipient: <select name="informationRecipient">

<option value="PAT">Patient</option>

<option value="PROV">Healthcare Provider</option>

</select></p>

<p>Recipient Language: <select name="informationRecipient.languageCode.c">

<option value="ar">Arabic</option>

<option value="de">German</option>

<option value="el">Greek</option>

<option value="en">English</option>

<option value="es">Spanish</option>

<option value="fr">French</option>

<option value="he">Hebrew</option>

<option value="hi">Hindi</option>

<option value="it">Italian</option>

<option value="ja">Japanese</option>

<option value="ru">Russian</option>

<option value="zh">Chinese</option>

</select></p>

<p>Information Recipient Type Code: </p><input type="text"

name="informationRecipient.healthCareProvider.c.c"/>

<p>Information Recipient Type Code System:

<select name="informationRecipient.healthCareProvider.c.cs">

<option value="2.16.840.1.113883.6.101">NUCC Healthcare Provider Code</option>

<option value="2.16.840.1.113883.6.96">SNOMED CT</option>

</select>

</p>

<p>Query Performer:

<select name="performer">

<option value="PAT">Patient</option>

<option value="PROV">Healthcare Provider</option>

</select></p>

<p>Query Performer Language:

<select name="performer.languageCode.c">

<option value="ar">Arabic</option>

<option value="de">German</option>

<option value="el">Greek</option>

<option value="en">English</option>

<option value="es">Spanish</option>

<option value="fr">French</option>

<option value="he">Hebrew</option>

<option value="hi">Hindi</option>

<option value="it">Italian</option>

<option value="ja">Japanese</option>

<option value="ru">Russian</option>

<option value="zh">Chinese</option>

</select></p>

<p>Encounter Type:

<select name="encounter.c.c">

<option value="AMB">ambulatory</option>

<option value="EMER">emergency</option>

<option value="FLD">field</option>

<option value="HH">home health</option>

<option value="IMP">inpatient encounter</option>

<option value="ACUTE">inpatient acute</option>

<option value="NONAC">inpatient non-acute</option>

<option value="SS">short stay</option>

<option value="VR">virtual</option>

</select></p>

<input type="submit"/>

</div>

</form>

</body>

</html>

1. A conforming Clinical Knowledge Requester must demonstrate the ability to send this parameter. [↑](#footnote-ref-1)
2. This is not a formal requirement of the Clinical Knowledge Source or Requester actors because they do not exert anything other than advisory control on proxies, caches or other intermediaries that may lie between them on a network. [↑](#footnote-ref-2)
3. Ed Note: To allow common web browsers to be used without restriction. [↑](#footnote-ref-3)