DICOM Conformance Statement

teamplay DICOM Hub VD31A

March 2022

SIEMENS Healthineers

DICOM Conformance Statement

Overview

The teamplay DICOM Hub offering is designed to be integrated into an environment of medical, DICOM-based devices. The teamplay DICOM Hub supports DICOM Storage and Query/Retrieve functionalities. The teamplay DICOM Hub provides options to create multiple AETs (virtual AET's). There is a possibility to extend the DICOM interface by additional DICOM AE titles. External systems can send DICOM data to these dedicated AE titles on the specific use cases. This allows teamplay DICOM Hub to categorize different data sets.

teamplay DICOM Hub also provides an imaging platform to other 3rd party applications by providing DICOMweb™ standard Store, Retrieve and Search capabilities.

Table 1: Network Services

SOP Classes	SOP Class UID	User of Service (SCU)	Provider of Service (SCP)
Verification			
Verification	1.2.840.10008.1.1	Yes	Yes

SOP Classes	SOP Class UID	User of Service (SCU)		Provider of Service (SCP)	
		Create	Send	Store	Display
SOP Classes managed by					
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	No	Yes	Yes	No
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	No	Yes	Yes	No
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	No	Yes	Yes	No
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	No	Yes	Yes	No
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	No	Yes	Yes	No
Digital Intra-Oral X-Ray Image - for Presentation - IMAGE	1.2.840.10008.5.1.4.1.1.1.3	No	Yes	Yes	No
Digital Intra-Oral X-Ray Image - for Processing - IMAGE	1.2.840.10008.5.1.4.1.1.1.3.1	No	Yes	Yes	No
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	No	Yes	Yes	No
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	No	Yes	Yes	No
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	No	Yes	Yes	No

SOP Classes	SOP Class UID	User of Service (SCU)		Provider of Service (SCP)	
		Create	Send	Store	Display
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	No	Yes	Yes	No
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	No	Yes	Yes	No
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	No	Yes	Yes	No
Enhanced MR Color Image Storage	1.2.840.10008.5.1.4.1.1.4.3	No	Yes	Yes	No
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	No	Yes	Yes	No
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	No	Yes	Yes	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	No	Yes	Yes	No
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	No	Yes	Yes	No
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	No	Yes	Yes	No
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	No	Yes	Yes	No
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	No	Yes	Yes	No
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	No	Yes	Yes	No
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	No	Yes	Yes	No
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	No	Yes	Yes	No
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	No	Yes	Yes	No
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	No	Yes	Yes	No
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	No	Yes	Yes	No
General Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.2	No	Yes	Yes	No
Arterial Pulse Waveform Storage	1.2.840.10008.5.1.4.1.1.9.5.1	No	Yes	Yes	No
Respiratory Waveform Storage	1.2.840.10008.5.1.4.1.1.9.6.1	No	Yes	Yes	No
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	No	Yes	Yes	No

SOP Classes	SOP Class UID	User of Service (SCU)		Provider of Service (SCP)	
		Create	Send	Store	Display
Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.2	No	Yes	Yes	No
Pseudo-Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.3	No	Yes	Yes	No
Blending Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.4	No	Yes	Yes	No
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	No	Yes	Yes	No
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	No	Yes	Yes	No
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	No	Yes	Yes	No
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	No	Yes	Yes	No
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	No	Yes	Yes	No
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	No	Yes	Yes	No
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	No	Yes	Yes	No
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	No	Yes	Yes	No
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	No	Yes	Yes	No
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	No	Yes	Yes	No
Deformable Spatial Registration SOP Class	1.2.840.10008.5.1.4.1.1.66.3	No	Yes	Yes	No
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	No	Yes	Yes	No
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5	No	Yes	Yes	No
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	No	Yes	Yes	No
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	No	Yes	Yes	No
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	No	Yes	Yes	No
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	No	Yes	Yes	No
Procedure Log Storage	1.2.840.10008.5.1.4.1.1.88.40	No	Yes	Yes	No
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	No	Yes	Yes	No
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59	No	Yes	Yes	No
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	No	Yes	Yes	No

SOP Classes	SOP Class UID	User of Service (SCU)		Provider of Service (SCP)	
		Create	Send	Store	Display
Radiopharmaceutical Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.68	No	Yes	Yes	No
Encapsulated PDF Storage SOP Class	1.2.840.10008.5.1.4.1.1.104.1	No	Yes	Yes	No
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	No	Yes	Yes	No
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	No	Yes	Yes	No
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	No	Yes	Yes	No
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	No	Yes	Yes	No
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	No	Yes	Yes	No
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	No	Yes	Yes	No
Radio Therapy Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	No	Yes	Yes	No
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	No	Yes	Yes	No
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	No	Yes	Yes	No
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	No	Yes	Yes	No
Hanging Protocol Storage	1.2.840.10008.5.1.4.38.1	No	Yes	Yes	No

SOP Classes	SOP Class UID	User of Service (SCU)	Provider of Service (SCP)
Transfer (Private SOP Class)			
Syngo Non-Image Storage	1.3.12.2.1107.5.9.1	Yes	Yes
Query/Retrieve			
Patient Root Q/R Information Model - FIND	1.2.840.10008.3.1.2.3.3	No	Yes
Patient Root Q/R - Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	No	Yes
Study Root Q/R - Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	No	Yes
Study Root Q/R - Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.1	No	Yes

SOP Classes	User Agent	Origin Server
WADO-RS		
WADO - RS - Retrieve Study	No	Yes
WADO - RS - Retrieve Series	No	Yes
WADO - RS - Retrieve Instance	No	Yes
STOW-RS		
STOW-RS - Store Instances	No	Yes
QIDO-RS		
QIDO-RS - Search for Studies	No	Yes
QIDO-RS - Search for Series	No	Yes
QIDO-RS - Search for Instances	No	Yes

Table 2: Implementation Identifying Information

Name	Value
Application Context Name	1.2.840.100008.3.1.1.1

1 Introduction

1.1 Revision History

Version	Date	Change
Vxxx (TBD)	28/01/2022	Added support for DICOMWeb™ Store, Retrieve and Search capabilities Rename of product name from teamplay Images to teamplay DICOM Hub

1.2 Audience

This document is intended for hospital staff, health system integrators, software designers or implementers. It is assumed that the reader has a working understanding of DICOM.

1.3 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between teamplay DICOM Hub and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [1]. DICOM by itself does not guarantee interoperability.
The Conformance Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting compatible DICOM functionality.
This Conformance Statement is not supposed to replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, the user should be aware of the following important issues:

- The comparison of conformance statements is the first step towards assessing interconnectivity and interoperability between teamplay DICOM Hub and other DICOM conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipment, as established by the healthcare facility.

Siemens Healthineers reserves the right to modify the design and specifications contained herein without prior notice. Please contact your local Siemens Healthineers representative for the most recent product information.

1.4 Definitions, Terms and Abbreviations

Definitions, terms, and abbreviations used in this document are defined within the different parts of the DICOM standard.
Additional Abbreviations and terms are as follows:

AE	DICOM Application Entity
AET	Application Entity Title
ASCII	American Standard Code for Information Interchange
DICOM	Digital Imaging and Communications in Medicine
IOD	DICOM Information Object Definition
ISO	International Standard Organization
n. a.	not applicable
NEMA	National Electrical Manufacturers Association
O	Optional Key Attribute
PDU	DICOM Protocol Data Unit

QIDO	Query based on ID for DICOM Objects (QIDO)
R	Required Key Attribute
SCU	DICOM Service Class User (DICOM client)
SCP	DICOM Service Class Provider (DICOM Server)
SOP	DICOM Service-Object Pair
SR	Structured Report
STOW	STore Over the Web
U	Unique Key Attribute
UID	Unique Identifier
UTF-8	Unicode Transformation Format-8
VR	Value Representation
WADO	Web Access to DICOM Objects

1.5 References

[1] NEMA PS3 / ISO 12052, Digital Imaging and Communications in Medicine (DICOM) Standard, National Electrical Manufacturers Association, Rosslyn, VA, USA (available free at www.DICOMstandard.org)

2 Networking

2.1 Implementation Model

The teamplay DICOM Hub supports the following DICOM functionalities:

Verification
Verification requests will be processed and responded to by the teamplay DICOM Hub Storage AE.

Storage
teamplay DICOM Hub Storage SCP AE starts to receive the instances and store them on file system after accepting an association with a negotiated Presentation Context. teamplay DICOM Hub Storage SCP will actively reject any C-STORE requests from unknown remote DICOM nodes.

Send
teamplay DICOM Hub Storage SCU AE can initiate a C-Store request to the remote Storage SCP.

Query
teamplay DICOM Hub AE supports the Query service in a SCP role. The C-FIND request to teamplay DICOM Hub is initiated by the remote authorized DICOM node to search for studies based on the date/time range or to search for studies based on patient attributes. (Example Patient ID). Query SCP provides the requested data based on the data obtained from the DICOMWeb Search (QIDO-RS) service hosted in teamplay cloud. Query SCP will actively reject any C-FIND requests from unknown remote DICOM systems.

Retrieve
teamplay DICOM Hub AE supports the Retrieve service in a SCP role. The C-MOVE request to teamplay DICOM Hub is initiated by the remote authorized DICOM node to retrieve the needed DICOM instances at various retrieve levels such as study or series. Retrieve SCP provides the requested data based on the data obtained from the DICOMWeb Retrieve (WADO-RS) service hosted in teamplay cloud. Retrieve SCP will actively reject any C-MOVE requests from unknown remote DICOM systems identified by AE Title and IP address.

Search (QIDO-RS)
teamplay DICOM Hub supports the Query service in an Origin Server role. The http request to teamplay DICOM Hub is initiated by an authorized user agent to search for studies based on the date/time range or to search for studies based on patient attributes. (Example Patient ID). The origin server returns the data based on the stored data available in the teamplay DICOM Hub cloud.

Retrieve (WADO-RS)
teamplay DICOM Hub supports the Retrieve service in an Origin Server role. The http request to teamplay DICOM Hub is initiated by an authorized user agent to retrieve the needed DICOM instances at various retrieve levels such as study or series. The origin server returns the data based on the stored data available in the teamplay DICOM Hub cloud.

2.1.1 Application Data Flow

The following figures provide a functional overview of the teamplay DICOM Hub Application Entities (AE). Relationships are shown between user-invoked activities (in the circles at the left of the AEs) and the associated real-world activities provided by DICOM service providers (in the circles at the right of the AEs).

2.1.1.1 teamplay DICOM Hub Storage AE

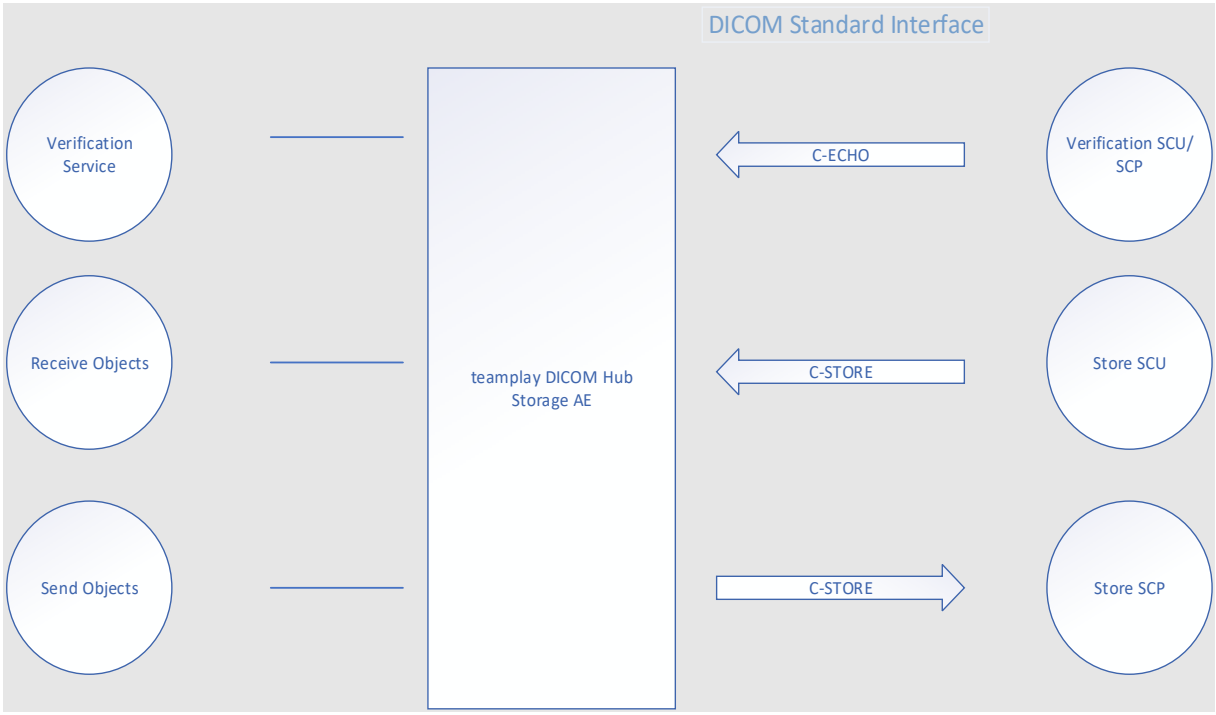

Figure 2-1: Application Data Flow Diagram teamplay DICOM Hub Storage AE

2.1.1.2 teamplay DICOM Hub Query Retrieve AE

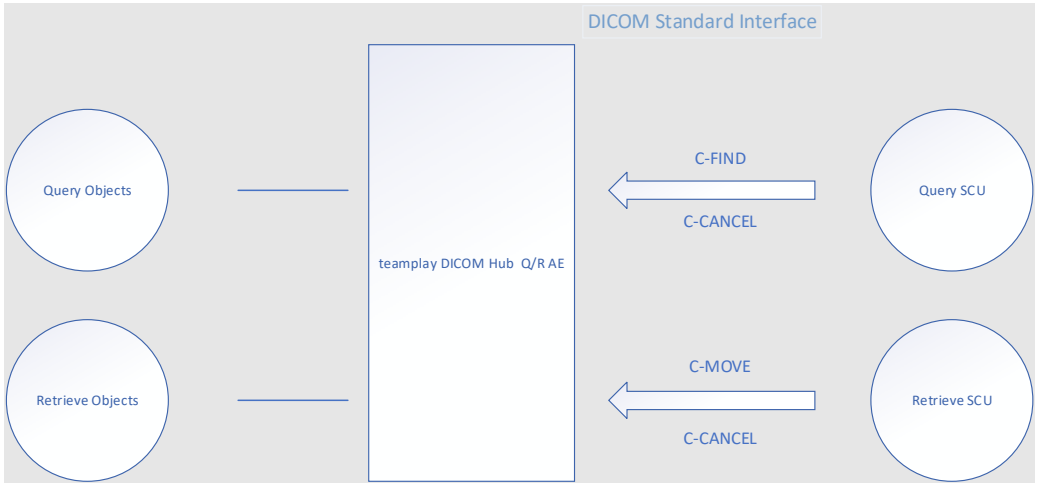

Figure 2-2: Application Data Flow Diagram teamplay DICOM Hub Q/R (Query/Retrieve) AE

2.1.1.3 DICOMWeb Retrieve (WADO-RS)

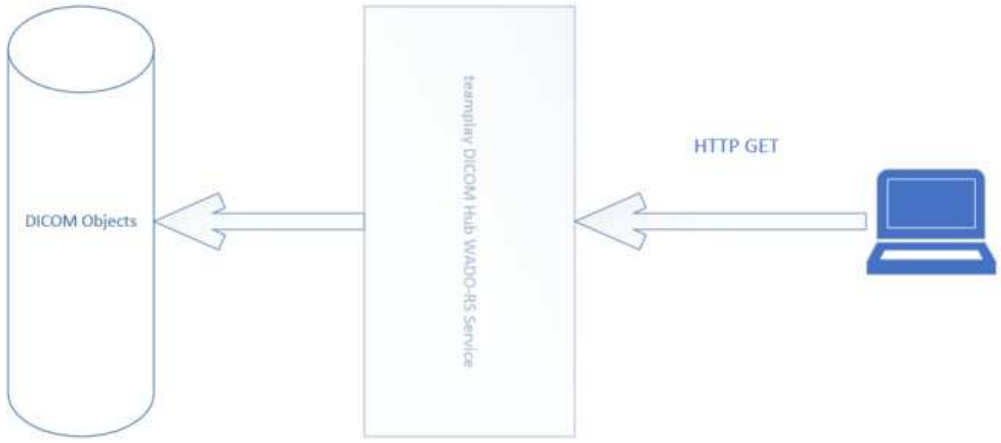

Figure 2-3: Application Data Flow Diagram teamplay DICOM Hub WADO-RS

2.1.1.4 DICOMWeb Store (STOW-RS)

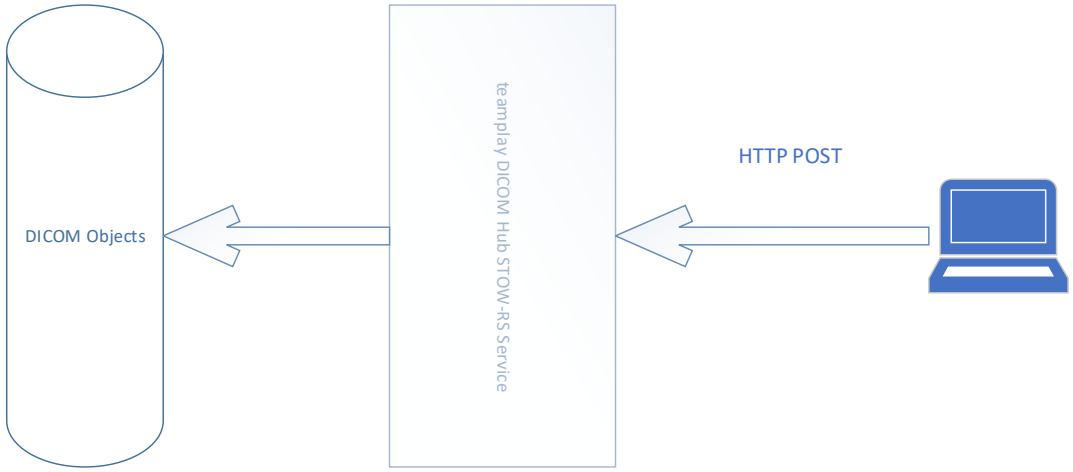

Figure 2-4: Application Data Flow Diagram teamplay DICOM Hub STOW-RS

2.1.1.5 DICOMWeb Search (QIDO-RS)

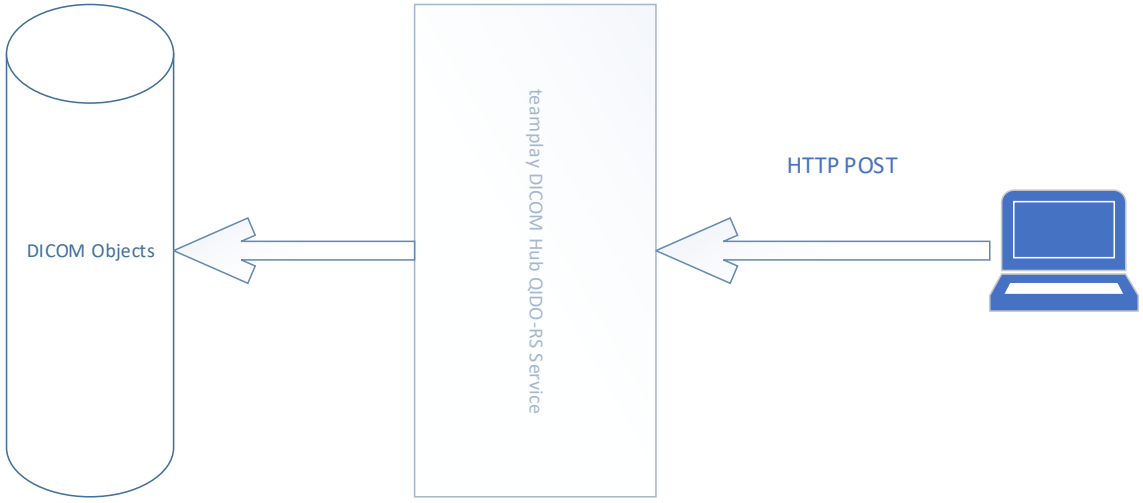

Figure 2-5: Application Data Flow Diagram teamplay DICOM Hub STOW-RS

2.1.2 Functional Definitions of AEs

The SCP and SCU components of the Application Entities of the teamplay DICOM Hub operate as background server processes. Upon accepting an association with a negotiated Presentation Context, it starts to receive and process the requests described in the following sections.

2.1.2.1 Functional Definitions of teamplay DICOM Hub Storage AE

The teamplay DICOM Hub can respond to verification requests from remote AEs.
The teamplay DICOM Hub Storage AE Storage SCP receives the instances and stores them on file system after accepting an association with a negotiated Presentation Context. Once stored on the file system a file uploader will upload the same to cloud storage and the local copy on file system will be deleted.
The teamplay DICOM Hub Storage AE invokes the Storage SCU. The request consists of data describing the instances selected for storage and the destination AET. An association is negotiated with the destination AE and the image data is transferred using the C-STORE DIMSE-Service. The transfer status is reported to the initiator of the Storage request.
For supported SOP Classes or Data Objects refer to the "Conformance Statement Overview".

2.1.2.2 Functional Definitions of teamplay DICOM Hub Query/Retrieve AE

The teamplay DICOM Hub can respond to Query/Retrieve requests from remote AEs.
The teamplay DICOM Hub Query/Retrieve AE receives the C-FIND request that is initiated by the remote authorized DICOM node to search for studies. teamplay DICOM Hub provides required data from QIDO-RS service as part of the C-FIND response to the authorized client.
Note: Potentially, there may be more than one match for a study query request as the teamplay DICOM Hub supports storing the same study uploaded with different privacy profiles multiple times.

The teamplay DICOM Hub Query/Retrieve AE receives the C-MOVE request that is initiated by the remote authorized DICOM node to retrieve the required studies. teamplay DICOM Hub provides the required data from WADO-RS service as part of the C-MOVE response to the authorized client. An association is negotiated with the destination storage AE and the image data is transferred using the C-STORE DIMSE-Service.
For supported SOP Classes or Data Objects refer to the "Conformance Statement Overview".

2.1.2.3 Functional Definition of DICOMWeb Retrieve (WADO-RS) service application

The reception of a WADO-RS http request from the user agent to the teamplay DICOM Hub origin server will trigger an internal request which is sent to the retrieve capabilities of the teamplay DICOM Hub cloud application. This request is based upon the request parameters or the URL resource end point from the WADO-RS request. The response is multi-part MIME format of the SOP instances stored on the teamplay DICOM Hub that match the request parameters. If there are no matching instances, the AE will indicate this in the WADO response. For all matching instances, the AE will utilize the internal image transfer request to obtain a copy of each instance. If the request was for retrieval of instances, these instances will be returned.

2.1.2.4 Functional Definition of DICOMWeb Store (STOW-RS) service application

The reception of a STOW-RS POST request from the user agent to the teamplay DICOM Hub origin server will activate the STOW-RS Service. The storage request is based upon the accept headers in the STOW-RS POST request. The response includes an HTTP status line, including a status-code and its associated textual phrase, followed by a JSON message indicating success, warning, or failure for each instance stored by the STOW-RS service.

2.1.2.5 Functional Definition of DICOMWeb Search (QIDO-RS) service application

The reception of a QIDO-RS GET request from the user agent to the teamplay DICOM Hub origin server will activate the QIDO-RS Provider. An internal query request is sent to the search capabilities of the associated PACS or Vendor Neutral Archive (VNA). The search result is based upon the URL of the QIDO-RS GET request.

The response is a status code indicating the success, warning, or failure of the search along with any matching results stored in the Remote PACS or VNA.

2.1.3 Sequencing of Activities

2.1.3.1 Verification

The communication between teamplay DICOM Hub Storage AE and an external DICOM node in case of Verify is depicted in Table 2-6 in more detail.

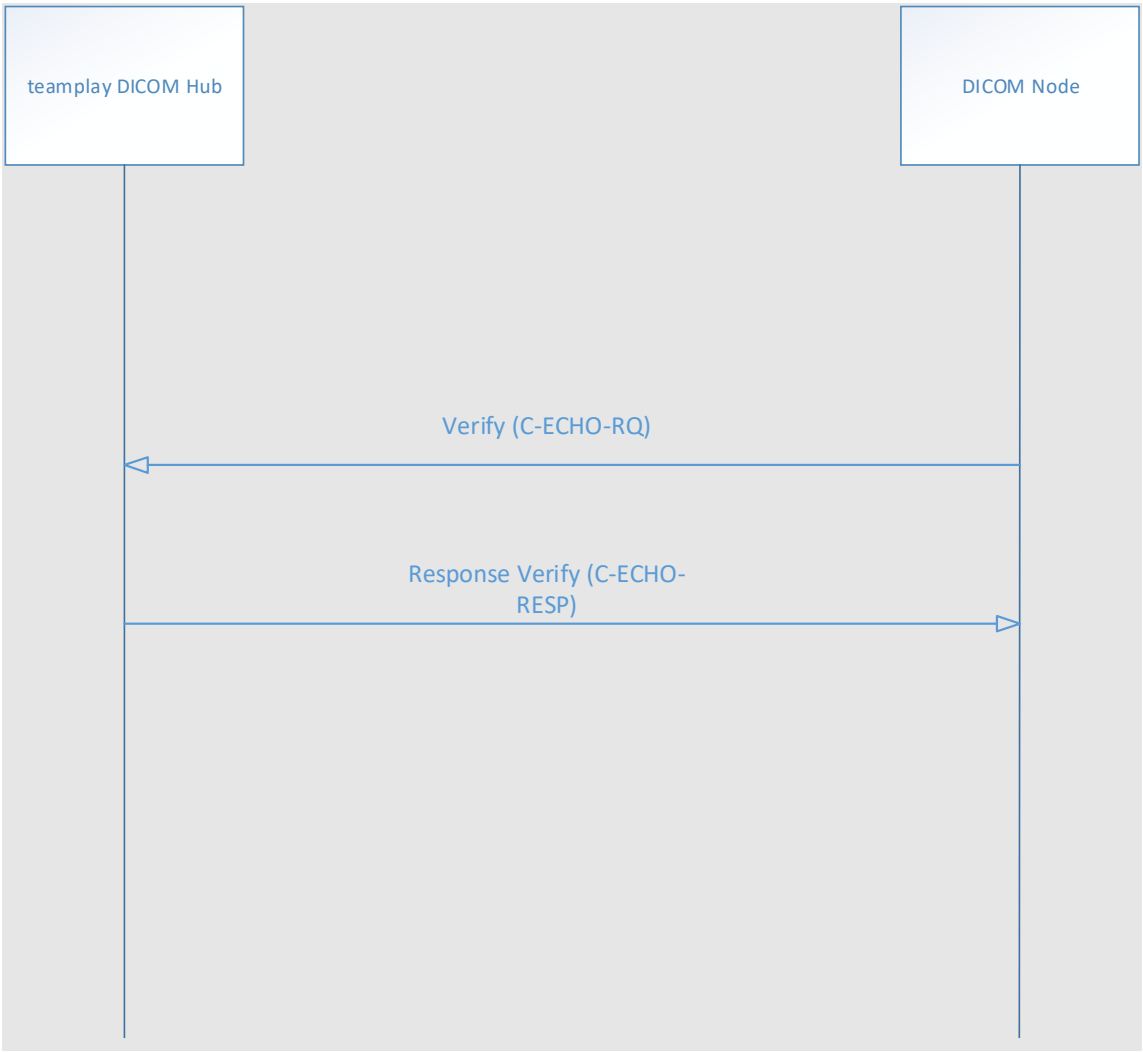

Figure 2-6: Sequence diagram – Verify

2.1.3.2 Storage

The communication between teamplay DICOM Hub Storage AE and an external DICOM node in case of triggering the transfer of objects to the teamplay DICOM Hub from the external node is depicted in Figure 2-7: Sequence diagram – Storage in more detail.

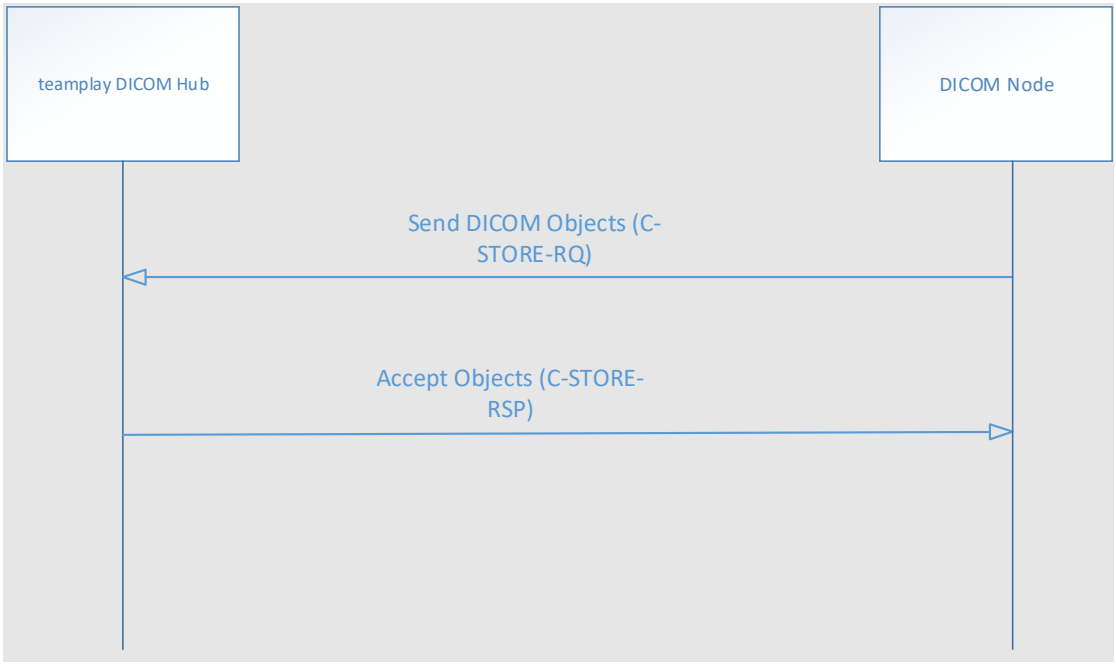

Figure 2-7: Sequence diagram – Storage

2.1.3.3 Send

The communication between teamplay DICOM Hub Storage AE and an external DICOM node in case of sending objects to a remote DICOM node is depicted in Figure 2-8 in more detail.

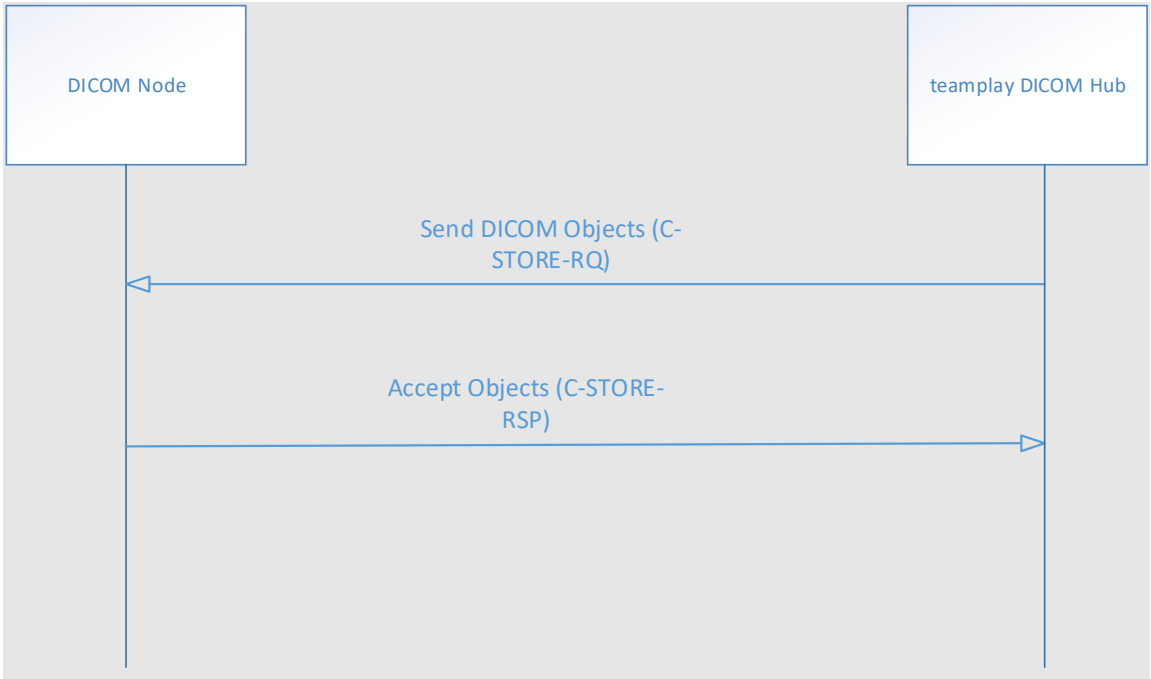

Figure 2-8: Sequence diagram – Send

2.1.3.4 Query/Retrieve

The communication between the teamplay DICOM Hub Q/R (Query/Retrieve) AE and an external DICOM node in case of querying for objects by a remote DICOM node and retrieving the studies from teamplay DICOM Hub is depicted in Figure 2-9 in more detail.

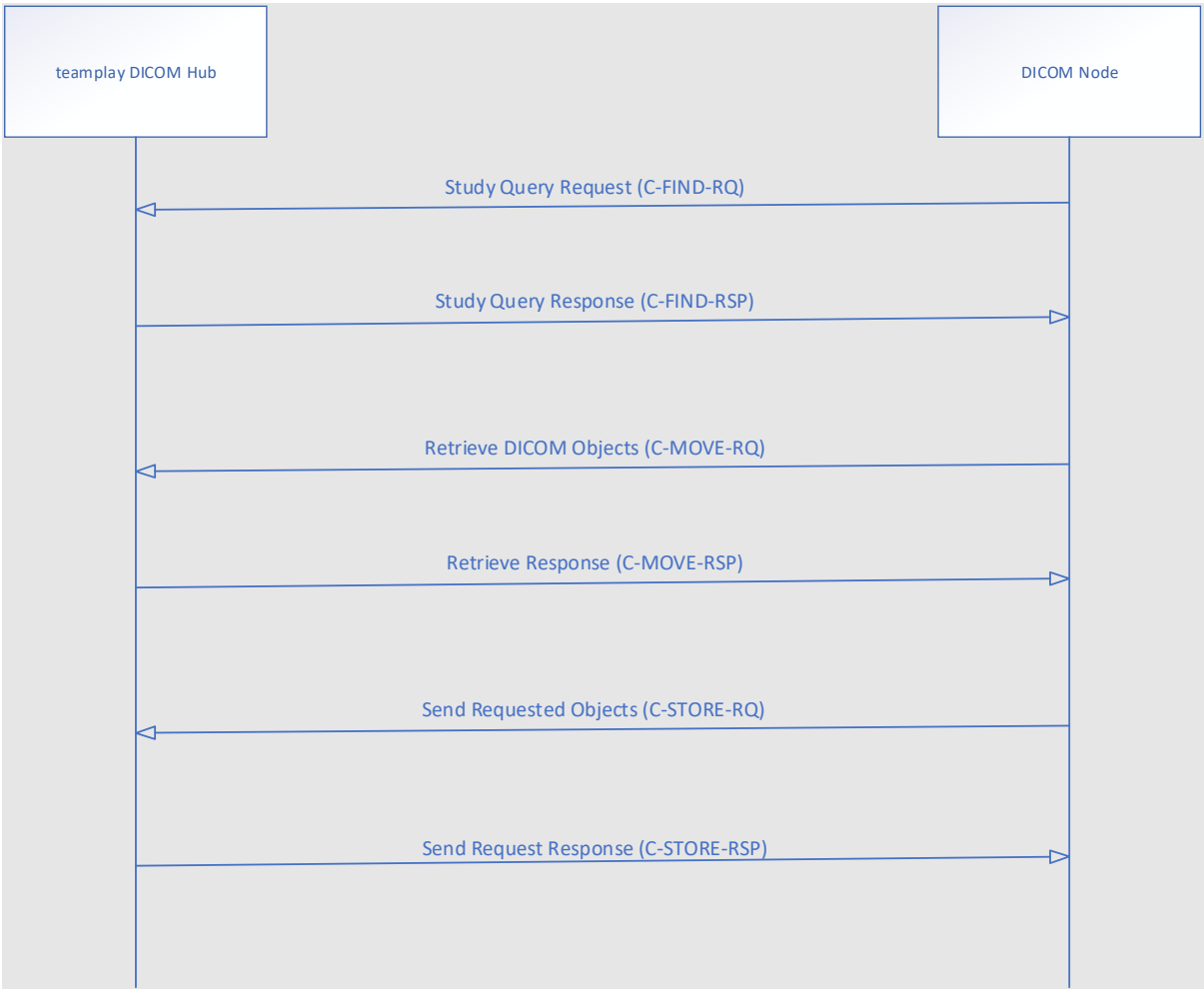

Figure 2-9: Sequence diagram – Query/Retrieve

2.2 AE Specifications

This section outlines the specifications for each of the Application Entities that are part of the teamplay DICOM Hub .

2.2.1 teamplay DICOM Hub Storage AE Specification

2.2.1.1 SOP Classes

The teamplay DICOM Hub Storage AE provides standard conformance to the SOP Class listed in "Table 1: Network Services in the "Conformance Statement Overview".

2.2.1.2 Association Policy

The association policies for the teamplay DICOM Hub Storage AE listed in Table 2-1

Table 2-1: Association Policies

Application Context Name	1.2.840.10008.3.1.1.1
PDU size	64 kB
Maximum number of simultaneous associations as an association acceptor	Unlimited
Maximum number of simultaneous associations as an association initiator	Unlimited

2.2.1.2.1 Asynchronous Nature

The teamplay DICOM Hub DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

2.2.1.2.2 Implementation Identifying Information

For Implementation Identifying Information please refer to "Table 2: Implementation Identifying Information" in the "Conformance Statement Overview".

2.2.1.3 Association Initiation Policy

2.2.1.3.1 Activity – "Send Storage Request"

2.2.1.3.1.1 Description and Sequencing of Activities

The teamplay DICOM Hub Storage AE send process will send an association request and transmit any object to a configured Storage SCP on that association.

2.2.1.3.1.2 Proposed Presentation Contexts

teamplay DICOM Hub Decides on the transfer syntaxes to be proposed based on the transfer syntax of the DICOM images to be sent to the remote DICOM storage SCP. In addition the following list of transfer syntaxes will be proposed as well to consider variety of systems.

Table 2-2: List of additional Transfer Syntaxes

Presentation Context	Transfer Syntax UID
Implicit Value Representation Little Endian	1.2.840.10008.1.2
Explicit Value Representation Little Endian	1.2.840.10008.1.2.1
Explicit Value Representation Big Endian	1.2.840.10008.1.2.2

2.2.1.4 Association Acceptance Policy

2.2.1.4.1 Activity – "Receive Verification" Request

2.2.1.4.1.1 Description and Sequencing of Activities

The Verification SCP C-ECHO request is received by teamplay DICOM Hub whenever "Verification" is requested by other DICOM AETs. If an association by the remote Application Entity is successfully established, then status code "Success" is sent.

2.2.1.4.1.2 Accepted Presentation Contexts

The teamplay DICOM Hub DICOM application will accept the Presentation Contexts as shown in the following Table 2-3:

Table 2-3: Presentation Context Table "Verification"

Presentation Context Table – "Verification"					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Verification	1.2.840.10008.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None

		Implicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2		

2.2.1.4.1.3 SOP specific Conformance for SOP classes – Verification SCP

The Application conforms to the definition of the Verification SCP in accordance with the DICOM Standard.

2.2.1.4.2 Activity – "Receive Storage Request"

2.2.1.4.2.1 Description and Sequencing of Activities

The teamplay DICOM Hub Storage AE receiving process will accept an association, receive any objects transmitted on that association and store the objects on to the disk.

2.2.1.4.2.2 Accepted Presentation Contexts

For all supported Transfer objects (see SOP Classes in the "Conformance Statement Overview"). The Transfer Syntaxes described in Table 2-4 are supported.

Generally all Presentation Contexts are accepted if they contain at least one suitable Transfer syntax specified in Table 2-4.

Table 2-4: Available Transfer Syntax

Presentation Context	**Transfer Syntax UID**
Explicit Value Representation Little Endian	1.2.840.10008.1.2.1
Implicit Value Representation Little Endian	1.2.840.10008.1.2
Explicit Value Representation Big Endian	1.2.840.10008.1.2.2
JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14)	1.2.840.10008.1.2.4.70
JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90
RLE Lossless	1.2.840.10008.1.2.5
JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51
JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50
JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91

2.2.1.4.2.3 SOP specific Conformance for SOP classes

In case of a successful C-STORE operation, the image has successfully been written to disk. The Storage teamplay DICOM Hub Storage AE return the status "success" when the data is stored to disk and a minimal image header validation has been performed. After a successful storage to disk, the upload functionality will upload the same data into the teamplay cloud using non-DICOM communication. The copy on the disk will be deleted upon successful upload.

The following header attributes must be available and filled:

- Study Instance UID (0020,000D)
- Series Instance UID (0020,000E) and

- SOP Instance UID (0008, 0018)

The C-STORE response codes that are available for the Storage are described in the Table 2-5.

Table 2-5: Storage C-STORE Response Status

Service Status	Further Meaning	Error	Reason
Success	Success	0000	Image received correctly (Success notification is done after receiving, before indexing and storing)
Failure	Out-of-resource	A700	No resource left in the storage
Failure	Unable to Process	0110	Error during instance reception

2.2.2 teamplay DICOM Hub Query Retrieve AE Specification

2.2.2.1 Association Acceptance Policy

2.2.2.1.1 Activity – "Query Objects" Request

2.2.2.1.1.1 Description and Sequencing of Activities

The teamplay DICOM Hub Q/R AE serves as a SCP for the following SOP Classes

- Patient Root Q/R Information Model – FIND SOP Class

  The associated real-World activity is receiving a C-Find request with patient level query attributes initiated by an authorized DICOM node against teamplay DICOM Hub Query SCP AE. The DICOM node specifies patient query attributes and will send a C-Find request (according to the query model) and will then get the results based on matching patient records.

- Study Root Q/R Information Model – FIND SOP Class

  The associated real-World activity is receiving a C-Find request with study level query attributes initiated by an authorized DICOM node against teamplay DICOM Hub Query CP AE. The DICOM node specifies query attributes and will send a C-Find request (according to the query model) and will then get the results based on matching patient study records.

2.2.2.1.1.2 Accepted Presentation Contexts

The teamplay DICOM Hub Q/R AE will accept Presentation Contexts as shown in the following Table 2-6:

Table 2-6: Proposed Presentation Contexts for Query Objects

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
		Implicit VR Little Endian	1.2.840.10008.1.2		

Patient Root Query/ Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	No
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Study Root Query/ Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	No
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

2.2.2.1.1.3 SOP Specific Conformance Statement to Query SOP classes

The status codes returned by the teamplay DICOM Hub Query SCP are as follows:

Table 2-7: C-FIND DICOM status codes

Service	Further Meaning	Error Code	Behavior
Error	e.g. Out of Resources; Cancellation; Identifier does not match SOP Class; Unable to process	Any; none; null; Code	Log message is created
Pending	All optional keys are supported the same manner as Required Keys.	FF00	Log message is created
	Matching Operation continues; some of the optional keys were not supported the same way as the required keys	FF01	Log message is created
Cancelled	Sub-operations terminated due to Cancel Indication	FE00	Log message is created
Success	Query has been performed successfully.	0000	Query response is sent successfully.

2.2.2.1.2 Activity – "Retrieve Objects" Request

2.2.2.1.2.1 Description and Sequencing of Activities

The teamplay DICOM Hub Q/R AE serves as a SCP for the following SOP Classes

- Patient Root Q/R Information Model – MOVE SOP Class

  The associated real-World activity is receiving a C-MOVE request with patient level attributes initiated by an authorized DICOM node against teamplay DICOM Hub Retrieve SCP AE. The DICOM node specifies some attributes and will send a C-MOVE request (according to the model). The response (C-MOVE-RSP) shall contain the result of the transfer operation and all DICOM images belonging to the matching patient shall be transferred to the designated DICOM destination.

- Study Root Q/R Information Model – MOVE SOP Class

  The associated real-World activity is receiving a C-MOVE request with patient level attributes initiated by an authorized DICOM node against teamplay DICOM Hub Retrieve SCP AE. The DICOM node specifies some attributes and will send a C-MOVE request (according to the model). The response (C-MOVE-RSP) shall contain the result of the transfer operation and all DICOM images belonging to the matching study shall be transferred to the designated DICOM destination.

2.2.2.1.2.2 Accepted Presentation Contexts

The teamplay DICOM Hub Q/R AE will accept the Presentation Contexts as shown in the following table:

Table 2-8: Accepted Presentation Contexts for Retrieve Objects

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Patient Root Query/ Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	No
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Study Root Query/ Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	No
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

2.2.2.1.2.3 SOP Specific Conformance Statement to Retrieve SOP classes

The status codes returned by the teamplay DICOM Hub Retrieve SCP are as follows:

Table 2-9: C-MOVE DICOM status codes

Service Status	Further Meaning	Error	Behavior
Refused	Out of Resources - Unable to calculate number of matches	A701	Retrieve will be retried again after some time.
	Out of Resources - Unable to perform sub operations	A702	Retrieve will be retried again after some time.
	Move destination unknown	A801	Retrieve will be retried again after some time.
Failed	Identifier does not match SOP Class	A900	N.A.
	Unable to process	Cxxx	Retrieve will be retried again after some time.
Cancel	Sub-operations terminated due to Cancel Indication	FE00	Retrieve will be retried again after some time.
Warning	Sub-operations Complete - One or more Failures of Warnings	B000	Data is processed from teamplay.
Success	Sub-operations Complete - No Failures or Warning	0000	Data is processed from teamplay.
Pending	Sub-operations are continuing	FF00	Wait for completion.

Table 2-10: Query/Retrieve DICOM Command Communication Failure Behavior

Exceptions	Behavior
Timeout	Log message is created. (Timeout configurable; default 30s)
Association Aborted	Log message is created.

2.2.3 DICOMWeb Retrieve (WADO-RS) Specification

2.2.3.1 DICOMWeb Retrieve (WADO-RS) Retrieve study

Table 2-11: WADO-RS Retrieve study

Options	Restrictions
Data Types Supported (Accept Type)	Restricted to application/DICOM or application/octet-stream
Transfer Syntaxes Supported (transfer-syntax Accept parameter)	Any Transfer Syntax supported by the hosting teamplay DICOM Hub
SOP Class Restrictions	Restricted to SOP classes supported by the hosting teamplay DICOM Hub
Size Restriction	Restricted to size supported by the hosting teamplay DICOM Hub

2.2.3.2 DICOMWeb Retrieve (WADO-RS) Retrieve series

Table 2-12: WADO-RS Retrieve series

Options	Restrictions
Data Types Supported (Accept Type)	Restricted to application/DICOM or application/octet-stream
Transfer Syntaxes Supported (transfer-syntax Accept parameter)	Any Transfer Syntax supported by the hosting teamplay DICOM Hub
SOP Class Restrictions	Restricted to SOP classes supported by the hosting teamplay DICOM Hub
Size Restriction	Restricted to size supported by the hosting teamplay DICOM Hub

2.2.3.3 DICOMWeb Retrieve (WADO-RS) Retrieve instances

Table 2-13: WADO-RS Retrieve instances

Options	Restrictions
Data Types Supported (Accept Type)	Restricted to application/DICOM or application/octet-stream
Transfer Syntaxes Supported (transfer-syntax Accept parameter)	Any Transfer Syntax supported by the hosting teamplay DICOM Hub
SOP Class Restrictions	Restricted to SOP classes supported by the hosting teamplay DICOM Hub

Size Restriction	Restricted to size supported by the hosting teamplay DICOM Hub

2.2.3.4 Connection Policies

2.2.3.4.1 General

All standard RS connection policies apply. There are no extensions for RS options.

2.2.3.4.2 Number of Connections

teamplay DICOM Hub application does not limit the number of simultaneous RS requests. When there are a considerable number of requests from a single requestor over a brief period, it might be subject to automatic throttling by the teamplay DICOM Hub system.

Table 2-14: Number of Rs Requests Supported

Maximum number of simultaneous RS requests	Unlimited

2.2.3.4.3 Asynchronous Nature

Not Applicable

2.2.3.4.4 Response Status

Table 2-15: Number of Rs Requests Supported

Service Status	HTTP Status Code	Description
Failure	400 - Bad Request	Indicates that the provided input is not valid.
	403 – Forbidden	Indicates that the user is not authorized to retrieve this DICOM dataset. Please check if your application has received data availability notification for this dataset.
	204 – No Content	Cannot find the DICOM study data requested.
	206 – Partial Content	Partial DICOM study/series transferred successfully
Success	200 – OK	DICOM study/series transferred successfully

2.2.4 DICOMWeb Store (STOW-RS) Specification

2.2.4.1 DICOMWeb Store (STOW-RS) Instance

Table 2-16: STOW-RS Store Instance

Options	Restrictions
Media Types Supported (Accept Type)	Restricted to application/DICOM
Transfer Syntaxes Supported (transfer-syntax Accept parameter)	Any Transfer Syntax supported by the hosting teamplay DICOM Hub

SOP Class Restrictions	Restricted to SOP classes supported by the hosting teamplay DICOM Hub
Size Restriction	Restricted to size supported by the hosting teamplay DICOM Hub

2.2.4.2 Connection Policies

2.2.4.2.1 General

All standard RS connection policies apply. There are no extensions for RS options.

2.2.4.2.2 Number of Connections

teamplay DICOM Hub application does not limit the number of simultaneous RS requests. When there are a considerable number of requests from a single requestor over a brief period, it might be subject to automatic throttling by the teamplay DICOM Hub system.

Table 2-17: Number of http Requests Supported

Maximum number of simultaneous RS requests	Unlimited

2.2.4.2.3 Asynchronous Nature

teamplay DICOM Hub WADO service does not support RS asynchronous response

2.2.4.2.4 Response Status

The teamplay DICOM Hub STOW service response message header contains status codes indicating success or failure as shown in the "HTTP Standard Response Codes" below. No additional status codes are used.

Table 2-18: Number of http Requests Supported

Service Status	HTTP Status Code	Description
Failure	400 - Bad Request	Invalid request. Possible reasons with sub status codes (sub status code can be seen under section '00081197' in the response body): 297: Unable to identify the application identity of the request. Please check if the authentication token used is valid. 298: Invalid Multi-part content in the incoming http request message.
	401 - Unauthorized	Invalid application access token.
	409 - Conflict	Conflict occurred and the response payload shall contain the Store Instances Response Module, which contains additional information regarding instance errors. Possible reasons with sub status codes (sub status code can be seen under section

		'00081197' in the response body): 293: Specified DICOM study uniquely identified by study instance UID already exist and uploaded by another application. It is not permitted to overwrite an existing study uploaded/owned by another application. 294: Invalid or corrupt DICOM files. Uploaded DICOM files cannot be understood by the system. 295: Invalid media type specified for the multi-part sub item. Only supported type is 'application/DICOM'. 296: There is mismatch of patient identification attributes between existing data and new incoming data. Following DICOM tags are checked for consistency: Patient's Name (0010,0010), Patient ID (0010,0020), Patient's Birth Date (0010,0030), Patient's Sex (0010,0040).
Success	200 - OK	The origin server successfully stored all Instances.

2.2.5 DICOMWeb Search (QIDO-RS) Specification

2.2.5.1 DICOMWeb Search (QIDO-RS) Search for studies

Table 2-19: QIDO-RS Search for studies specification

Parameter	Restrictions
Media Types	application/json
Matching Attributes	See Table 2-20
Return Attributes	See Table 2-20
Limit and offset supported?	Yes
Person name matching	No

Table 2-20: QIDO-RS Study attribute matching

Keyword	Tag	Types of matching
STUDY Level		
StudyDate	00080020	S

StudyTime	00080030	S
AccessionNumber	00080050	S
ModalitiesInStudy	00080061	S
ReferringPhysiciansName	00080090	S
StudyDescription	00081030	S
PatientID	00100020	S
PatientsName	00100010	S
PatientBirthDate	00100030	NONE
PatientSex	00100040	NONE
StudyInstanceUID	0020000D	UNIQUE
StudyID	00200010	S
NumberOfStudyRelatedSeries	00201206	NONE
Common to all query levels		
RetrieveURL	00081190	None

Types of Matching:

- "S" indicates the identifier attribute uses Single Value Matching
- "L" indicates UID List Matching
- "U" indicates Universal Matching.

Note:

- If only Universal Matching is supported for an attribute, then that attribute can only be passed as an "includefield" query key
- "*" indicates wild card matching
- "R" indicates Range Matching
- "SEQUENCE" indicates Sequence Matching
- "NONE" indicates that no matching is supported, but that values for this Element requested will be returned with all requests
- "UNIQUE" indicates that this is the Unique Key for that query level, in which case Universal Matching or Single Value Matching is used depending on the query level.

2.2.5.2 DICOMWeb Search (QIDO-RS) Search for series

Table 2-21: QIDO-RS Search for series specification

Parameter	**Restrictions**
Media Types	Restricted to “multipart/related; type = application/DICOM+json”
Matching Attributes	See Table 2-22
Return Attributes	See Table 2-22
Limit and offset supported?	Yes
Person name matching	No

Table 2-22: QIDO-RS series attribute matching

Keyword	Tag	Types of matching
SERIES Level		
Modality	00080060	S
SeriesDescription	0008103E	NONE
SeriesInstanceUID	0020000E	UNIQUE
SeriesNumber	00200011	S
NumberOfSeriesRelatedInstances	00201209	NONE
Common to all query levels		
InstanceAvailability	00080056	S
RetrieveURL	00081190	NONE

Types of Matching:

- "S" indicates the identifier attribute uses Single Value Matching
- "L" indicates UID List Matching
- "U" indicates Universal Matching.

Note:

- If only Universal Matching is supported for an attribute, then that attribute can only be passed as an "includefield" query key
- "*" indicates wild card matching
- "R" indicates Range Matching
- "SEQUENCE" indicates Sequence Matching
- "NONE" indicates that no matching is supported, but that values for this Element requested will be returned with all requests

"UNIQUE" indicates that this is the Unique Key for that query level, in which case Universal Matching or Single

Value Matching is used depending on the query level.

2.2.5.3 DICOMWeb Search (QIDO-RS) Search for instances

Table 2-23: QIDO-RS Search for series specification

Parameter	Restrictions
Media Types	Restricted to “multipart/related; type = application/DICOM+json”
Matching Attributes	See Table 2-24
Return Attributes	See Table 2-24
Limit and offset supported?	Yes
Person name matching	No

Table 2-24: QIDO-RS instance attribute matching

Keyword	Tag	Types of matching
SERIES Level		
Modality	00080060	S
SeriesDescription	0008103E	NONE
SeriesInstanceUID	0020000E	UNIQUE
SeriesNumber	00200011	S
NumberOfSeriesRelatedInstances	00201209	NONE
PerformedProcedureStepStartDate	00400244	S
PerformedProcedureStepStartTime	00400245	S
RequestAttributeSequence	00400275	SEQUENCE
>ScheduledProcedureStepID	00400009	S
>RequestedProcedureID	00401001	S
COMPOSITE INSTANCE Level		
SOPClassUID	00080016	L
SOPInstanceUID	00080018	UNIQUE
InstanceNumber	00200013	S
Rows	00280010	NONE
Columns	00280011	NONE
BitsAllocated	00280100	NONE
NumberOfFrames	00280008	NONE
Common to all query levels		
InstanceAvailability	00080056	S
SpecificCharacterSet	00080005	NONE
RetrieveURL	00081190	NONE

Types of Matching:

- "S" indicates the identifier attribute uses Single Value Matching
- "L" indicates UID List Matching
- "U" indicates Universal Matching.

Note:

- If only Universal Matching is supported for an attribute, then that attribute can only be passed as an "includefield" query key
- "*" indicates wild card matching
- "R" indicates Range Matching
- "SEQUENCE" indicates Sequence Matching

- "NONE" indicates that no matching is supported, but that values for this Element requested will be returned with all requests
- "UNIQUE" indicates that this is the Unique Key for that query level, in which case Universal Matching or Single Value Matching is used depending on the query level.

2.2.5.4 Connection Policies

All standard RS connection policies apply. There are no extensions for RS options.

2.2.5.4.1 Number of Connections

teamplay DICOM Hub application does not limit the number of simultaneous RS requests. When there are a considerable number of requests from a single requestor over a brief period, it might be subject to automatic throttling by the teamplay DICOM Hub system.

Table 2-25: Number of http Requests Supported

Maximum number of simultaneous RS requests	Not Restricted

2.2.5.4.2 Asynchronous Nature

teamplay DICOM Hub QIDO service does not support RS asynchronous response

2.2.5.4.3 Response Status

teamplay DICOM Hub QIDO service shall provide a response message header containing the appropriate status code indicating success or failure as shown in Table 2-26.

Table 2-26: QIDO-RS HTTP Standard Response Codes

Service Status	HTTP Status Code	Description
Success	200 - OK	The query completed and any matching results are returned in the message body. In addition to the standard result attributes, there are optional result attributes which can be requested via the http request. The below mentioned attributes provide information about teamplay DICOM Hub privacy level which is used for the data minimization of DICOM images. 00331101: Attribute which contains the privacy level which was used for data minimization 00331102: Attribute which contains the privacy level extensions which are used on top of the privacy level 00331103: Attribute which contains the detailed privacy level tag rules
	204 - No Content	The query completed and no matching results were found, returning empty message.
Failure	400 - Bad Request	This indicates that the QIDO-RS Provider was unable to fulfil it because it cannot understand the query component.
	401 - Unauthorized	This indicates that the QIDO-RS Provider refused to fulfil it because the client is not authorized.
	403 - Forbidden	This indicates that the QIDO-RS Provider understood the request, but is refusing to fulfil it (e.g., no single patient specified, an authorized user with insufficient privileges, etc.).

2.2.5.5 Extended Negotiation

teamplay DICOM Hub QIDO service does not support the "fuzzymatching" query key.

teamplay DICOM Hub QIDO service will perform case insensitive matching for PN VR attributes but will not perform other forms of fuzzy matching. This applies to the following attributes:

- Referring Physician's Name (0008,0090)
- Physician(s) of Record (0008,1048)
- Patient's Name (0010,0010)

2.3 Network Interfaces

2.3.1 Physical Network Interface

The teamplay DICOM Hub provides DICOM 3.0 TCP/IP network communication support as defined in Part 8 of DICOM [1]. The network communication is independent from the physical medium over which TCP/IP executes; it inherits this from the Windows OS system upon which it executes.

2.3.2 Additional Protocols

N/A

2.3.3 IPv4 and IPv6 Support

Currently only IPv4 is supported.

2.4 Configuration

2.4.1 AE Title/Presentation Address Mapping

AE Titles shall be unique within the hospital. A common way to achieve that is to use the hostname as part of the AE Titles. The string can be up to 16 characters and must not contain any extended characters. Only 7-bit ASCII characters (excluding Control Characters) are allowed according to DICOM.

2.4.1.1 Local AE Titles

The teamplay DICOM Hub allows configuring AE Title and Port in any desired way.

Table 2-27: Default Local teamplay DICOM Hub AE Title

Parameter	Configurable	Default Value
Default AE title	Yes	TEAMPLAY-ISHARE (hostname in uppercase characters; limited to 16 characters)
Default Port	Yes	105

Table 2-28: Default Local teamplay DICOM Hub QR AE Title

Parameter	Configurable	Default Value
Default AE title	Yes	TEAMPLAY-QR (hostname in uppercase characters; limited to 16 characters)
Default Port	Yes	106

2.4.1.2 Remote AE Title / Presentation Address Mapping

2.4.1.2.1 Remote SCU´s

All relevant remote applications that may initiate DICOM associations with teamplay DICOM Hub need to be configured in the teamplay DICOM settings page before the association can be established.

The mapping of external AE Titles to TCP/IP addresses and ports is configurable and initially set at the time of installation. Changes can also be performed later. The Application Entity Title and supported transfer syntaxes need to be known for configuration.

2.4.1.2.2 Remote SCP's

Remote applications can accept DICOM associations from the teamplay DICOM Hub, the following information needs to be available:

- Application Entity Title
- Host Name / IP address on which the remote application service runs
- Port number on which the remote application accepts association requests.

2.4.2 Parameters

There are no additional parameters to be configured.

3 Media Interchange

3.1 N/A

4 Support of Extended Character Sets

The teamplay DICOM Hub DICOM application supports the following character sets as defined in the four tables below.

Table 4-1: Single-Byte Character Sets without Code Extension

Character Set Description	Defined Term	ISO registration number	Character Set
Default repertoire	None	ISO IR 6	ISO 646
Latin alphabet No. 1	ISO_IR 100	ISO_IR 100	Supplementary set
		ISO_IR 6	ISO 646
Latin alphabet No. 2	ISO_IR 101	ISO_IR 101	Supplementary set
		ISO_IR 6	ISO 646
Latin alphabet No. 3	ISO_IR 109	ISO_IR 109	Supplementary set
		ISO_IR 6	ISO 646
Latin alphabet No. 4	ISO_IR 110	ISO_IR 110	Supplementary set
		ISO_IR 6	ISO 646
Cyrillic	ISO_IR 144	ISO_IR 144	Supplementary set
		ISO_IR 6	ISO 646

Arabic	ISO_IR 127	ISO_IR 127	Supplementary set
		ISO_IR 6	ISO 646
Greek	ISO_IR 126	ISO_IR 126	Supplementary set
		ISO_IR 6	ISO 646
Hebrew	ISO_IR 138	ISO_IR 138	Supplementary set
		ISO_IR 6	ISO 646
Latin alphabet No. 5	ISO_IR 148	ISO_IR 148	Supplementary set
		ISO_IR 6	ISO 646
Japanese	ISO_IR 13	ISO_IR 13	JIS X 0201: Katakana
		ISO_IR 14	JIS X 0201: Romaji
Thai	ISO_IR166	ISO_IR166 ISO_IR 6	TIS 620-253 (1990) ISO 646

Table 4-2: Single-Byte Characters Sets with Code Extension

Character Set Description	**Defined Term**	**Standard for Code Extension**	**ESC sequence**	**ISO registration number**	**Character Set**
Default repertoire	ISO 2022 IR 6	ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646
Latin alphabet No.1	ISO 2022 IR 100	ISO 2022	ESC 02/13 04/01	ISO-IR 100	Supplementary set
		ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646
Latin alphabet No.2	ISO 2022 IR 101	ISO 2022	ESC 02/13 04/02	ISO-IR 101	Supplementary set
		ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646
Latin alphabet No.3	ISO 2022 IR 109	ISO 2022	ESC 02/13 04/03	ISO-IR 109	Supplementary set
		ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646
Latin alphabet No.4	ISO 2022 IR 110	ISO 2022	ESC 02/13 04/04	ISO-IR 110	Supplementary set
		ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646

Multi-Byte Character Sets without Code Extension

Table 4-3: Multi-Byte Character Sets without Code Extension

Character Set Description	**Defined Term**	**ISO registration number**	**Character Set**
Unicode	ISO_IR 192	ISO 10646	Unicode in UTF-8
Chinese	GB18030	GB18030	GB 18030-2000 (China Association for Standardization)

Table 4-4: Multi-Byte Character Sets with Code Extension

Character Set Description	Defined Term	Standard for Code Extension	ESC sequence	ISO registration number	Character Set
Japanese	ISO 2022 IR 159	ISO 2022	ESC 02/04 02/08 04/04	ISO-IR 159	JIS X 0212: Supplementary Kanji set
Korean	ISO 2022 IR 149	ISO 2022	ESC 02/04 02/09 04/03	ISO-IR 149	KS X 1001: Hangul and Hanja

All SCS (Special Character Sets) listed above are supported for incoming Data.

There are now three categories of character sets which must be differentiated because of their different encoding formats:

- Conventional ISO character sets: ISO_IR 6, ISO 2022 IR 6, ISO_IR 100, etc. Encoded in ISO 2022
- ISO_IR 192 encoded in UTF-8
- GB18030 encoded in GB18030

It is not possible to recognize the following mismatches automatically on receiving or importing:

- An attribute value is encoded in ISO_IR 192 (0008,0005) contains a conventional ISO character set as primary character set
- An attribute value is encoded in GB18030 (0008,0005) contains a conventional ISO character set as primary character set
- An attribute value is encoded in ISO 2022 (0008,0005) contains ISO_IR 192
- An attribute value is encoded in ISO 2022 (0008,0005) contains GB18030

An IOD that contains one of the above-mentioned inconsistencies does not conform to DICOM. As these kinds of inconsistencies cannot be recognized by the system, the IOD will not be rejected but the character data might be corrupted.

The teamplay DICOM Hub supports Kanji characters in the byte zone after 74 (79, 7A, 7B and 7C).

5 Attribute confidentiality profiles

5.1 De-identification

The teamplay DICOM Hub can de-identify attributes using proprietary mechanisms.

6 Security

6.1 Security Profiles

The teamplay DICOM Hub does not support any specific security profiles.

6.2 Association Level Security

N/A

6.3 Application Level Security

N/A

7 Annexes

7.1 IOD Contents

N/A

7.2 Data Dictionary of Private Attributes.

Table 7-1: Dictionary of private tags in teamplay DICOM Hub

DICOM Tag	Private Creator	Attribute Name	Description	VR	VM
0033, xx01	SIEMENS teamplayImages	Privacy Level	Attribute which contains the privacy level which was used for data minimization	LO	1
0033, xx02	SIEMENS teamplayImages	Privacy Level Extensions	Attribute which contains the privacy level extensions which are used on top of the privacy level	LO	1
0033, xx03	SIEMENS teamplayImages	Privacy Level Metadata	Attribute which contains the detailed privacy level tag rules	LO	1
0033, xx04	SIEMENS teamplayImages	Hashed Patient's Name	key hashed Patient Name	ST	1
0033, xx05	SIEMENS teamplayImages	Hashed Patient's Birth Date	key hashed Patient Birth Date	ST	1

7.3 Coded Terminology and Templates

N/A

7.4 Grayscale Image Consistency

N/A

7.5 Standard Extended / Specialized / Private SOP Classes

N/A

7.6 Private Transfer Syntaxes

N/A

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