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DICOM Conformance Statement

teamplay Receiver

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1 DICOM Conformance Statement Overview

The ***teamplay Receiver*** is designed to be integrated into an environment of medical, DICOM-based devices. The teamplay Receiver supports Storage of images utilizing the DICOM “Storage Service Class” and the retrieval of images from DICOM Archives utilizing the DICOM “Query/Retrieve Service Class”.

The ***teamplay Receiver*** provides an AET for the analytics offering functionality.

The default AET is TEAMPLAY.

It is possible to change the configuration of the AET.

The teamplay analytics offerings AE **teamplay** provides the following functionality:

- Receive DICOM objects from service class users
- Query remote nodes for objects based on Study Root Model and retrieve them.
- Receive data and optionally deidentifies it.

The ***teamplay Receiver*** conforms to the DICOM Standard and supports the network services as described in Table 1: Network Services and the media services as described in Table 2 - Media Services.

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 created by *teamplay Receiver*					
		Create	**Send**	**Store**	**Display**
None					
SOP Classes managed by *teamplay Receiver*					
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	No	No	Yes	No
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	No	No	Yes	No
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	No	No	Yes	No
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	No	No	Yes	No
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	No	No	Yes	No
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	No	No	Yes	No
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	No	No	Yes	No
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	No	No	Yes	No
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	No	No	Yes	No
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	No	No	Yes	No
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	No	No	Yes	No
Enhanced MR Color Image Storage	1.2.840.10008.5.1.4.1.1.4.3	No	No	Yes	No
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	No	No	Yes	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	No	No	Yes	No

SOP Classes	SOP Class UID	User of Service (SCU)		Provider of Service (SCP)	
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	No	No	Yes	No
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	No	No	Yes	No
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	No	No	Yes	No
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	No	No	Yes	No
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	No	No	Yes	No
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	No	No	Yes	No
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	No	No	Yes	No
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	No	No	Yes	No
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	No	No	Yes	No
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	No	No	Yes	No
Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.2	No	No	Yes	No
Pseudo-Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.3	No	No	Yes	No
Blending Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.4	No	No	Yes	No
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	No	No	Yes	No
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	No	No	Yes	No
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	No	No	Yes	No
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	No	No	Yes	No
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	No	No	Yes	No
X-Ray 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2	No	No	Yes	No
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	No	No	Yes	No
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	No	No	Yes	No
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	No	No	Yes	No
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	No	No	Yes	No
Deformable Spatial Registration SOP Class	1.2.840.10008.5.1.4.1.1.66.3	No	No	Yes	No
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	No	No	Yes	No
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5	No	No	Yes	No
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	No	No	Yes	No
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	No	No	Yes	No

SOP Classes	SOP Class UID	User of Service (SCU)		Provider of Service (SCP)	
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	No	No	Yes	No
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	No	No	Yes	No
Procedure Log Storage Storage	1.2.840.10008.5.1.4.1.1.88.40	No	No	Yes	No
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	No	No	Yes	No
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59	No	No	Yes	No
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	No	No	Yes	No
Encapsulated PDF Storage SOP Class	1.2.840.10008.5.1.4.1.1.104.1	No	No	Yes	No
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	No	No	Yes	No
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	No	No	Yes	No
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	No	No	Yes	No
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	No	No	Yes	No
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	No	No	Yes	No
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	No	No	Yes	No
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	No	No	Yes	No
Digital Intra-Oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	No	No	Yes	No
Digital Intra-Oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	No	No	Yes	No
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	No	No	Yes	No
Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.130	No	No	Yes	No
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	No	No	Yes	No
Transfer (Private SOP Class)					
Syngo Non-Image Storage	1.3.12.2.1107.5.9.1	Yes		Yes	
Storage Commitment					
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	No		No	
Worklist Management					
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	No		No	
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	No		No	
Query/Retrieve					
Patient Root Q/R Information Model - FIND	1.2.840.10008.3.1.2.3.3	No		No	
Patient Root Q/R - Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	No		No	
Study Root Q/R - Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes		No	
Study Root Q/R - Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.1	Yes		No	
Patient/Study Only Q/R - Information Model FIND	1.2.840.10008.5.1.4.1.2.2.1	No		No	

SOP Classes	SOP Class UID	User of Service (SCU)	Provider of Service (SCP)
Patient/Study Only Q/R - Information Model MOVE	1.2.840.10008.5.1.4.1.2.3.2	No	No
Print Management			
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	No	No
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	No	No
Basic Film Sesssion SOP Class	1.2.840.10008.5.1.1.1	No	No
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	No	No
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	No	No
Basic Color Image Box SOP SOP Class	1.2.840.10008.5.1.1.4.1	No	No
Printer SOP Class	1.2.840.10008.5.1.1.16	No	No
Print Job SOP Class	1.2.840.10008.5.1.1.14	No	No
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23	No	No

Table 2 - Media Services

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
Compact Disk - Recordable		
STD-GEN-CD	No	No
AUG-GEN-CD	No	No
DVD		
AUG-GEN-DVD	No	No
AUG- GEN-DVD-J2K	No	No
STD-GEN-DVD	No	No
STD-GEN-DVD-J2K	No	No
USB		
AUG- GEN-USB-J2K	No	No
STD-GEN-USB-J2K	No	No

Table 3 - Implementation Identifying Information

Name	Value
Application Context Name	1.2.840.100008.3.1.1.1

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2 Table of Contents

3 Introduction

3.1 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.

3.2 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between ***teamplay Receiver*** and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard (Digital Imaging and Communication in Medicine (DICOM)). 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 Receiver and other DICOM conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipement, as established by the healthcare facility.

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3.3 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
DCS	DICOM Conformance Statement
DICOM	Digital Imaging and Communications in Medicine
FSC	File Set Creator
FSR	File Set Reader
FSU	File Set Updater
GSDF	Grayscale Standard Display Function
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
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
TFT	Thin Film Transistor (Display)
TID	Template ID
U	Unique Key Attribute
UID	Unique Identifier
UTF-8	Unicode Transformation Format-8
VR	Value Representation

3.4 References

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

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4 Networking

4.1 Implementation Model

- **Verification**
  Verification requests will be processed and responded by the **teamplay** AE. The AE can also initiate an association and request verification to a remote AE.

- **Storage**
  The **teamplay** AE Storage SCP starts to receive the Information Objects and store them on file system after accepting an association with a negotiated Presentation Context.

- **Query**
  The **teamplay** AE supports the Query/Retrieve services in a SCU role. The C-FIND request to the remote SCP is invoked by teamplay.

- **Retrieve**
  The **teamplay** AE initiates a C-MOVE request to the remote Retrieve SCP. The remote Retrieve SCP in turn starts C-STORE sub operations to the teamplay Storage SCP. The **teamplay** AE supports Study Root - Query/Retrieve Information model as SCU.

4.1.1 Application Data Flow

The following figures provide a functional overview of the **teamplay** Application Entity (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)

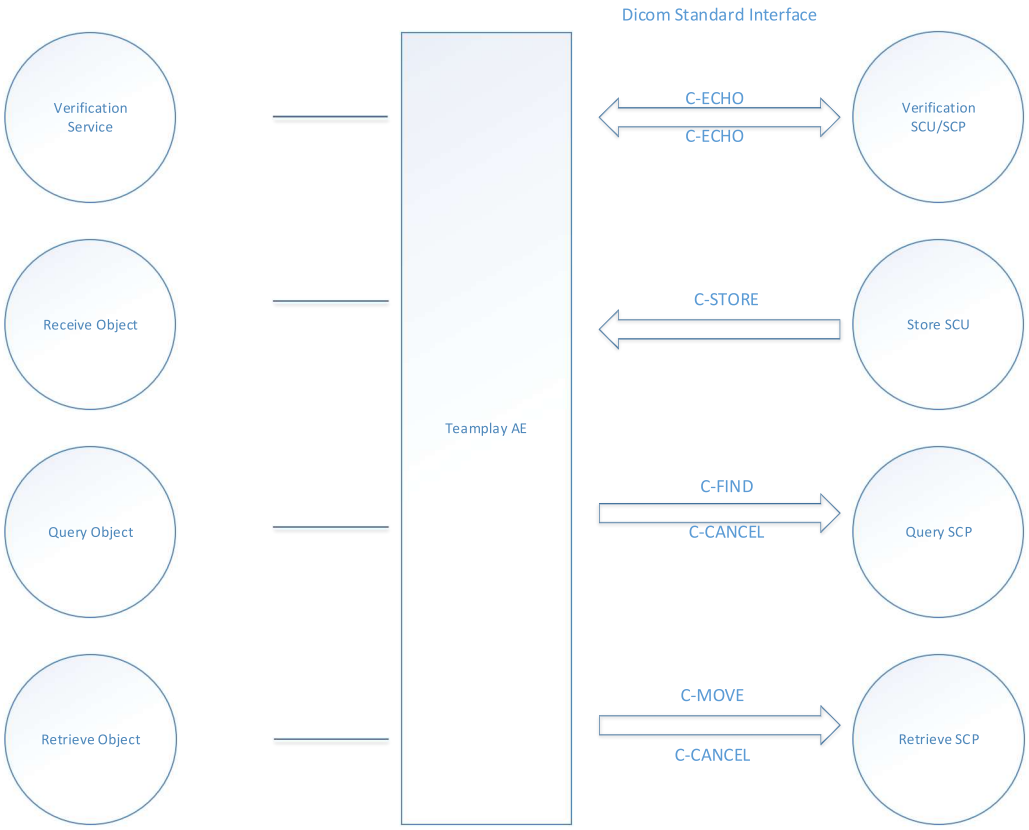

Figure 4.1-1: Application Data Flow Diagram teamplay AE

- The teamplay DICOM service opens an association when a "verification" of a remote application is requested during a configuration session. This can be done when entering new data to configure a remote application or to verify existing configuration data.
- The Storage SCP of the **teamplay** AE can receive incoming DICOM images and add them to the local database. It can respond to external Storage and Verification Requests as a Service Class Provider (SCP) for C-STORE and C-ECHO requests.
- The Query part of the Query SCU **teamplay** AE uses C-FIND to search a remote SCP for Patient Study and Series information.
- The **teamplay** AE initiates a C-MOVE request to the remote Retrieve SCP. The remote Retrieve SCP in turn starts C-STORE sub operations to the teamplay Storage SCP.

4.1.2 Functional Definitions of Application Entities

The ***teamplay Receiver*** operate as background server processes. Upon accepting an association with a negotiated Presentation Context it starts to receive and process requests.

4.1.2.1 Functional Definition of teamplay AE

The **teamplay** AE can initiate verification requests to remote AE title as well as respond to verification requests from remote AEs.

The **teamplay** AE Storage SCP receives the Information Objects 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** AE supports the Study Root Query/Retrieve Information Model - FIND as an SCU.
The C-FIND request to a remote SCP is invoked directly by **teamplay** AE for analytics offerings.
The remote SCP returns a list of responses with defined data (which can be displayed to the user).
The **teamplay** AE initiates a C-MOVE request to the remote Retrieve SCP. The remote Retrieve SCP in turn starts C-STORE sub operations to the **teamplay** AE Storage SCP. The **teamplay** AE supports the Study Root Query/Retrieve Information Model - MOVE as an SCU.

For supported SOP Classes or Data Objects refer to the “Conformance Statement Overview”.

4.1.3 Sequencing of Activities

4.1.3.1 Verification

The communication between **teamplay** AE and an external DICOM node in case of Verify is depicted in Figure 4.1-2 in more detail.

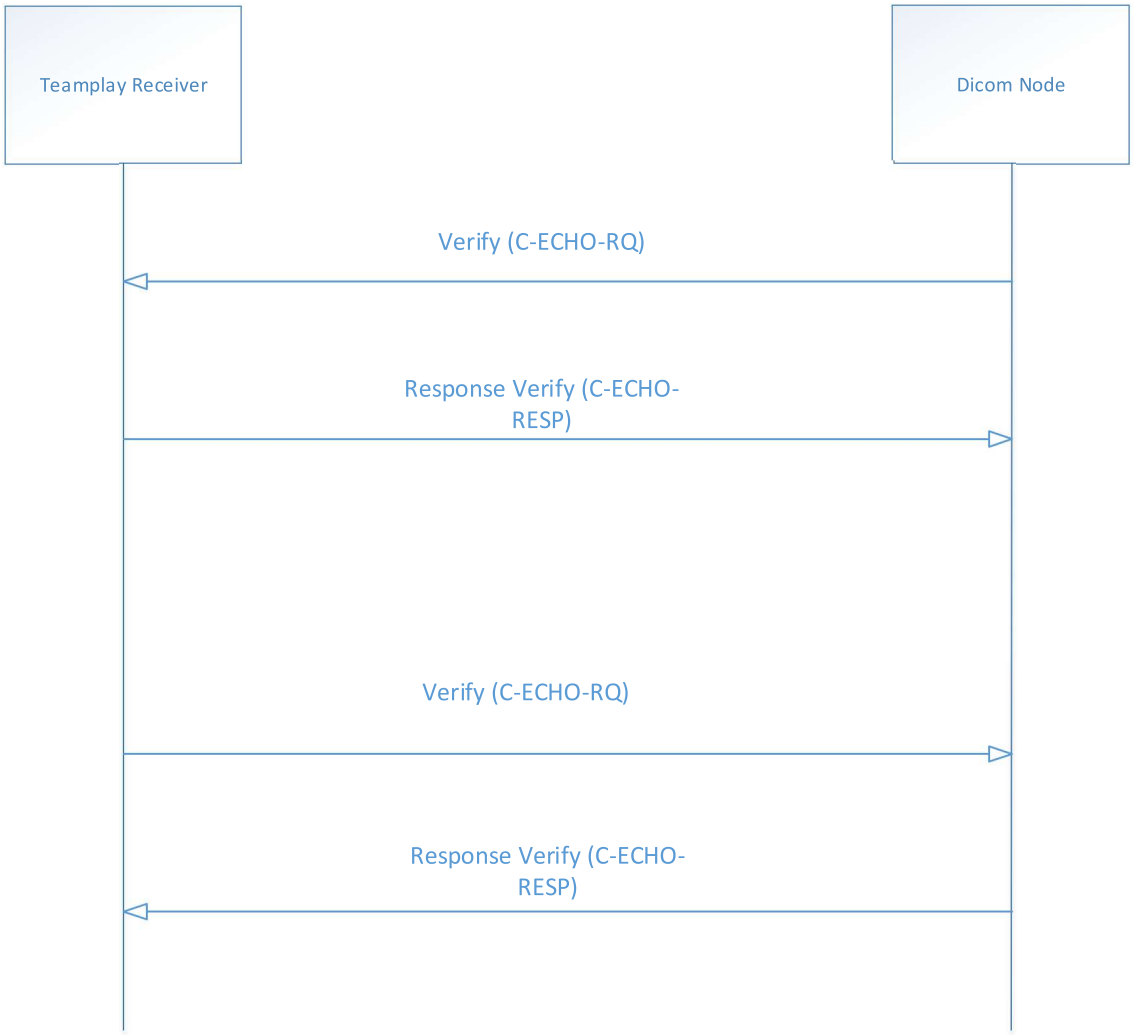

Figure 4.1-2: Sequence diagram – Verify

4.1.3.2 Storage

The communication between **teamplay** AE and an external DICOM node in case of triggering the transfer of objects to the teamplay Receiver from the external node is depicted in Figure 4.1-3 in more detail.

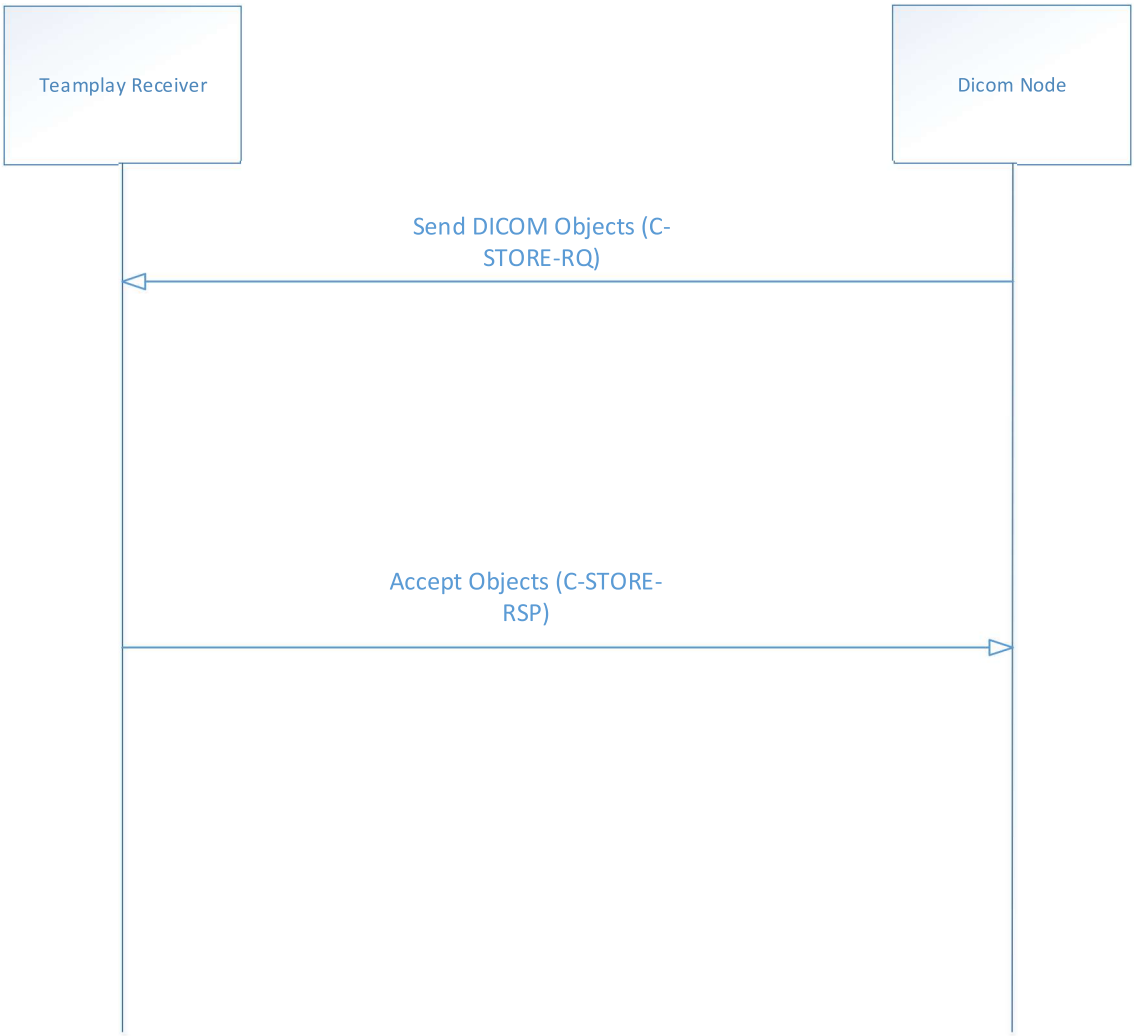

Figure 4.1-3: Sequence diagram – Storage

4.1.3.3 Query / Retrieve

The communication between the **teamplay** AE and an external DICOM node in case of querying for objects from a remote DICOM node and retrieving to the teamplay Receiver is depicted in Figure 4.1-4 in more detail.

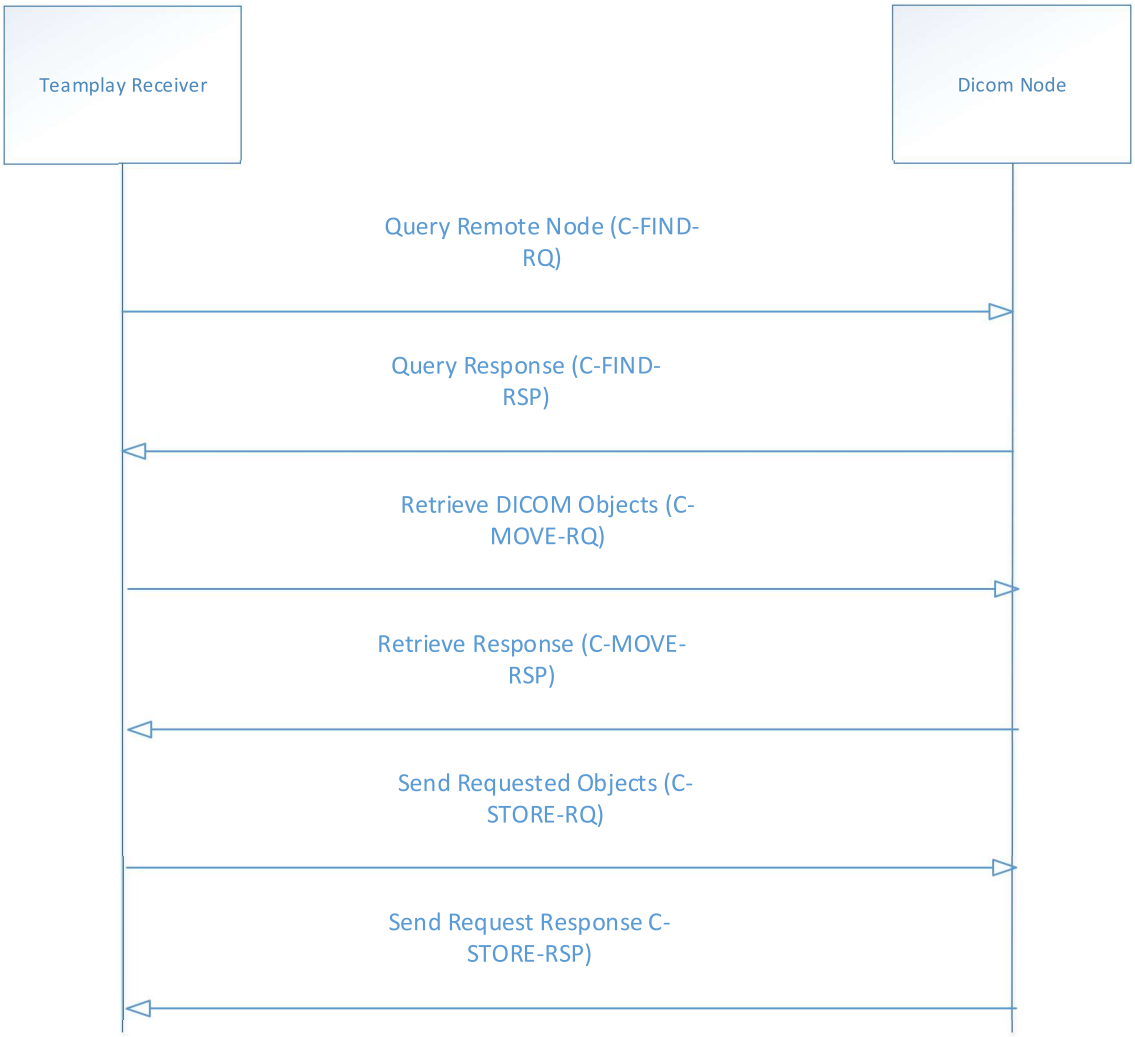

Figure 4.1-4: Sequence diagram – Query/Retrieve

4.2 Application Entity Specification

This section outlines the specifications for the Application Entity that is part of the teamplay Receiver.

4.2.1 teamplay AE Specification

4.2.1.1 SOP Classes

The **teamplay** AE provides standard conformance to the SOP Class listed in “Table 1: Network Services” section "Verification" in the “Conformance Statement Overview”.

4.2.1.2 Association Policy

The association policies for the **teamplay** AE listed in table 4-1.

Table 4-1: 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

4.2.1.2.1 Asynchronous Nature

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

4.2.1.2.2 Implementation Identifying Information

For Implementation Identifying Information please refer to “Table 3 - Implementation Identifying Information” in the “Conformance Statement Overview”.

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Activity – “Send Verification” Request

4.2.1.3.1.1 Description and Sequencing of Activities

The Verification SCU C-ECHO request is initiated by Service and Configuration SW whenever "Verification" is requested. If an association to a remote Application Entity is successfully established, Verification with the configured AET is requested via the open association. If the C-ECHO Response from the remote Application contains a status other than "Success", will be indicated in the service environment and the association is closed.

4.2.1.3.1.2 Proposed Presentation Contexts

The ***teamplay Receiver*** DICOM application will propose Presentation Contexts as shown in the following table:

Table 4-2 - 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 Implicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2 1.2.840.10008.1.2.2	SCU	None

4.2.1.3.1.3 SOP specific Conformance for SOP classes – Verification SCU

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

4.2.1.3.2 Activities “Query a Remote Node for Instances” / “Retrieve Instances from a remote node”

4.2.1.3.2.1 Description and Sequencing of Activities

The **teamplay** AE serves as a SCU for the following SOP Classes

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

  The associated Real-World activity is a C-Find request initiated by the user **teamplay** AE. The user specifies some attributes and will send a C-Find request (according to the query model) and will then return the results to the initiating application.

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

  The Retrieve request(C-MOVE) is initiated for the C-FIND results.

4.2.1.3.2.2 Proposed Presentation Contexts

The **teamplay** AE will propose Presentation Contexts as shown in the following table:

Table 4-3: Proposed Presentation Contexts for Query/Retrieve

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
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	SCU	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	SCU	No
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

4.2.1.3.2.3 SOP Specific Conformance Statement to Query / Retrieve SOP classes

The **teamplay** AE supports the following query levels:

- Study

  Matching Keys on Series and Instance Levels are not supported by teamplay Receiver as SCU.

The **teamplay** AE checks for the following status codes in the Query SCP's C-FIND-Response:

Table 4-4: C-FIND DICOM status codes

Service Status	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
Success	Query has been performed successfully.	0000	Query request is sent success-

The **teamplay** AE checks for the following status codes in the Retrieve SCP's C-MOVE-Response:

Table 4-5: C-MOVE DICOM status codes

Service Status	Further Meaning	Error Code	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 for teamplay.
Success	Sub-operations Complete - No Failures or Warning	0000	Data is processed for teamplay.
Pending	Sub-operations are continuing	FF00	Wait for completion.

Table 4-6: Query/Retrieve DICOM Command Communication Failure Behaviour

Exceptions	Behavior
Timeout	Log message is created. (default timeout value is 30 seconds)
Association Aborted	Log message is created.

4.2.1.4 Association Acceptance Policy

4.2.1.4.1 Activity – "Receive Storage Request"

4.2.1.4.1.1 Description and Sequencing of Activities

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

4.2.1.4.1.2 Accepted Presentation Contexts

For all supported Transfer objects (see SOP Classes in the "Conformance Statement Overview").the Transfer Syntaxes described in Table 4-7 are supported.

Generally all Presentation Contexts are accepted as long as they contain at least one suitable Transfer syntax specified in table 4.3.

Table 4-7: 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

4.2.1.4.1.3 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** 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 blob storage using non-DICOM communication. The copy on the disk will be deleted upon successful upload.

The following header attributes must be available and filled:

- Patient Name (0010,0010)
- 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 4-8.

Table 4-8: Storage C-STORE Response Status

Service Status	Further Meaning	Error Code	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	Cxxx	Error during instance reception
Failure	Dataset does not match SOP Class	A9xx	The Dataset is not conform to the SOP Class contained in the resource.

4.3 Network Interfaces

4.3.1 Physical Network Interface

The ***teamplay Receiver*** provides DICOM 3.0 TCP/IP network communication support as defined in Part 8 of [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.

4.3.2 Additional Protocols

N/A

4.3.3 IPv4 and IPv6 Support

Only IPv4 support is provided in this version.

4.4 Configuration

4.4.1 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 [1].

4.4.1.1 Local AE Titles

The ***teamplay Receiver*** allows configuring the AETitle and the related Port.

Table 4-9: Default Local Analytics teamplay AE Title

Parameter	Configurable	Default Value
Default AE title	Yes	hostname in uppercase characters; limited to 16 characters
Default Port	Yes	104

4.4.1.2 Remote AE Title / Presentation Address Mapping

4.4.1.2.1 Remote SCU´s

All relevant remote applications that may initiate DICOM associations with teamplay Receiver need to be configured in the ***teamplay Receiver,*** 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 on. The Application Entity Title and supported transfer syntaxes need to be known for configuration.

4.4.1.2.2 Remote SCP's

Remote applications can accept DICOM associations from the ***teamplay Receiver***, 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.

4.4.2 Parameters

There are no additional parameters to be configured.

5 Media Interchange

5.1 Implementation Model

The ***teamplay Receiver*** does not support Media Storage.

5.1.1 Application Data Flow Diagram

N/A

5.1.2 Functional definitions of AEs

N/A

5.1.3 Sequencing of Real-World Activities

N/A

5.1.4 File Meta Information for Implementation Class and Version

N/A

5.2 AE SPECIFICATIONS

5.2.1 Media Storage AE – Specification

N/A

5.2.1.1 Real-World Activities

N/A

5.2.1.2 SOP Classes and Transfer Syntaxes

N/A

5.3 AUGMENTED AND PRIVATE APPLICATION PROFILES

N/A

5.3.1 Augmented Application Profiles

N/A

5.4 MEDIA CONFIGURATION

N/A

6 Support of Extended Character Sets

6.1 Character sets for teamplay Receiver

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

Table 6-1: 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 6-2: 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 6-3: 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 6-4: 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.

When there is a mismatch between the given character set in attribute (0008,0005) and the characters in an IOD received by the system, then the following measures are taken to make the characters DICOM conform:

- Convert each illegal character to a '?'.

There are now three categories of character sets which have to 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 Receiver supports Kanji characters in the byte zone after 74 (79, 7A, 7B and 7C).

7 Attribute confidentiality profiles

7.1 De-identification

The ***teamplay Receiver*** can de-identify attributes using proprietary mechanisms.

8 Security

8.1 Security Profiles

The ***teamplay Receiver*** does not support any specific security measures.

8.2 Association Level Security

It is possible to configure whether the SCP will only answer to known AETs or to any AET.

8.3 Application Level Security

N/A

9 Annexes

9.1 IOD Contents

N/A

9.2 Data Dictionary of Private Attributes

N/A

9.3 Coded Terminology and Templates

N/A

9.3.1 Context Groups

N/A

9.3.2 Template Specifications

N/A

9.3.3 Private Code definitions

Attribute Name	Attribute Tag	VR	VM	Private Creator Code
Private Creator ID	(0031, 00xx)	LO	1	Constant value “SIEMENS SY CLOUD”. Reserve elements in block (0031, xx00-xxFF)
Snapshot	(0031, xx01)	LT	1	The value present in this field represent the deidentification rules applied.
Toolkit version	(0031, xx02)	LO	1	The value present in the field represent the version of the toolkit that performed the deidentification

9.4 Grayscale Image Consistency

N/A

9.5 Standard Extended / Specialized / Private SOP Classes

N/A

9.6 Private Transfer Syntaxes

None

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Siemens Healthineers Headquarters
Siemens Healthcare GmbH
Henkestr. 127
91052 Erlangen
Germany
Phone +49 9131 84 0
siemens.com/healthineers