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DICOM Conformance Statement

VISUPAC Digital Imaging and Archive Management System

Version 4.3

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1 Conformance Statement Overview

This document is structured as suggested in the DICOM Standard (PS 3.2, 2004).

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
VL Photographic Image Storage	Option 1	Option 2
Query/Retrieve		
Patient Root Information Model - FIND	Option 2	No
Patient Root Information Model - MOVE	Option 2	No
Workflow Management		
Modality Worklist Information Model - FIND	Option 1 Option 2	No

Option 1

This is the option to integrate VISUPAC Viewers and VISUPAC Capture Stations in the DICOM Workflow.

Option 2

Those services are available when VISUPAC's Archive Management System is linked with the DICOM PACS via the Extensible Broker Interface.

2 Table Of Contents

1	Conformance Statement Overview	2
2	Table Of Contents	3
3	Introduction	5
3.1	Revision History	5
3.2	Audience	5
3.3	Remarks	5
3.4	Definitions, Terms and Abbreviations	5
3.5	References	6
4	Networking	7
4.1	Implementation Model	7
4.1.1	Application Data Flow	7
4.1.2	Functional Definition Of AEs	7
4.1.2.1	Functional Definition Of Extensible Broker Interface Application Entity	7
4.1.2.2	Functional Definition Of VISUPAC Application Entity	8
4.1.3	Sequencing of Real-World Activities	8
4.2	AE Specifications	10
4.2.1	Extensible Broker Interface Application Entity Specification	10
4.2.1.1	SOP Classes	10
4.2.1.2	Association Policies	10
4.2.1.2.1	General	10
4.2.1.2.2	Number of Associations	10
4.2.1.2.3	Asynchronous Nature	10
4.2.1.2.4	Implementation Identifying Information	10
4.2.1.3	Association Initiation Policy	10
4.2.1.3.1	Activity - Archive images	10
4.2.1.3.2	Activity - Relocate images	11
4.2.1.4	Association Acceptance Policy	13
4.2.1.4.1	Activity - Receive requested images	13
4.2.2	VISUPAC Application Entity	14
4.2.2.1	SOP Classes	14
4.2.2.2	Association Policies	14
4.2.2.2.1	General	14
4.2.2.2.2	Number of Associations	14
4.2.2.2.3	Asynchronous Nature	14
4.2.2.2.4	Implementation Identifying Information	14
4.2.2.3	Association Initiation Policy	14
4.2.2.3.1	Activity - Send image to default storage	14
4.2.2.3.2	Activity - Send image to several storages	15
4.2.2.3.3	Activity - Query worklist item	15
4.2.2.4	Association Acceptance Policy	17
4.3	Network Interfaces	17
4.3.1	Physical Network Interface	17
4.3.2	Additional Protocols	17
4.4	Configuration for Extensible Broker Interface Application Entity	17
4.4.1	AE Title/Presentation Address Mapping	17
4.4.1.1	Local AE Titles	17
4.4.1.2	Remote AE Title	18
4.4.2	Parameters	18
4.5	Configuration for VISUPAC Application Entity	18
4.5.1	AE Title/Presentation Address Mapping	18
4.5.1.1	Local AE Titles	18
4.5.1.2	Remote AE Title	18
4.5.2	Parameters	18
4.5.2.1	General DICOM Messaging parameters	19
4.5.2.2	Modality Worklist SCU parameters	19
4.5.2.3	Storage SCU parameters	20
5	Media Interchange	21
5.1	Implementation Model	21
5.1.1	Application Data Flow	21
5.1.2	Functional Definition of AEs	21
5.1.2.1	EBI Application Entity	21
5.1.2.2	VISUPAC Application Entity	21
5.1.3	Sequencing of Real-World Activities	21
5.1.4	File Meta Information Options	21
5.2	AE Specifications	21
5.2.1	EBI AE	21
5.2.2	VISUPAC AE	21
5.2.2.1	File Meta Information	21

5.2.2.2 Real-World Activities	22
5.2.2.2.1 Activity: Write selected VISUPAC Visits	22
5.2.2.2.2 Activity: Write selected images	22
5.2.2.2.3 Activity: Read files	22
5.3 Augmented And Private Application Profiles	22
5.4 Media Configuration	22
6 Support Of Character Sets	23
7 Security	24
8 Annexes	25
8.1 IOD Contents	25
8.1.1 Created SOP Instance(s)	25
8.1.2 Usage Of Attributes From Received IOD's	33
8.1.3 Attribute Mapping	33
8.1.4 Coerced/Modified Fields	33
8.2 Data Dictionary Of Private Attributes	33
8.3 Coded Terminology And Templates	33
8.3.1 Context Groups	33
8.3.2 Template Specifications	33
8.3.3 Private Code Definitions	33
8.3.3.1 Concept <i>OP-Modality</i>	34
8.3.3.2 Concept <i>OP-Procedure</i>	35
8.3.3.3 Concept <i>Sensor</i>	36
8.3.3.4 Concept <i>Stereo</i>	36

3 Introduction

3.1 Revision History

This table shall help to find the Conformance Statement to a specific VISUPAC version.

Document Version	Author	Date	VISUPAC Version
No document number			
1.0	HJO	2000-12-22	
1.01	Volker Bauer	2001-04-10	
1.1	Volker Bauer	2001-07-23	
1.2	Volker Bauer	2001-12-04	
1.3	Achim Seidel	2002-04-15	3.2.1
1.4	Jörg König	2003-01-31	3.4
1.5	Jörg König	2004-06-28	4.0
1.6	Jörg König	2005-02-25	4.1
As document number 2006-50024			
2.0 D	Jörg König	2005-12-23	
2.1 D	Jörg König	2006-02-10	4.2.1
2.2	Jörg König	2006-03-13	4.2.2
2.3 D	Jörg König	2006-03-31	
2.4	Jörg König	2006-10-12	4.2.3
As document number 2006-50421			
1.0 D	Jörg König	2006-11-27	
1.1	Jörg König	2006-11-28	4.3

The character 'D' marks draft revisions.

3.2 Audience

This document is intended for hospital staff, health system integrators, software designers or implementers. The reader should have a basic understanding of DICOM.

3.3 Remarks

If another device matches this conformance statement based on the comparison with its own conformance statement, there is a chance, but no guarantee, that they interoperate. DICOM only deals with communication; it does not specify what is needed for certain applications to run on a device.

3.4 Definitions, Terms and Abbreviations

Abbreviation	Definition
AE	Application Entity
AET	Application Entity Title
DICOM	Digital Imaging and Communications in Medicine
EBI	Extensible Broker Interface
ILE	Implicit Little Endian
IOD	Information Object Definition
MWL	Modality Work List
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair, pair of user and provider.
TCP/IP	Transmission Control Protocol / Internet Protocol
UID	Unique Identifier
VL	Visible Light

Capture Station

Name for a PC, which runs the VISUPAC Application in capture mode. The PC is connected with a visual sensor. The VISUPAC Application controls the visual sensor and feeds the database with images and data, describing the camera state at the time when the images were taken.

Extensible Broker Interface

An interface, mediating between VISUPAC System and DICOM environment. Activities are triggered by the VISUPAC Application.

Image Cache

A well known folder in the VISUPAC System. The size is supervised by the VISUPAC Application.

Viewing Station

Name for a PC, which runs the VISUPAC Application in viewing mode only.

VISUPAC Application

The application which is used by an operator. It has a user interface and it communicates with VISUPAC Database and EBI. It is installed on Viewing Stations and on Capture Stations.

VISUPAC Database

The database is used by the applications. In a VISUPAC System exists one database. All applications get their information from one database.

VISUPAC System

A VISUPAC System comprises of a VISUPAC Database, a file layout and at least one VISUPAC Application. Additionally the EBI component can be installed on a dedicated computer. Usually the VISUPAC System comprises one database and several VISUPAC Applications.

VISUPAC Visit

VISUPAC Visit does not relate to the DICOM Visit. Merely it relates to the DICOM Study. A restriction is that VISUPAC can control one visit per day.

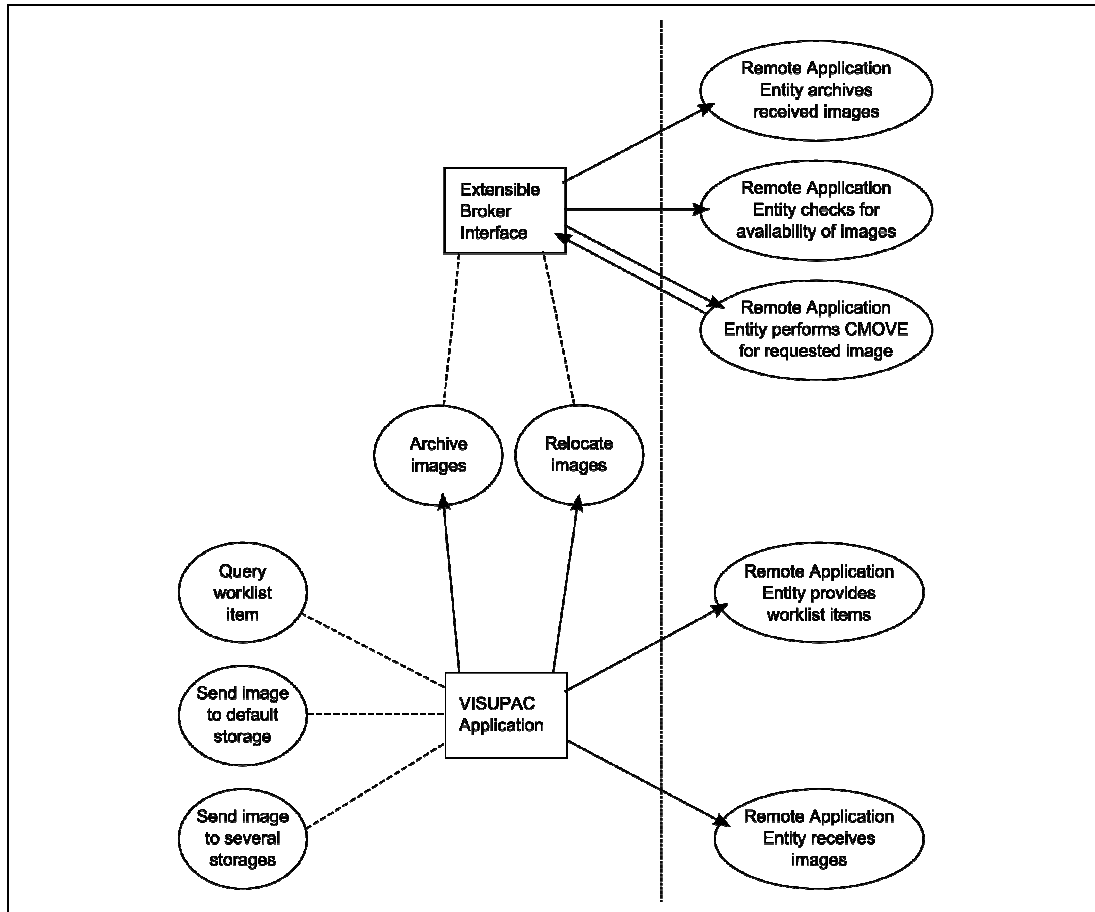
3.5 References

Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1-3.18, 2004.

4 Networking

4.1 Implementation Model

4.1.1 Application Data Flow



The VISUPAC system is divided in two pieces for this perspective.

One part is the single, dedicated Extensible Broker Interface. It is hosted on a dedicated machine. Each VISUPAC Application can, if so configured, access the Extensible Broker Interface and trigger the Real-World Activities "Archive images" and "Relocate images".

The other part, the VISUPAC Application, runs the User Interface for the operator. Here, the VISUPAC Application is located on a Capture Station or on a Viewing Station. From there an operator can perform the Real-World Activities "Query worklist item", "Send image to default storage" and "Send image to several storages". Additionally the operator triggers indirectly the activities "Archive images" and "Relocate images".

4.1.2 Functional Definition Of AEs

4.1.2.1 Functional Definition Of Extensible Broker Interface Application Entity

The main functionality of EBI is coupling the Archive Management System of VISUPAC with the DICOM PACS. EBI has a special role. To one side it is a service provider, to the other one it is a service user.

It archives images of modalities in the adequate IODs. Images or objects which do not match the need of the IOD are not archived in the DICOM environment.

EBI is able to retrieve images from a partner Application Entity. The images to be retrieved are images which have been archived by the VISUPAC System in a time before and which are not in the cache anymore. So EBI requests images which have been archived. The VISUPAC System stores the according SOP Instance UID as reference to the archived images. It does not query for images created by other Application Entities.

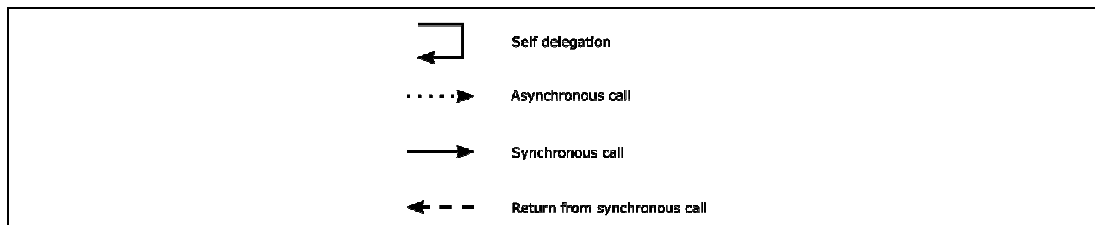
Since EBI requests for images to be relocated, EBI implements a Storage Provider. So it is able to receive image objects. EBI accepts DICOM objects which have been requested by itself only. It denies receiving DICOM objects which were not requested. Archiving and relocation are activities that must be triggered by an (accordingly configured) VISUPAC Application.

4.1.2.2 Functional Definition Of VISUPAC Application Entity

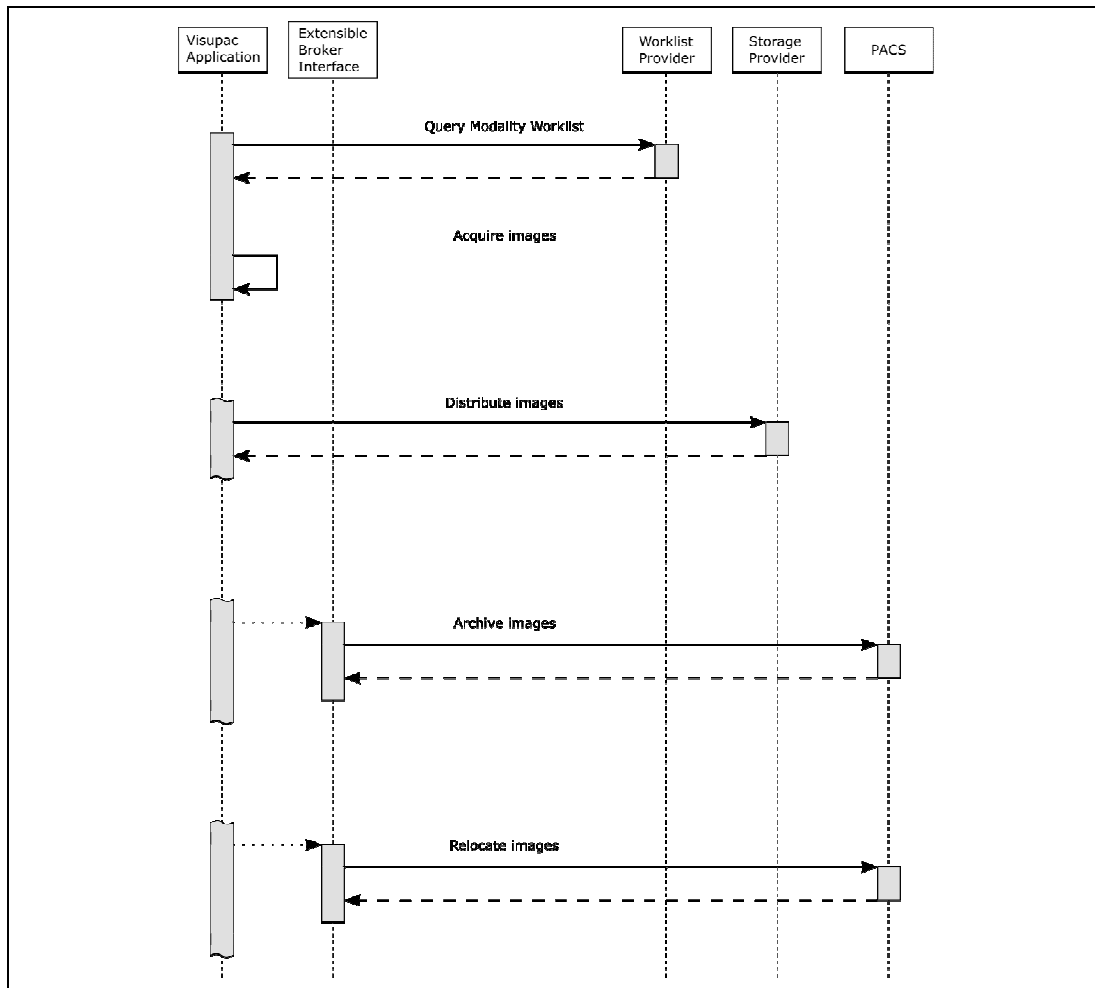
The VISUPAC Application allows to create data files for patients. It is possible to create visits and to attach images to visits. Image instances can be created and attached via visual sensors, file import and by image manipulation. Stations equipped with visual sensors are called Capture Stations. It is meaningful to integrate VISUPAC Capture Stations so that it is possible to query the DICOM Modality Worklist from there. Operators can create new image instances by performing image processing on images. The original data stays untouched. VISUPAC stores manipulated images as independent images, but marked as derived. To the other side VISUPAC Application can distribute DICOM instances. So the operator can send images to other DICOM modalities. Finally, if so configured, the VISUPAC Application works together with the EBI and handles the archiving mechanism.

4.1.3 Sequencing of Real-World Activities

To realize the Real-World Activities, the different entities inside and outside of VISUPAC will work together. The sequence diagrams shall depict the way how they interact usually.



The diagrams uses slightly modified UML symbols. The asynchronous call is not realized as suggested. Some objects do have more than one dashed line. It symbolizes more than one thread.



All activities are initiated by an operator.

Query Modality Worklist

When the patient arrives at the Capture Station, then the operator queries the work list. He types in search criteria and gets matches back. Those matches are listed in a table, so the operator can select the correct entry. According to the entry VISUPAC creates a VISUPAC Visit for the patient and the day of visit. Then the system is prepared to acquire images for that patient.

Acquire images

Within this step the operator attaches images to the VISUPAC Visit.

Distribute images

With the VISUPAC Application, Distribution can be done in two ways. Either the operator sends images to a default AE or he/she sends images to several AEs.

Archive images

The operator can trigger this activity by a click on a button or when the VISUPAC Application gets closed. Then the VISUPAC System automatically archives the images which have been added since the last archive task.

Relocate images

The operator can trigger that activity when the operator wants to check images of a VISUPAC Visit which was some time ago. He/she needs to trigger that activity if the images are not in the Image Cache anymore. Since this task takes some time, the user can decide whether to order those images or not.

4.2 AE Specifications

4.2.1 Extensible Broker Interface Application Entity Specification

4.2.1.1 SOP Classes

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	Yes
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Yes	Yes
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	No
Patient Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	No

4.2.1.2 Association Policies

4.2.1.2.1 General

The DICOM standard Application Context Name is DICOM 3.0.

Application Context Name	1.2.840.10008.3.1.1.1
--------------------------	-----------------------

4.2.1.2.2 Number of Associations

4.2.1.2.2.1 Initiated, outgoing.

Verification service is performed at start-up. At runtime, the services "VL Photographic Image Storage", "Patient Root Query/Retrieve Information Model – FIND" and "Patient Root Query/Retrieve Information Model – MOVE" are performed in parallel. Each service runs in its own thread. So the maximum number of simultaneous associations is 3 for Service Class User.

Maximum number of simultaneous associations	3
---	---

4.2.1.2.2.2 Accepted, incoming.

The number of simultaneous connections resulted by the need to have the Verification service available without blocking the VL Photographic Image Storage service.

Maximum number of simultaneous associations	2
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4.2.1.2.3 Asynchronous Nature

EBI AE does not support asynchronous communication (multiple outstanding transactions over a single Association).

4.2.1.2.4 Implementation Identifying Information

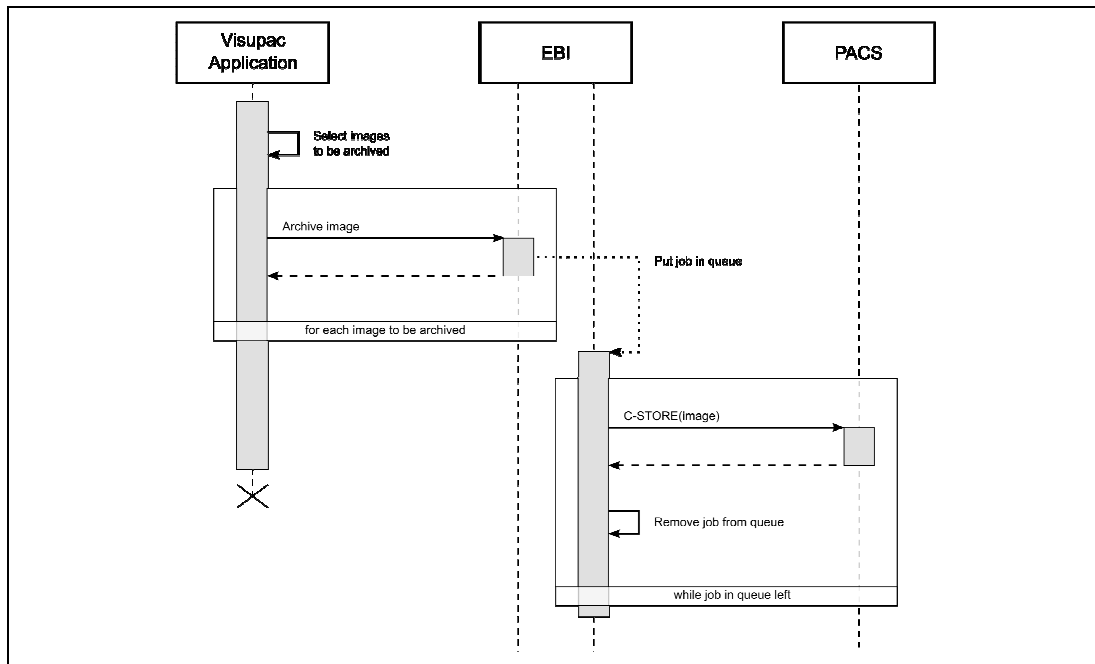
Implementation Class UID	1.2.826.0.1.3680043.2.139.1
Implementation Version Name	VISUPAC 43 0047

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Activity - Archive images

4.2.1.3.1.1 Description and Sequencing of Activities

Here the Archive Management System of the VISUPAC System is bound to the Picture Archiving and Communication System of the clinical IT environment. An operator cannot determine which images shall be archived on PACS. Indeed, the VISUPAC System itself determines which images need to be archived. Automatically it selects those which have been added to the VISUPAC System since the last time the archive activity was performed.



The archive activity is triggered by the operator. Either he/she leaves the VISUPAC Application or he/she triggers the archive activity by clicking on a button. Or the operator leaves the VISUPAC Application, then the VISUPAC System remembers the operator to perform the archive activity and offers a UI element to trigger it. The VISUPAC Application passes information about the images to be archived to the EBI. The information comprises references to images which have not been archived yet. EBI creates DICOM objects and puts a send-job into a queue for each created DICOM object.

An asynchronous thread processes the send-jobs and sends DICOM objects to the partner Application Entity. EBI gets a notification after a transfer has been finished. Was the transfer successful then EBI changes the archive flag in the VISUPAC Database. Was the transfer not successful then EBI does not change the archive flag, instead it writes the failed transmission into the log file.

4.2.1.3.1.2 Proposed Presentation Contexts

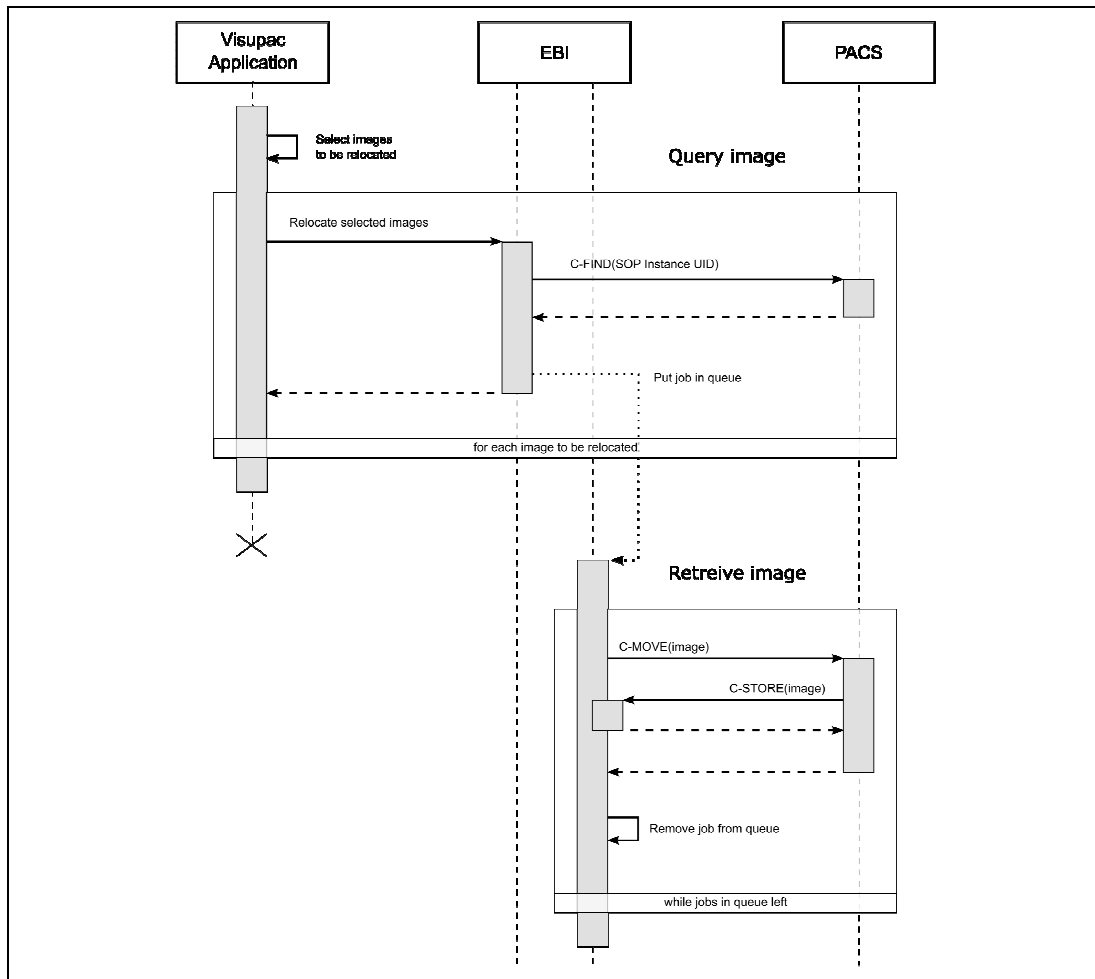
Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	ILE	1.2.840.10008.1.2	SCU	No

4.2.1.3.1.3 SOP Specific Conformance Image Storage SOP Class

Service Status	Further Meaning	Error Code	Behaviour
Success	Success	0000	The archive flag in the VISUPAC Database is set to "archived".
*	*	Any other status code	EBI writes an error message to the log file. The error message contains the error message as supported by the service provider.

4.2.1.3.2 Activity - Relocate images

4.2.1.3.2.1 Description and Sequencing of Activities



EBI uses two dedicated threads for the communication with other AEs. One thread performs the "Query", the other one performs the "Retrieve".

Whenever an operator watches the overview of VISUPAC Visits for a patient, then the VISUPAC Application automatically checks for the availability of the images. EBI receives the request for availability for those images which are not in the Image Cache anymore. EBI delegates the requests to the PACS for those images. When the operator finally selects a VISUPAC Visit which has images archived in the PACS, then the VISUPAC Application orders those images by EBI. EBI puts these requests in a queue and a separate thread retrieves the images from the PACS. Meanwhile the operator can continue work with the VISUPAC Application while EBI is retrieving the images. The operator gets feedback about the state of the images to be relocated.

4.2.1.3.2.2 Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	ILE	1.2.840.10008.1.2	SCU	No
Patient Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	ILE	1.2.840.10008.1.2	SCU	No

4.2.1.3.2.3 SOP Specific Conformance Query/Retrieve SOP Class

Patient Root Query/Retrieve Information Model - FIND request identifier

Attribute Name	Tag	VR	
Attribute Specific Character Set	(0008,0005)	CS	N/A
Query/Retrieve Level	(0008,0052)	CS	IMAGE
Additional the identifiers of the Composite Object Instance Level Keys for the Patient Root Query/Retrieve Information Model.			

Composite Object Instance Level Keys for the Patient Root Query/ Retrieve Information Model

Description	Tag	Type	
Instance Number	(0020,0013)	R	N/A
Overlay Number	(0020,0022)	O	N/A
Curve Number	(0020,0024)	O	N/A
LUT Number	(0020,0026)	O	N/A
SOP Instance UID	(0008,0018)	U	The UID of the instance to be relocated. A single value.
SOP Class UID	(0008,0016)	O	N/A
Alternate Representation Sequence	(0008,3001)	O	N/A
>Series Instance UID	(0020,000E)	O	N/A
>SOP Class UID	(0008,1150)	O	N/A
>SOP Instance UID	(0008,1155)	O	N/A
>Purpose of Reference Code Sequence	(0040,A170)	O	N/A
>>Code Value	(0008,0100)	O	N/A
>>Coding Scheme Designator	(0008,0102)	O	N/A
>>Coding Scheme Version	(0008,0103)	O	N/A
>>Code Meaning	(0008,0104)	O	N/A
Related General SOP Class UID	(0008,001A)	O	N/A
Concept Name Code Sequence	(0040,A043)	O	N/A
>Code Value	(0008,0100)	O	N/A
>Coding Scheme Designator	(0008,0102)	O	N/A
>Coding Scheme Version	(0008,0103)	O	N/A
>Code Meaning	(0008,0104)	O	N/A
Content Template Sequence	(0040,A504)	O	N/A
>Template Identifier	(0040,DB00)	O	N/A
>Mapping Resource	(0008,0105)	O	N/A
All Other Attributes at composite object instance Level		O	N/A

Patient Root Query/Retrieve Information Model - FIND response identifier

Attribute Name	Tag	VR	
Storage Media File-set ID	(0088,0130)	SH	N/A
Storage Media File-set UID	(0088,0140)	UI	N/A
Retrieve AE Title	(0008,0054)	AE	Used as partner AE for the C-MOVE request. The AET must exist in the AE register of EBI. If the tag does not exist in the response or the AET is not known by EBI, then EBI will request the instance from the Default Retrieve AE.
Instance Availability	(0008,0056)	CS	N/A

Patient Root Query/Retrieve Information Model - MOVE request identifier

Attribute Name	Tag	VR	
Query/Retrieve Level	(0008,0052)	CS	IMAGE
Patient ID	(0010,0020)	UI	N/A
Study Instance UID	(0020,000D)	UI	N/A
Series Instance UID	(0020,000E)	UI	N/A
SOP Instance UID	(0008,0018)	UI	The UID of the instance to be relocated.

4.2.1.4 Association Acceptance Policy

4.2.1.4.1 Activity - Receive requested images

4.2.1.4.1.1 Description and Sequencing of Activities

4.2.1.4.1.2 Accepted Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		

VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	ILE	1.2.840.10008.1.2	SCP	No
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4.2.1.4.1.3 SOP Specific Conformance Image Storage SOP Class

Attribute Name	Tag	VR	
Attribute Specific Character Set	(0008,0005)	CS	N/A
SOP Instance UID	(0008,0018)	UI	The UID must match the UID as used for the C-MOVE request.

4.2.2 VISUPAC Application Entity

4.2.2.1 SOP Classes

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Yes	No

4.2.2.2 Association Policies

4.2.2.2.1 General

4.2.2.2.2 Number of Associations

The number of simultaneous associations results is two since the activities "Query worklist item" and "Send image to default storage" can run in parallel.

Maximum number of simultaneous associations	2
---	---

4.2.2.2.3 Asynchronous Nature

VISUPAC does not support asynchronous communication (multiple outstanding transactions over a single Association).

4.2.2.2.4 Implementation Identifying Information

Implementation Class UID	1.2.826.0.1.3680043.2.139.1
Implementation Version Name	VISUPAC 43 0047

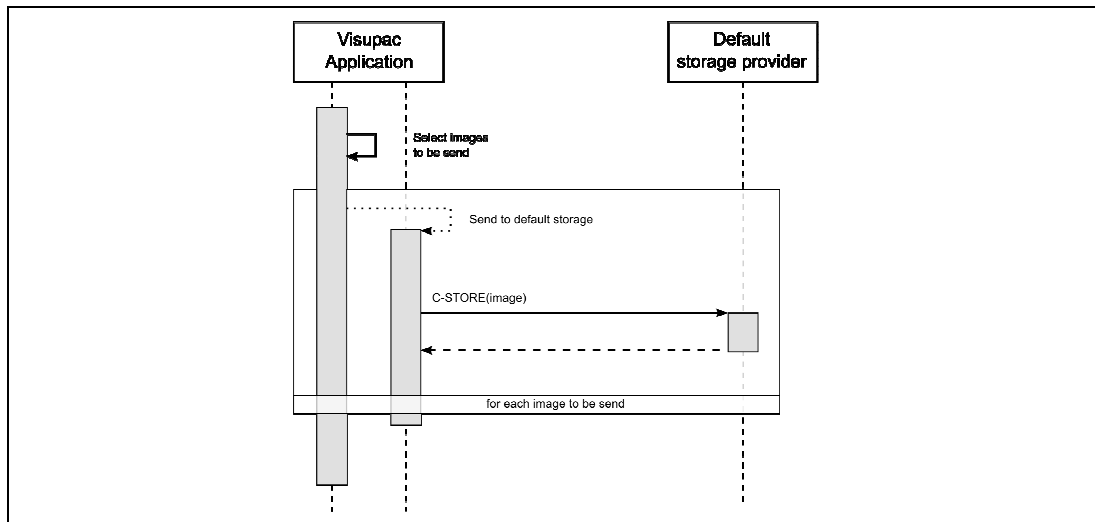
4.2.2.3 Association Initiation Policy

4.2.2.3.1 Activity - Send image to default storage

4.2.2.3.1.1 Description and Sequencing of Activities

After finishing the examination, the whole visit can be submitted from the database dialog in VISUPAC. In this case all images of the visit are selected. Alternatively some images can be selected in the image overview and sent to one or more DICOM storage server. The operator can send images at any time to storages, except during image capture process.

Here the operator defines which images shall be sent to another Entity.



Sending images to the default storage is processed in the background (that means it is performed while operator continues work with VISUPAC).

4.2.2.3.1.2 Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	ILE	1.2.840.10008.1.2	SCU	No

4.2.2.3.1.3 SOP Specific Conformance for Image Storage SOP Class

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The job is removed from list. The list is not visible to the operator.
*	*	Any other status code	An error dialog opens up.

4.2.2.3.2 Activity - Send image to several storages

4.2.2.3.2.1 Description and Sequencing of Activities

The selection of images is the same as for the activity "Send image to default storage". The difference is, here the user watches a dialog which lists several known AEs. The user can assign images to the destination AEs. The user gets immediate feedback whether the transfer was successful or not. The user can leave the dialog when all images have been transferred or if he accepts that some images could not be sent.

4.2.2.3.2.2 Proposed Presentation Contexts

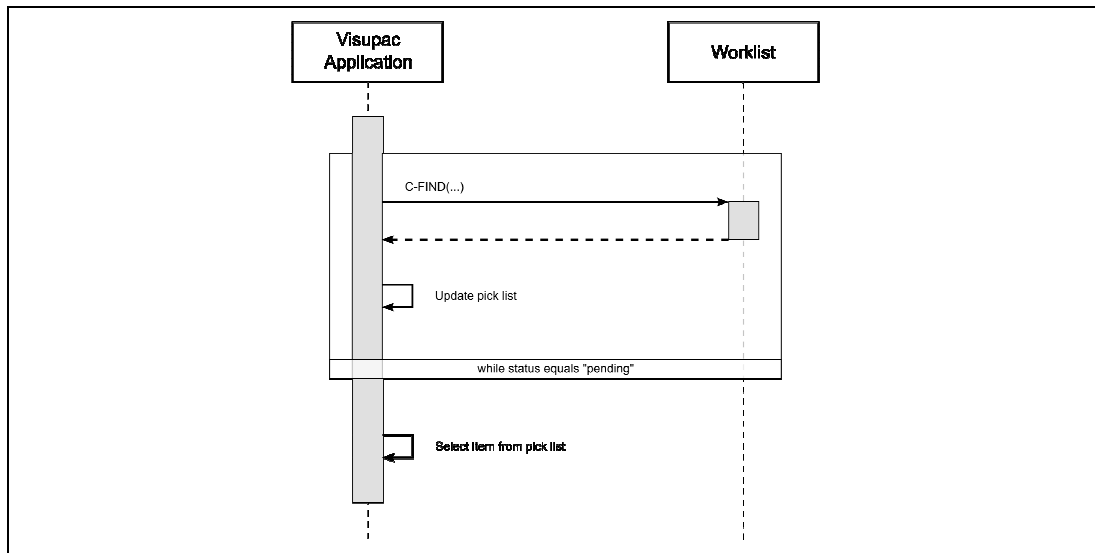
Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	ILE	1.2.840.10008.1.2	SCU	No

4.2.2.3.2.3 SOP Specific Conformance for Image Storage SOP Class

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The job is removed from list. The list is visible to the operator.
*	*	Any other status code	The status label of the dialog shows an error message.

4.2.2.3.3 Activity - Query worklist item

4.2.2.3.3.1 Description and Sequencing of Activities



The Modality Worklist Query can be done at any time during a VISUPAC session. It is meaningful to have this feature enabled on Capture Stations.

The Modality Worklist Query can be done when the patient comes to the Capture Station. Then the Modality Worklist contains the latest information. The operator initiates the activity. Then he can fill in search criteria, for instance incomplete patient information. After sending the request, the system waits for the response from the partner Application Entity. VISUPAC receives finally a response. It updates the pick list with the inheriting information. The pick list instantly shows the received information. VISUPAC will wait for additional responses as long as the Worklist Provider sends "pending" as status and the number of already received responses does not overstep the number of 100.

When VISUPAC stopped receiving, then the operator can choose the exact item to create a new visit for. After that, the operator can start to acquire images for that visit.

4.2.2.3.3.2 Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	ILE	1.2.840.10008.1.2	SCU	No

4.2.2.3.3.3 SOP Specific Conformance for Modality Worklist SOP Class

Service Status	Further Meaning	Error Code	Behavior
Success	Matching is complete	0000	The operator is now allowed to select a worklist item to import.
Pending	Matches are continuing	FF00, FF01	VISUPAC Application puts received worklist item into the pick list. If the number of received items oversteps 100 then the SCU sends an ABORT to the SCP and the operator gets a request to specify query keys more accurate.
*	*	Any other status code	The status label of the dialog shows an error message.

	Query key, editable by operator	Displayable in pick list ¹	Retrieved for the application	Displayed in application
Scheduled Procedure Step Sequence		Y		
> Scheduled Station AET		Y		
> Scheduled Procedure Step Start Date	Y	Y		
> Scheduled Procedure Step Start Time		Y		
> Modality	Y	Y		

¹ The set of tags to be displayed can be configured.

> Scheduled Performing Physician's Name		Y		
> Scheduled Procedure Step Description		Y		
> Scheduled Station Name		Y		
> Scheduled Procedure Step Location		Y		
> Scheduled Protocol Code Sequence		Y		
> Pre-Medication		Y		
> Scheduled Procedure Step ID		Y		
> Requested Contrast Agent		Y		
Requested Procedure ID	Y	Y		
Requested Procedure Description		Y		
Requested Procedure Code Sequence		Y		
Study Instance UID		Y	Y	
Accession Number	Y	Y	Y	Y
Referring Physicians Name ³		Y	Y ²	Y ²
Patients Name ³	Y	Y	Y ⁴	Y ⁴
Patient ID	Y	Y	Y	Y
Patients Birth Date		Y	Y	Y
Patients Sex		Y	Y	Y

The operator can fill in search criteria as query keys. VISUPAC offers two input masks for it. Following tags are editable as search criteria in input mask "Patient based query".

Tag	Description
(0010,0010)	Patients Name
(0010,0020)	Patient ID
(0008,0050)	Accession Number
(0040,1001)	Requested Procedure ID

Following tags are editable as search criteria in input mask "Broad worklist query".

Tag	Description
(0040,0100)	Scheduled Procedure Step Sequence
>(0040,0002)	Scheduled Procedure Step Start Date
>(0008,0060)	Modality

4.2.2.4 Association Acceptance Policy

The VISUPAC Application does not accept Associations.

4.3 Network Interfaces

4.3.1 Physical Network Interface

The physical network interface is not visible for the applications. The applications use the communication stack as offered by the Operating System.

4.3.2 Additional Protocols

No additional protocols are supported.

4.4 Configuration for Extensible Broker Interface Application Entity

4.4.1 AE Title/Presentation Address Mapping

The mapping from AE Title to TCP/IP addresses and ports is configurable and set at the time of installation by Installation Personnel.

4.4.1.1 Local AE Titles

The IP is not configurable by the Configuration Tool. The IP is administrated by the Operating System. The calling AET is configurable by parameters (see below).

² The application supports: Family name complex, given name complex and name prefix

³ The DICOM tag type PN (Person Name) comprises of five components (shown order matches the order in the tag value): Family name complex, given name complex, middle name, name prefix, name suffix.

⁴ The application supports: Family name complex and given name complex.

4.4.1.2 Remote AE Title

The mapping of external AE Titles to TCP/IP addresses and ports is configurable and set at the time of installation by Installation Personnel. The configuration information is passed as parameter to the EBI Application Entity.

4.4.2 Parameters

The Installation Personnel can modify parameters to adapt the system according to the needs of the DICOM environment. It is not necessary to set up all parameters. For the proper work of EBI all parameters must be adapted.

Parameter Name	Description	Default Value
applicationEntity01 applicationEntity02 ...	The AE registry. Information about partner Application Entities.	-
callingApplicationEntityTitle	This is the AET of the EBI when calling Service Providers. The given AE must be registered in the AE registry.	VP_EBI
exportAsVL	Determines which VISUPAC Image Types are allowed to be archived as Visible Light IOD.	"M-FUNDUS-CAM", "M-SLITLAMP", "FUNDUSCAMERA"
EBIarchiveApplicationEntityTitle	The given AET identifies what AE shall be used for the activity "Archive images". The given AE must be registered in the AE registry.	-
EBIrelocateApplicationEntityTitle	The given AET identifies what AE shall be used for the C-FIND activity "Relocate images". The given AE must be registered in the AE registry. Additionally potential return values for "Retrieve AE Title" (0008,0054) must be registered in the AE registry.	-

4.5 Configuration for VISUPAC Application Entity

4.5.1 AE Title/Presentation Address Mapping

4.5.1.1 Local AE Titles

The mapping from AE Title to TCP/IP addresses and ports is configurable and set at the time of installation by Installation Personnel. The IP is not configurable by the VISUPAC Configuration Tool. The IP is administrated by the Operating System. The calling AET is configurable by parameters (see below).

4.5.1.2 Remote AE Title

The mapping of external AE Titles to TCP/IP addresses and ports is configurable and set at the time of installation by Installation Personnel. The information is passed as parameter to the VISUPAC Application Entity.

4.5.2 Parameters

The Installation Personnel can modify parameters to adapt the system according to the needs of the DICOM environment. It is not necessary to set up all parameters. Depending on whether to set up the Storage Service User or the Modality Worklist User only a few parameters must be changed.

The syntax for values that describe Application Entities shall match
`<ae> := <host>; <port>; <timeout>; <ae title>; <name>`

- `<host>` Network address of host machine where AE resides, may be a name or IP.
- `<port>` Port number where the remote AE is listening for incoming requests.
- `<timeout>` Timeout in milliseconds
- `<ae title>` Application Entity Title

Valid examples:

```
192.168.42.42; 104; 10000; WL-scu; WL Ophthalmic Department
wl-host.clinic.org; 104; 15000; wList; Work List for Oph. Dep.
```

4.5.2.1 General DICOM Messaging parameters

Parameter Name	Description	Default Value
useMessaging	Enables DICOM messaging at all.	false
callingApplicationEntityTitle	This is the AET of the VISUPAC Application when calling Service Providers.	E_I_S

4.5.2.2 Modality Worklist SCU parameters

Parameter Name	Description	Default Value
modalityWorklistServer ⁵	Information about the Modality Worklist Provider. Value shall match syntax of <ae> (see above).	-
modalityWorklistPickListTags0	Tags that values are shown in the pre-selection table after accessing a Modality Worklist server.	(0010,0010) (0010,0020) (0008,0050)
modalityWorklistPickListTags1	First extension to parameter modalityWorklistPickListTags0	(0040,0100)>(0040,0007) (0040,0100)>(0040,0002) (0040,1001)
modalityWorklistPickListTags2	Second extension to parameter modalityWorklistPickListTags0	-

Additionally, for this service file-based parameters are available. The file-based parameter describes a template for DICOM objects which will be used to perform the request. Whenever the operator performs a request, the VISUPAC Application loads the template file and creates a DICOM object of it. Then the application fills in values which were typed in by the operator in the current active input mask. A dedicated file contains template information for the Modality Worklist Query. By default, the file looks like this:

```
# Empty lines and comments are allowed now!
# Feel free to use this file to preset values
# for a Modality Worklist Query.
# Remember that only listed tags will
# be responded by SCP
(0008,0016)=
(0008,0018)=
(0008,0020)=
(0008,0021)=
(0008,0023)=
(0008,0030)=
(0008,0031)=
(0008,0033)=
(0008,0050)=

(0008,0090)=
(0008,1030)=
(0008,103E)=
(0010,0010)=
(0010,0020)=
(0010,0030)=
(0010,0040)=
(0010,1010)=
(0010,1030)=
(0020,0013)=
(0020,000d)=
(0020,000e)=
(0020,0010)=
(0020,0011)=

# Scheduled Station AE Title
(0040,0100)>(0040,0001)=

# Scheduled Step Start Date
(0040,0100)>(0040,0002)=
```

```
# Scheduled Procedure Step Description
(0040,0100)>(0040,0007)=

# Modality
(0040,0100)>(0008,0060)=

(0040,1001)=
(0020,1204)=
```

Presets can be assigned by writing the value behind the character '=' in the according line. The syntax of the value must match the syntax as defined by the DICOM VR.

4.5.2.3 Storage SCU parameters

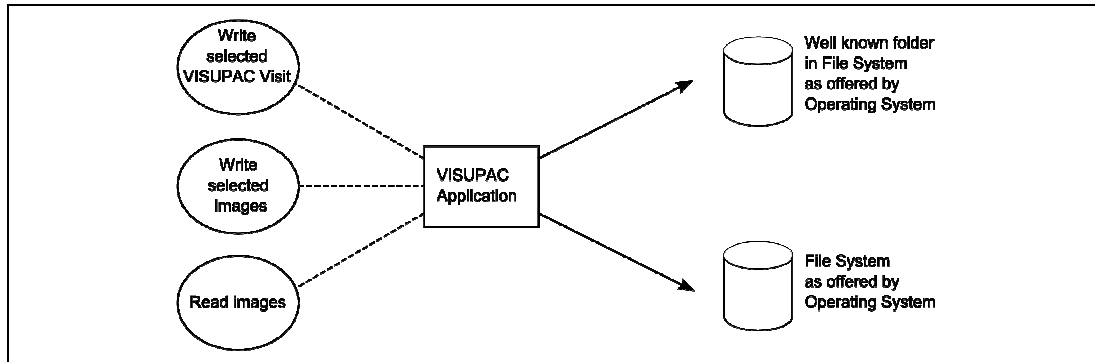
Parameter Name	Description	Default Value
defaultStorageServer ⁵	Information about the Default Storage Provider. Value shall match syntax of <ae> (see above).	-
storageServer0 ⁵	Information about a storage provider. Value shall match syntax of <ae> (see above).	-
storageServer1 ⁵	Information about a storage provider.	-
storageServer2 ⁵	Information about a storage provider.	-
multipleStoragesPickListTags0	These tags are visible in the overview on outgoing DICOM objects.	(0010,0010) (0020,0013) (0010,4000)
multipleStoragesPickListTags1	First extension to parameter multipleStoragesPickListTags0	-
multipleStoragesPickListTags2	Second extension to parameter multipleStoragesPickListTags0	-

⁵ The syntax for this parameter contains information about host, port, timeout, AET and a human-readable alias.

5 Media Interchange

5.1 Implementation Model

5.1.1 Application Data Flow



5.1.2 Functional Definition of AEs

5.1.2.1 EBI Application Entity

The EBI Application Entity does not support Media Interchange.

5.1.2.2 VISUPAC Application Entity

VISUPAC Application Entity does not support the Media Storage Service class since it does not access a DICOMDIR.

However, the VISUPAC AE is capable to write DICOM files and to read DICOM files. "Read files" is available from the patient selection dialog only. Files can be read from the file system as offered by the Operating System. "Write files" is available from the patient selection dialog as well as from the overview on current selected VISUPAC Visits. Files can be written to the file system as offered by the Operating System. The VISUPAC Application proposes a name root for the file names. The operator can take over that name root or can type in another one. The VISUPAC Application enumerates the files.

5.1.3 Sequencing of Real-World Activities

5.1.4 File Meta Information Options

Implementation Class UID	1.2.826.0.1.3680043.2.139.1
Implementation Version Name	VISUPAC 423 0041

5.2 AE Specifications

5.2.1 EBI AE

The EBI Application Entity does not support Media Interchange at all.

5.2.2 VISUPAC AE

VISUPAC AE does not support the Media Storage Service class since it does not access a DICOMDIR.

5.2.2.1 File Meta Information

VISUPAC AE does not access tag Source Application Entity Title. It also does not access private information, so it does not use tags Private Information Creator UID and Private Information.

5.2.2.2 Real-World Activities

The operator can export files from patient selection dialog as well as from overview on current selected VISUPAC Visit.

5.2.2.2.1 Activity: Write selected VISUPAC Visits

This activity supports same SOP Class UID and transfer syntax as the activity "Write selected images". When the operator exports files from the patient selection dialog then VISUPAC proposes to write the files in a well known folder. That folder is configurable by parameter. The operator can decide whether to use JPEG Baseline compression or not.

5.2.2.2.2 Activity: Write selected images

Here the operator can select discrete images from the current visible VISUPAC Visits. Then he/she pushes the button for the export activity. The operator can decide whether to use JPEG Baseline compression or not.

5.2.2.2.2.1 Media Storage Application Profiles

VISUPAC AE does not support Media Storage Application Profiles since it does not support the Media Storage Class.

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	ELE	1.2.840.10008.1.2.1
		JPEG Baseline	1.2.840.10008.1.2.4.50

5.2.2.2.3 Activity: Read files

For this activity, the VISUPAC AE has a well known folder. VISUPAC checks for the existence of DICOM files in that folder when the operator activates the patient selection dialog. The icon of the button which triggers that activity, changes the colour depending on the existence of DICOM files in that folder. However, the operator clicks on the button to import the DICOM files.

5.2.2.2.3.1 Media Storage Application Profiles

VISUPAC AE does not support Media Storage Application Profiles since it does not support the Media Storage Class.

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	ILE	1.2.840.10008.1.2
		ELE	1.2.840.10008.1.2.1
		JPEG Baseline	1.2.840.10008.1.2.4.50

5.3 Augmented And Private Application Profiles

VISUPAC AE does not support Augmented Application Profiles nor Private Application Profiles since it does not support the Media Storage Class.

5.4 Media Configuration

There is not specialized configuration for Media Interchange.

6 Support Of Character Sets

VISUPAC supports the DICOM default character repertoire.

7 Security

The DICOM capabilities of the VISUPAC System do not support any specific security measures.

It is assumed that VISUPAC System is used within a secured environment. It is assumed that a secured environment includes at a minimum:

- Firewall or router protections to ensure that only approved external hosts have network access to VISUPAC System.
- Firewall or router protections to ensure that VISUPAC System only has network access to approved external hosts and services.
- Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g. such as a Virtual Private Network (VPN))

Other network security procedures such as automated intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.

8 Annexes

8.1 IOD Contents

8.1.1 Created SOP Instance(s)

The table shows the content of the **Visible Light IOD**.

IE	Module	Reference ⁶	Usage	Presence of Module
Patient	Patient	C.7.1.1	M	Always
	Specimen Identifier	C.7.1.2	C	Never
	Clinical Trial Subject	C.7.1.3	U	Never
Study	General Study	C.7.2.1	M	Always
	Patient Study	C.7.2.2	U	Always
	Clinical Trial Study	C.7.2.3	U	Never
Series	General Series	C.7.3.1	M	Always
	General Trial Series	C.7.3.2	U	Never
Equipment	General Equipment	C.7.5.1	M	Always
Image	General Image	C.7.6.1	M	Always
	Image Pixel	C.7.6.3	M	Always
	Acquisition Context	C.7.6.14	M	Always
	VL Image	C.8.12.1	M	Always
	Overlay Plane	C.9.2	U	Never
	SOP Common	C.12.1	M	Always

The rows of not supported tags are grey.

IE	Module	Attribute Name	Tag	Type	MWL	Editable by operator	Automatically generated	Editable by Administrator	Generated by file export module, comments	Generated by archiving module, comments
Patient	Patient, C.7.1.1, M	Patient's Name	(0010,0010)	2	Y	Y			Supported components ⁷	
		Patient ID	(0010,0020)	2	Y	Y			• Family name	
		Issuer of Patient ID	(0010,0021)	3					• Given name	
		Patient's Birth Date	(0010,0030)	2	Y	Y				
		Patient's Sex	(0010,0040)	2	Y	Y				
		Referenced Patient Sequence	(0008,1120)	3						
		>Referenced SOP Class UID	(0008,1150)	1C						
		>Referenced SOP Instance UID	(0008,1155)	1C						
		Patient's Birth Time	(0010,0032)	3						
		Other Patient IDs	(0010,1000)	3		Y				
		Other Patient Names	(0010,1001)	3						
		Ethnic Group	(0010,2160)	3						
		Patient Comments	(0010,4000)	3		Y				
		Imaging Subject is a Specimen		Specimen Accession Number	(0040,050A)	1				
Specimen Sequence	(0040,0550)			2						
>Specimen Identifier	(0040,0551)			2C						
>Specimen Type Code Sequence	(0040,059A)			2C						

⁶ Reference to DICOM PS 3.3-2004.

⁷ The DICOM tag type PN (Person Name) comprises of five components (shown order matches the order in the tag value): Family name complex, given name complex, middle name, name prefix, name suffix.

IE	Module	Attribute Name	Tag	Type	MWL	Editable by operator	Automatically generated	Editable by Administrator	Generated by file export module, comments	Generated by archiving module, comments
		>>Include 'Code Sequence Macro' Table 8.8-1, No Baseline Context IDs are defined								
		>Slide Identifier	(0040,06FA)	2C						
	Clinical Trial Subject, C.7.1.3, U	Clinical Trial Sponsor Name	(0012,0010)	1						
		Clinical Trial Protocol ID	(0012,0020)	1						
		Clinical Trial Protocol Name	(0012,0021)	2						
		Clinical Trial Site ID	(0012,0030)	2						
		Clinical Trial Site Name	(0012,0031)	2						
		Clinical Trial Subject ID	(0012,0040)	1C						
		Clinical Trial Subject Reading ID	(0012,0042)	1C						
Study	General Study, C.7.2.1, M	Study Instance UID	(0020,000D)	1	Y		Y*		1.2.276.0.75.2.3.20.1. as leading string when UID was created in the VISUPAC system, by current software version. The Study Instance UID is not created by VISUPAC if it was included in the result of an earlier Modality Worklist Request.	
		Study Date	(0008,0020)	2			Y			
		Study Time	(0008,0030)	2			Y			
		Referring Physician's Name	(0008,0090)	2	Y	Y			Supported components ⁷	
		Referring Physician Identification	(0008,0096)	3						
		>Include 'Person Identification Macro' Table 10-1								
		Study ID	(0020,0010)	2			Y			
		Accession Number	(0008,0050)	2	Y	Y			Editable for the case that MWL is not reachable.	
		Study Description	(0008,1030)	3						
		Physician(s) of Record	(0008,1048)	3						
		Physician(s) of Record Identification	(0008,1049)	3						
		>Include 'Person Identification Macro' Table 10-1								
		Name of Physician(s) Reading Study	(0008,1060)	3						
		Physician(s) Reading Study	(0008,1062)	3						
		>Include 'Person Identification Macro' Table 10-1								
		Referenced Study Sequence	(0008,1110)	3						
		>Referenced SOP Class UID	(0008,1150)	1C						
	>Referenced SOP Instance UID	(0008,1155)	1C							
	Procedure Code Sequence	(0008,1032)	3							
	>Include 'Code Sequence Macro' Table 8.8-1, No Baseline Context ID is defined.									
Patient Study, C.7.2.2, U	Admitting Diagnoses Description	(0008,1080)	3							
	Admitting Diagnoses Code Sequence	(0008,1084)	3		Y					
	>Include 'Code Sequence Macro', Table 8.8-1, No Baseline Context ID is defined.				Y					
	Patient's Age	(0010,1010)	3							

IE	Module	Attribute Name	Tag	Type	MWL	Editable by operator	Automatically generated	Editable by Administrator	Generated by file export module, comments	Generated by archiving module, comments
Clinical Trial Study, C.7.2.3. U		Patient's Size	(0010,1020)	3		Y				
		Patient's Weight	(0010,1030)	3		Y				
		Occupation	(0010,2180)	3						
		Additional Patient's History	(0010,21B0)	3						
		Clinical Trial Time Point ID	(0012,0050)	2						
		Clinical Trial Time Point	(0012,0051)	3						
Series General Series, C.7.3.1. M		Modality	(0008,0060)	1			Y		XC	
		Series Instance UID	(0020,000E)	1			Y		1.2.276.0.75.2.3.20.1. as leading string when UID was created in the VISUPAC system, by current software version. An imported DICOM object will keep UID.	
		Series Number	(0020,0011)	2			Y			
		Laterality	(0020,0060)	2C		Y			R for right L for left or empty	
		Series Date	(0008,0021)	3			Y			
		Series Time	(0008,0031)	3			Y			
		Performing Physicians' Name	(0008,1050)	3		Y			Supported components ⁷ • Family name • Given name • Name prefix	
		Performing Physician Identification	(0008,1052)	3						
		>Include 'Person Identification Macro' Table 10-1								
		Protocol Name	(0018,1030)	3						
		Series Description	(0008,103E)	3		Y				
		Operators' Name	(0008,1070)	3		Y			Supported components ⁷ • Family name • Given name • Name prefix	
		Operator Identification Sequence	(0008,1072)	3						
		>Include 'Person Identification Macro' Table 10-1								
		Referenced Performed Procedure	(0008,1111)	3						
		>Referenced SOP Class UID	(0008,1150)	1C						
		>Referenced SOP Instance UID	(0008,1155)	1C						
		Related Series Sequence	(0008,1250)	3						
		>Study Instance UID	(0020,000D)	1						
		>Series Instance UID	(0020,000E)	1						
		>Purpose of Reference Code	(0040,A170)	2						
		>>Include Code Sequence Macro, Table 8.8-1, DCID 7210								
	Body Part Examined	(0018,0015)	3							
	Patient Position	(0018,5100)	2C							
	Smallest Pixel Value in Series	(0028,0108)	3							

IE	Module	Attribute Name	Tag	Type	MWL	Editable by operator	Automatically generated	Editable by Administrator	Generated by file export module, comments	Generated by archiving module, comments
		Largest Pixel Value in Series	(0028,0109)	3						
		Request Attributes Sequence	(0040,0275)	3						
		>Requested Procedure ID	(0040,1001)	1C						
		>Reason for the Requested	(0040,1002)	3						
		>Reason for Requested Procedure	(0040,100A)	3						
		>>Include 'Code Sequence Macro' Table 8.8-1, No Baseline Context ID is defined.								
		>Scheduled Procedure Step ID	(0040,0009)	1C						
		>Scheduled Procedure Step	(0040,0007)	3						
		>Scheduled Protocol Code Sequence	(0040,0008)	3						
		>>Include 'Code Sequence Macro' Table 8.8-1, No Baseline Context ID is defined.								
		>>Protocol Context Sequence	(0040,0440)	3						
		>>>Include 'Content Item Macro' Table 10-2, No Baseline Template is defined.								
		>>> Content Item Modifier Sequence	(0040,0441)	3						
		>>>>Include 'Content Item Macro' Table 10-2, No Baseline Template is defined.								
		Performed Procedure Step ID	(0040,0253)	3						
		Performed Procedure Step Start Date	(0040,0244)	3						
		Performed Procedure Step Start Time	(0040,0245)	3						
		Performed Procedure Step Description	(0040,0254)	3						
		Performed Protocol Code Sequence	(0040,0260)	3						
		>Include 'Code Sequence Macro' Table 8.8-1, No Baseline Context ID is defined.								
		>Protocol Context Sequence	(0040,0440)	3						
		>>Include 'Content Item Macro' Table 10-2, No Baseline Template is defined.								
		>> Content Item Modifier Sequence	(0040,0441)	3						
		>>>Include 'Content Item Macro' Table 10-2, No Baseline Template is defined.								
		Comments on the Performed Procedure Step	(0040,0280)	3						
	General Trial Series, C.7.3.2, U	Clinical Trial Coordinating Center Name	(0012,0060)	2						

IE	Module	Attribute Name	Tag	Type	MWL	Editable by operator	Automatically generated	Editable by Administrator	Generated by file export module, comments	Generated by archiving module, comments
Equipment	General Equipment C.7.5.1.1, M	Manufacturer	(0008,0070)	2				Y	Defined by camera properties.	
		Institution Name	(0008,0080)	3				Y	Defined by property DIC institutionName	
		Institution Address	(0008,0081)	3				Y	Defined by property DIC institutionAddress	
		Station Name	(0008,1010)	3				Y	Name of the host in the network environment.	
		Institutional Department Name	(0008,1040)	3				Y	Defined by property DIC institutionalDepartmentName	
		Manufacturer's Model Name	(0008,1090)	3				Y	Defined by camera properties.	
		Device Serial Number	(0018,1000)	3				Y	Defined by camera properties.	
		Software Versions	(0018,1020)	3				Y	As defined above. See 4.2.1.2.4 and 4.2.2.2.4.	
		Spatial Resolution	(0018,1050)	3						
		Date of Last Calibration	(0018,1200)	3						
		Time of Last Calibration	(0018,1201)	3						
		Pixel Padding Value	(0028,0120)	3						
Image	General Image, C.7.6.1.1, M	Instance Number	(0020,0013)	2			Y			
		Patient Orientation	(0020,0020)	2C			Y		Always empty	
		Content Date	(0008,0023)	2C			Y		Date when image was stored to the database	
		Content Time	(0008,0033)	2C					see Module VL-Image	
		Image Type	(0008,0008)	3					see Module VL-Image	
		Acquisition Number	(0020,0012)	3						
		Acquisition Date	(0008,0022)	3						
		Acquisition Time	(0008,0032)	3				Y	Exists when Image Type contains FAG or ICG as fourth element. Then it contains time since injection of contrast agent.	
		Acquisition Datetime	(0008,002A)	3						
		Referenced Image Sequence	(0008,1140)	3						
		>Referenced SOP Class UID	(0008,1150)	1						
		>Referenced SOP Instance UID	(0008,1155)	1						
		>Referenced Frame Number	(0008,1160)	3						
		>Purpose of Reference Code	(0040,A170)	3						
		>>Include 'Code Sequence Macro' Table 8.8-1 Defined Context ID is 7201.								
		Derivation Description	(0008,2111)	3						
		Derivation Code Sequence	(0008,9215)	3						
		>Include 'Code Sequence Macro' Table 8.8-1, Defined Context ID is 7203.								
		Source Image Sequence	(0008,2112)	3						
		>Referenced SOP Class UID	(0008,1150)	1C						
		>Referenced SOP Instance UID	(0008,1155)	1C						
		>Referenced Frame Number	(0008,1160)	3						
		>Purpose of Reference Code	(0040,A170)	3						
>>Include 'Code Sequence Macro' Table 8.8-1 Defined Context ID is 7202.										
Referenced Waveform Sequence	(0008,113A)	3								
>Include 'SOP Instance Reference Macro' Table C.17-3										

IE	Module	Attribute Name	Tag	Type	MWL	Editable by operator	Automatically generated	Editable by Administrator	Generated by file export module, comments	Generated by archiving module, comments
		>Purpose of Reference Code	(0040,A170)	1						
		>>Include 'Code Sequence Macro' Table 8.8-1 Defined Context ID is CID 7004								
		Images in Acquisition	(0020,1002)	3						
		Image Comments	(0020,4000)	3		Y				
		Quality Control Image	(0028,0300)	3						
		Burned In Annotation	(0028,0301)	3						
		Lossy Image Compression	(0028,2110)	3					see Module VL-Image	
		Lossy Image Compression Ratio	(0028,2112)	3						
		Lossy Image Compression Method	(0028,2114)	3						
		Icon Image Sequence	(0088,0200)	3						
		>Include 'Image Pixel Macro' Table C.7-11b See C.7.6.1.1.6 for further explanation.								
		Presentation LUT Shape	(2050,0020)	3						
	Image Pixel, C.7.6.3, M	Samples per Pixel	(0028,0002)	1					see Module VL-Image	
		Photometric Interpretation	(0028,0004)	1					see Module VL-Image	
		Rows	(0028,0010)	1			Y		Number of rows	
		Columns	(0028,0011)	1			Y		Number of columns	
		Bits Allocated	(0028,0100)	1					see Module VL-Image	
		Bits Stored	(0028,0101)	1					see Module VL-Image	
		High Bit	(0028,0102)	1					see Module VL-Image	
		Pixel Representation	(0028,0103)	1					see Module VL-Image	
		Pixel Data	(7FE0,0010)	1					see Module VL-Image	
		Planar Configuration	(0028,0006)	1C					see Module VL-Image	
		Pixel Aspect Ratio	(0028,0034)	1C						
		Smallest Image Pixel Value	(0028,0106)	3						
		Largest Image Pixel Value	(0028,0107)	3						
		Red Palette Color Lookup Table	(0028,1101)	1C						
		Green Palette Color Lookup Table	(0028,1102)	1C						
		Blue Palette Color Lookup Table	(0028,1103)	1C						
		Red Palette Color Lookup Table Data	(0028,1201)	1C						
		Green Palette Color Lookup Table	(0028,1202)	1C						
	Blue Palette Color Lookup Table Data	(0028,1203)	1C							
	C.7.6.14, M	Acquisition Context Sequence	(0040,0555)	2		Y	Y		The acquisition context is used for additional information.	
		> Value Type	(0040,A040)	3						
	VL Image, C.8.12.1, M	Image Type	(0008,0008)	1			Y		4 Items: 1. ORIGINAL DERIVED 2. PRIMARY 3. 4. FAG ICG COLOR RED BLUE GREEN NONE	

IE	Module	Attribute Name	Tag	Type	MWL	Editable by operator	Automatically generated	Editable by Administrator	Generated by file export module, comments	Generated by archiving module, comments
		Photometric Interpretation	(0028,0004)	1			Y		MONOCHROME2 for monochrome images, compressed or not compressed. RGB for color images, not compressed. YBR_422_FULLL for color images, compressed.	MONOCHROME2 for monochrome images RGB for color images
		Bits Allocated	(0028,0100)	1			Y		8	
		Bits Stored	(0028,0101)	1			Y		8	
		High Bit	(0028,0102)	1			Y		7	
		Pixel Representation	(0028,0103)	1			Y		0	
		Samples per Pixel	(0028,0002)	1			Y		1, for monochrome images 3, for color images	
		Planar Configuration	(0028,0006)	1C			Y		0, for color images. Meaning is color-by-pixel.	
		Content Time	(0008,0033)	1C			Y			
		Lossy Image Compression	(0028,2110)	2			Y		00, for no compression. 01, for JPEG Baseline compression.	00, no compression
		Referenced Image Sequence	(0008,1140)	1C						
		> Referenced SOP Class UID	(0008,1150)	1						
		> Referenced SOP Instance UID	(0008,1155)	1						
		>Referenced Frame Number	(0008,1160)	3						
		>Purpose of Reference Code Sequence	(0040,A170)	2						
		>>Include Code Sequence Macro Table Defined Context ID 7201 8.8-1								
		Window Center	(0028,1050)	3						
		Window Width	(0028,1051)	1C						
		Anatomic Region Sequence	(0008,2218)	1C						
		>Include 'Code Sequence Macro' DCID 4040 is defined for the Video Endoscopic IOD. Table 8.8-1 For other IODs, no Context ID is defined.								
		>Anatomic Region Modifier Sequence	(0008,2220)	3						
		>>Include 'Code Sequence Macro' Baseline Context ID is 2. Table 8.8-1 Include 'Primary Anatomic Structure Macro' Table 10.x-4. No Context ID is defined.								
	Overlay Plane, C.9.2, U	Overlay Rows	(60xx,0010)	1						
		Overlay Columns	(60xx,0011)	1						
		Overlay Type	(60xx,0040)	1						
		Overlay Origin	(60xx,0050)	1						
		Overlay Bits Allocated	(60xx,0100)	1						
		Overlay Bit Position	(60xx,0102)	1						

IE	Module	Attribute Name	Tag	Type	MWL	Editable by operator	Automatically generated	Editable by Administrator	Generated by file export module, comments	Generated by archiving module, comments
		Overlay Data	(60xx,3000)	1C						
		Overlay Description	(60xx,0022)	3						
		Overlay Subtype	(60xx,0045)	3						
		Overlay Label	(60xx,1500)	3						
		ROI Area	(60xx,1301)	3						
		ROI Mean	(60xx,1302)	3						
		ROI Standard Deviation	(60xx,1303)	3						
	SOP Common, C.12.1, M	SOP Class UID	(0008,0016)	1			Y		1.2.840.1008.5.1.4.1.1.77.1.4	
		SOP Instance UID	(0008,0018)	1			Y		1.2.276.0.75.2.3.20.1. as leading string when UID was created in the VISUPAC system, by current software version. An imported DICOM object will keep its UID.	
		Specific Character Set	(0008,0005)	1C						
		Instance Creation Date	(0008,0012)	3						
		Instance Creation Time	(0008,0013)	3						
		Instance Creator UID	(0008,0014)	3						
		Related General SOP Class UID	(0008,001A)	3						
		Original Specialized SOP Class	(0008,001B)	3						
		Coding Scheme Identification	(0008,0110)	3						
		>Coding Scheme Designator	(0008,0102)	1						
		>Coding Scheme Registry	(0008,0112)	1C						
		Rescale Slope	(0028,1053)	1C						
		Rescale Type	(0028,1054)	1C						
		Frame Increment Pointer	(0028,0009)	1C						
		Nominal Scanned Pixel Spacing	(0018,2010)	1C						
		Digitizing Device Transport Direction	(0018,2020)	3						
		Rotation of Scanned Film	(0018,2030)	3						
		>Purpose of Reference Code	(0040,A170)	1						
		>>Include 'Code Sequence Macro' Table 8.8-1 Defined Context ID 7005.								
		>Manufacturer	(0008,0070)	1						
		>Institution Name	(0008,0080)	3						
		>Institution Address	(0008,0081)	3						
		>Station Name	(0008,1010)	3						
		>Institutional Department Name	(0008,1040)	3						
		>Manufacturer's Model Name	(0008,1090)	3						
		>Device Serial Number	(0018,1000)	3						
		>Software Versions	(0018,1020)	3						
		>Spatial Resolution	(0018,1050)	3						
	>Date of Last Calibration	(0018,1200)	3							
	>Time of Last Calibration	(0018,1201)	3							
	>Contribution DateTime	(0018,A002)	3							
	>Contribution Description	(0018,A003)	3							

IE	Module	Attribute Name	Tag	Type	MWL	Editable by operator	Automatically generated	Editable by Administrator	Generated by file export module, comments	Generated by archiving module, comments
		Instance Number	(0020,0013)	3			Y			
		SOP Instance Status	(0100,0410)	3						
		SOP Authorization Date and Time	(0100,0420)	3						
		SOP Authorization Comment	(0100,0424)							
		Authorization Equipment	(0100,0426)	3						
		Include 'Digital Signatures Macro' Table C.12-5								
		Encrypted Attributes Sequence	(0400,0500)	1C						
		>Encrypted Content Transfer	(0400,0510)	1						
		>Encrypted Content	(0400,0520)	1						

8.1.2 Usage Of Attributes From Received IOD's

Attributes are used in the meaning as for creating SOP Instances.

8.1.3 Attribute Mapping

The implemented mapping is straight forward. It explains the flow of data through the VISUPAC System. The VISUPAC Application requests information by a Modality Worklist request. Later it passes parts of the information to a Storage Provider via an Image IOD.

Modality Worklist	Image IOD
Study Instance UID	Study Instance UID
Accession Number	Accession Number
Referring Physicians Name	Referring Physicians Name
Patients Name	Patients Name
Patient ID	Patient ID
Patients Birth Date	Patients Birth Date
Patients Sex	Patients Sex

8.1.4 Coerced/Modified Fields

When reading/receiving DICOM objects, the VISUPAC AE stores supported tags only. Thus, Private Attributes get lost and are not available in the VISUPAC System.

8.2 Data Dictionary Of Private Attributes

VISUPAC AE does not define Private Attributes.

8.3 Coded Terminology And Templates

8.3.1 Context Groups

8.3.2 Template Specifications

8.3.3 Private Code Definitions

Several coding concepts have been defined for the VISUPAC System. The Coding Scheme Designator is "99HIKO".

Tag	Name	CID	Configurable
0008,1084	Admitting Diagnosis Code Sequence		
0040,0555	Acquisition Context Sequence		

CC Concept Code
 NVU Numeric Value with Unit
 TV Text Value
 NV Numeric Value⁸

Coding Scheme Designator	Coding Scheme Version	Concept Name	Concept Type
99HIKO	VP4.0	OP-Modality	CC
		OP-Procedure	CC
		Sensor	CC
		Stereo	CC
		Angle	NVU
		Flash	NVU
		Gain	NVU
		Sensor Gain	NVU
		Sensor Offset	NVU
	VP3.2.1	Angle	TV
		Flash	TV
		Gain	TV
		Sensor	TV
		Sensor Gain	TV
		Sensor Offset	TV
	VP3.2	Angle	NV
		Flash	NV
		Sensor	TV
		Sensor Gain	NV
Pixel Height		TV	
Pixel Width		TV	

VISUPAC can read and interpret all Coding Scheme Versions of coding scheme "99HIKO".

Coding Scheme Version VP4.0

for images which was captured by a VISUPAC Capture Station. It is used for export of exams as DICOM files and for DICOM Messaging.

Coding Scheme Version VP3.2.1

for images which were captured by a VISUPAC Capture Station and if backward compatibility was selected by operator. Backward compatibility is available for export of exams as DICOM files. It is not supported for DICOM Messaging.

Coding Scheme Version VP3.2

for backward compatibility reasons. It is not supported for export of exams as DICOM files nor for DICOM Messaging.

8.3.3.1 Concept OP-Modality

Code Value	Code Meaning	Definition
M-FUNDUS-CAM	Funduscamera	Used for Zeiss FF450+, Zeiss FF450, Zeiss FF4, Kowa Pro
M-SLITLAMP	Slitlamp	Used for Zeiss SL 120, Zeiss SL 130.
M-S-OCT	Stratus OCT	Used for Stratus OCT.
M-US	Ophthalmic Ultrasound	
XC		Imported. Generated by an external camera.

⁸ The concept of Numeric Value is not conform to DICOM. It is listed because the reading capability is still implemented. The implementation exists because of backward compatibility reasons.

Presence of Concept Codes depends on Ophthalmic Modality

Concept Name	Ophthalmic Modality		
	M-FUNDUS-CAM	M-SLITLAMP	M-S-OCT
OP-Modality	Y	Y	Y
OP-Procedure	c	Y	Y
Sensor	c	Y	
Stereo	c		
Angle	c		
Flash	c		
Gain	c		
Sensor Gain	c	Y	
Sensor Offset	c	Y	

Here 'c' means 'conditional'. The according Concept is supported if images was captured by Carl Zeiss FF450+, connected to a Capture Station.

8.3.3.2 Concept OP-Procedure

Value range of codes for OP-Procedure depends on value of OP-Modality.

OP-Modality	OP-Procedure		
	Code Value	Code Meaning	Definition
M-FUNDUS-CAM	FC-FA	FA Fundus Mode	Fluorescein Angiogram
	FC-ICG	ICG Fundus Mode	Indocyanine Green
	FC-COLOR	Color Fundus Mode	
	FC-RED	Red Fundus Mode	
	FC-BLUE	Blue Fundus Mode	
	FC-GREEN	Green Fundus Mode	
M-S-OCT	OCT-LINE	Line	
	OCT-CIRCLE	Circle	
	OCT-C-CIRCLE	Composite Circle	
	OCT-R-SCAN	Raster Scan	
	OCT-C-6-RING	Concentric 6 Rings	
	OCT-C-3-RING	Concentric 3 Rings	
	OCT-R-LINES	Radial Lines	
	OCT-C-HAIR	Cross Hair	
	OCT-X-LINE	X-Line	
	OCT-P-CIRCLE	Proportional Circle Scan	
	OCT-N-H-CIRCLE	Nerve Head Circle	
	OCT-RNFL-T3.4	RNFL Thickness (3.4)	
	OCT-RNFL	RNFL Thickness	
	OCT-FAST-RNFL-T3.4	Fast RNFL Thickness (3.4)	
	OCT-RNFL-T2.27	RNFL Thickness (2.27xdisc)	
	OCT-M-T-MAP	Macular Thickness Map	
	OCT-O-DISK	Optic Disk Analysis	
	OCT-F-O-DISK	Fast Optic Disk	
	OCT-H-LINE	Horizontal Line	
	OCT-F-M-MAP	Fast Macular Map	
OCT-F-M-THICK	Fast Macular Thickness		
OCT-F-M-THICK-MAP	Fast Macular		

		Thickness Map	
	OCT-F-RNFL-THICK	Fast RNFL Thickness	
	OCT-RNFL-MAP	RNFL Map	
	OCT-F-RNFL-MAP	Fast RNFL Map	

8.3.3.3 Concept Sensor

OP-Modality	Sensor	
	Code Value	Definition/Comment
M-FUNDUS-CAM	JVC	JVC, 3-CCD
	Sony RGB	Sony, 3-CCD
	DCS	Kodak, 1-CCD
	Sony ICG	Sony
	Megaplug	Roper
	SVHS	Retired
	FBAS	Retired
	SVHS-NTSC	Retired
	NTSC	Retired
	VideoCapture	General interface to WDM compatible video source (single image taken from video stream).
	AVT ZK-5	AVT, DCAM interface, 1-CCD
	AVT Dolphin F201b	AVT, DCAM interface
	JVC KY-F75U	JVC, DCAM interface, 3-CCD
	h5	Phase One, 1-CCD
	h10	Phase One, 1-CCD
h101	Phase One, 1-CCD	
M-SLITLAMP	Canon 20D	Canon, 1-CCD
	Canon G3	Canon, 1-CCD
	Canon G5	Canon, 1-CCD
	Canon 10D	Canon, 1-CCD
	Sony RGB	Sony, 3-CCD

A column for the Code Meaning does not exist. The Code Meaning repeats value of the Code Value.

8.3.3.4 Concept Stereo

OP-Modality	Stereo		
	Code Value	Code Meaning	Definition
M-FUNDUS-CAM	True	Assigned condition is fulfilled	Image is part of a stereo pair.