Ethnic Group	(0010,2160)	3	Viewer Original if present, empty otherwise Filmer Empty
Patient Comments	(0010,4000)	3	Viewer Original if present, empty otherwise Filmer Empty

9.4.2 Common Study Entity Modules

9.4.2.1 General Study Module

This section specifies the Attributes, which describe and identify the Study performed upon the Patient.

TABLE 9-4 GENERAL STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Type	Notes
Study Instance UID	(0020,000D)	1	Viewer Original Filmer Original if No Mix Mode Generated if Mix Mode = Patient or Mix Mode = Study
Study Date	(0008,0020)	2	Viewer Original Filmer Study Date of first referenced image (Empty if does not exist) if No Mix Mode Empty if Mix Mode = Patient or Mix Mode = Study
Study Time	(0008,0030)	2	Viewer Original Filmer Study Time of first referenced image (Empty if does not exist) if No Mix Mode Empty if Mix Mode = Patient or Mix Mode = Study
Accession Number	(0008,0050)	2	Viewer Original Filmer Accession Number of first referenced image (Empty if does not exist) if No Mix Mode Empty if Mix Mode = Patient or Mix Mode = Study

Referring Physician's Name	(0008,0090)	2	Viewer Original Filmer Referring Physician's Name of first referenced image (Empty if does not exist) if No Mix Mode Semantically empty if Mix Mode = Patient or Mix Mode = Study (The content may be empty or contain only ^)
Study Description	(0008,1030)	3	Viewer Original if present, empty otherwise Filmer If No Mix Mode, this is the study Description of first referenced image. It is empty if the original study description is not present. User defined if Mix Mode = Patient or Mix Mode = Study
Study ID	(0020,0010)	2	Viewer Original Filmer Study ID of first referenced image (Empty if does not exist) if No Mix Mode Generated if Mix Mode = Patient or Mix Mode = Study

9.4.2.2 Patient Study Module

This section defines Attributes that provide information about the Patient at the time the Study was performed.

TABLE 9-5 PATIENT STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Patient's Age	(0010,1010)	3	Viewer Original if present, empty otherwise Filmer Patient's Age of first referenced image if No Mix Mode. It is empty if the original Patient's Age is not present. Empty if Mix Mode = Patient or Mix Mode = Study

Patient's Size	(0010,1020)	3	Viewer Original if present, empty otherwise Filmer Patient's Size of first referenced image if No Mix Mode. It is empty if the original Patient's Size is not present. Empty if Mix Mode = Patient or Mix Mode = Study
Patient's Weight	(0010,1030)	3	Viewer Original if present, empty otherwise Filmer Patient's Weight of first referenced image if No Mix Mode. It is empty if the original Patient's Weight is not present. Empty if Mix Mode = Patient or Mix Mode = Study
Occupation	(0010,2180)	3	Viewer Original if present, empty otherwise Filmer Empty
Additional Patient History	(0010,21B0)	3	Viewer Original if present, empty otherwise Filmer Empty

9.4.3 Key Object Document Series Entity Modules

9.4.3.1 Key Object Document Series Module

This section specifies the attributes that identify and describe general information about the Key Object Document Series within a Study.

TABLE 9-6 KEY OBJECT SELECTION DOCUMENT SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	KO
Series Instance UID	(0020,000E)	1	Generated
Series Number	(0020,0011)	1	Generated
Series Description	(0008,103E)	3	Viewer: Key Object description if not empty, Key Object Selection title otherwise. Filmer: Begin with Key Object Selection title, followed by user description (filled by default with “AW Electronic Film”)
Series Date	(0008,0021)	3	Not present
Series Time	(0008,0031)	3	Not present

Referenced Performed Procedure Step Sequence	(0008,1111)	2	Empty

9.4.4 Common Equipment Entity Modules

9.4.4.1 General Equipment Module

This section specifies the attributes that identify and describe the piece of equipment that produced a Series of Images.

TABLE 9-7 GENERAL EQUIPMENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	GE MEDICAL SYSTEMS
Institution Name	(0008,0080)	3	Hospital Name provided on the platform
Institution Address	(0008,0081)	3	Viewer Original if present, empty otherwise Filmer Empty
Station Name	(0008,1010)	3	Host name provided on the platform
Institutional Department Name	(0008,1040)	3	Viewer Original if present, empty otherwise Filmer Empty
Manufacturer's Model Name	(0008,1090)	3	Viewer: VIEWER_5 Filmer: FILMER_5
Device Serial Number	(0018,1000)	3	Empty
Software Versions	(0018,1020)	3	Software version build identifier

9.4.5 Key Object document Entity Modules

9.4.5.1 Key Object document

This section specifies the attributes that identify and describe the Key Object document.

TABLE 9-8 KEY OBJECT DOCUMENT GENERAL MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020, 0013)	1	Generated
Content Date	(0008, 0023)	1	Generated at the date when the Key Object is created
Content Time	(0008, 0033)	1	Generated at the time when the Key Object is created
Referenced Request Sequence	(0040,A370)	1C	N/A
Current Requested Procedure Evidence Sequence	(0040,A375)	1C	List of images referenced within the Key Object Selection.
> Study Instance UID	(0020,000D)	1	Refer to (0040,A375)
> Referenced Series Sequence	(0008,1115)	1	Refer to (0040,A375)

>> Series Instance UID	(0020,000E)	1	Refer to (0040,A375)
>> Referenced SOP Sequence	(0008,1199)	1	Refer to (0040,A375)
>>> Referenced SOP Class UID	(0008,1150)	1	Refer to (0040,A375)
>>> Referenced SOP Instance UID	(0008,1155)	1	Refer to (0040,A375)

9.4.5.2 SR Document Content Module

This section specifies the attributes that identify and describe the SR Document content

TABLE 9-9 SR DOCUMENT CONTENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Value Type	(0040, A040)	1	CONTAINER
Concept Name code Sequence	(0040, A043)	1C	Describe Title in DCID(7010) Key Object Selection Document Titles. See 9.5.4 Note: For Filmer, title is forced to “Of Interest” Note: This title is translated into current application language
> Code Value	(0008, 0100)	1C	See (0040, A043) Sequence
> Coding Scheme Designator	(0008, 0102)	1C	See (0040, A043) Sequence
> Code Meaning	(0008, 0104)	1C	See (0040, A043) Sequence
Continuity Of Content	(0040, A050)	1C	SEPARATE
Content Template Sequence	(0040, A504)	1C	Template that describes the content of the content item
> Mapping Resource	(0008, 0105)	1	DCMR
> Template Identifier	(0040, DB00)	1	2010
Observation Date Time	(0040, A032)	1C	Generated at the date and time when the Key Object is created
Content Sequence	(0040, A730)	1C	Content of the DICOM KEY OBJECT SELECTION – See 9.5

9.4.6 General Modules

The SOP Common Module is mandatory for all DICOM IODs.

9.4.6.1 SOP Common Module

This section defines the Attributes that are required for proper functioning and identification of the associated SOP Instances. They do not specify any semantics about the Real-World Object represented by the IOD.

TABLE 9-10 SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Instance Creation Date	(0008,0012)	3	Date the Key Object was created
Instance Creation Time	(0008,0013)	3	Time the Key Object was created
Instance Creator UID	(0008,0014)	3	Empty
SOP Class UID	(0008,0016)	1	1.2.840.10008.5.1.4.1.1.88.59
SOP Instance UID	(0008,0018)	1	Generated from GE Based UID, <station configuration> and timestamp.

Specific Character Set	(0008,0005)	1C	Viewer:
			• ISO_IR 100 if original value is not present and at least one of the Dicom data element contains non-ascii characters.
			• Original value otherwise
			
			Filmer:
			• ISO_IR 100 if Mix Mode = Patient
			• Otherwise:
			  • ISO_IR 100 if original value is not present and at least one of the Dicom data element contains non-ascii characters.
			  • Original value otherwise
			Note: Multi valued Specific Character Set with first value non-null and Specific Character Set ISO_IR 13 are not supported.

Instance Number	(0020,0013)	3	Equal to 1

9.5 KEY OBJECT SELECTION – TEMPLATE IDENTIFICATION

This section describes the Key Object Selection Template – TID 2010

This template describes how the SR Document Content Module of the Key Object Selection Information Object Definition is constrained. This template is the standard TID 2010.

9.5.1 TID 2010 Key Object Selection

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint

1			CONTAINER	DCID(7010) Key Object Selection Document Title	1	M		Root node
2	>	HAS CONCEPT MOD	CODE	EV (113011, DCM, "Document Title Modifier")	1-n	U		Not used
3	>	HAS CONCEPT MOD	CODE	EV (113011, DCM, "Document Title Modifier")	1	UC	IF Row 1 Concept Name = (113001, DCM, "Rejected for Quality Reasons") or (113010, DCM," Quality Issue")	DCID (7011)
4	>	HAS CONCEPT MOD	CODE	EV (113011, DCM, "Document Title Modifier")	1	MC	IF Row 1 Concept Name = (113013, DCM, "Best In Set")	DCID (7012)
5	>	HAS CONCEPT MOD	INCLUDE	DTID(1204) Language of Content Item and Descendants	1	U		Not used
6	>	HAS OBS CONTEXT	INCLUDE	DTID(1002) Observer Context	1-n	U		Present
7	>	CONTAINS	TEXT	EV(113012, DCM, "Key Object Description")	1	U		Viewer: User defined. It is not present if description is not filled Filmer: User defined, filled by default with "AW Electronic Film"
8	>	CONTAINS	IMAGE	Purpose of Reference shall not be present	1-n	MC		Present

9.5.2 TID 1002 Observer Context

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		HAS OBS CONTEXT	CODE	EV (121005,DCM, "Observer Type")	1	MC		EV (121006,DCM, "Person")
2		HAS OBS CONTEXT	INCLUDE	DTID (1003) Person observer identifying attributes	1	MC		

9.5.3 TID 1003 Person Observer Identifying Attributes

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			PNAME	EV (121008,DCM, "Person Observer Name")	1	M		Name of the current user
2			TEXT	EV (121009,DCM, " Person Observer's Organization Name")	1	U		Hospital Name provided on the platform

9.5.4 CID 7010 Key Object Selection Document Title

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	113000	Of Interest
DCM	113001	Rejected for Quality Reasons
DCM	113002	For Referring Provider
DCM	113003	For Surgery
DCM	113004	For Teaching
DCM	113005	For Conference
DCM	113006	For Therapy
DCM	113007	For Patient
DCM	113008	For Peer Review
DCM	113009	For Research
DCM	113010	Quality Issue
DCM	113013	Best In Set
DCM	113018	For Printing
DCM	113020	For Report Attachment
DCM	113030	Manifest
DCM	113031	Signed Manifest
DCM	113032	Complete Study Content
DCM	113033	Signed Complete Study Content
DCM	113034	Complete Acquisition Content
DCM	113035	Signed Complete Acquisition Content
DCM	113036	Group of Frames for Display

9.5.5 CID 7012 Key Object Selection Document Title Modifier

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	113014	Study
DCM	113015	Series
DCM	113016	Performed Procedure Step
DCM	113017	Stage-View

10. XA IMAGE INFORMATION OBJECT IMPLEMENTATION

10.1 INTRODUCTION

The AW 4.7 2D Multi-Modality Viewer can save all injected frames of a DSA or Bolus multi-frame image (including user annotations and measurements) into a new XA multi-frame image. In case of biplane acquisition, two XA multi-frame images will be saved, corresponding to both frontal and lateral original images. This feature only works on XA GE images.

The aim of the DEVIRED XA images, is it to create substracted images for systems that cannot perform the operation. The substraction is applied in it and so the object generated can be reviewed on elsewhere without having to apply processing again.

This section specifies the use of the DICOM XA Image IOD to represent the information included in XA image produced by this implementation. Corresponding attributes are conveyed using the module construct. The contents of this section are:

10.2 - XA IMAGE Entity-Relationship Model

10.3 - XA IMAGE-IOD MODULE TABLE

10.4 - XA Image -INFORMATION MODULE DEFINITIONS

10.5 - XA IMAGE-Private data dictionary

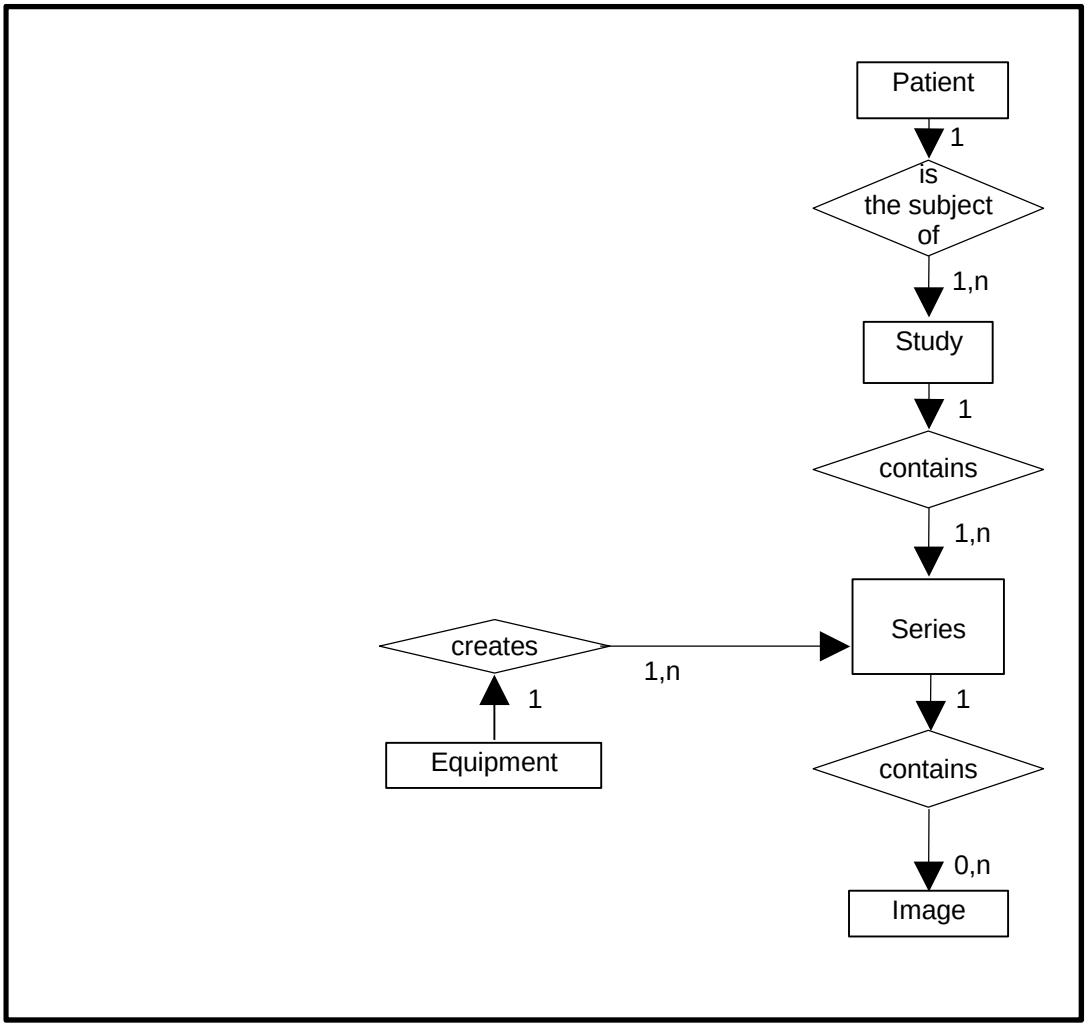
10.2 XA IMAGE ENTITY-RELATIONSHIP MODEL

The Entity-Relationship diagram for the XA Image interoperability schema is shown in **Illustration 10.2.1.** In this figure, the following diagrammatic convention is established to represent the information organization:

- Each entity is represented by a rectangular box
- Each relationship is represented by a diamond shaped box.
- The fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.

The relationships are fully defined with the maximum number of possible entities in the relationship shown. In other words, the relationship between Series and Image can have up to n Images per Series, but the Study to Patient relationship has 1 Patient for each Study (a Patient can have more than one Study on the system, however each Study will contain all of the information pertaining to that Patient).

ILLUSTRATION 10.2-1
XA IMAGE IMAGE ENTITY RELATIONSHIP DIAGRAM



10.2.1 ENTITY DESCRIPTIONS

Please refer to DICOM Standard Part 3 (Information Object Definitions) for a description of each of the entities contained within the XA Image Information Object.

10.2.2 Advantage Workstation 4.7 Mapping of DICOM entities

TABLE 10-1 MAPPING OF DICOM ENTITIES TO ADVANTAGE WORKSTATION 4.7 ENTITIES

DICOM	Advantage Workstation 4.7 Entity
Patient	Patient
Study	Exam
Series	Series
Equipment	Equipment
Image	Image

10.3 XA IMAGE-IOD MODULE TABLE

Within an entity of the DICOM XA Image IOD, attributes are grouped into related set of attributes. A set of related attributes is termed a module. A module facilitates the understanding of the semantics concerning the attributes and how the attributes are related with each other. A module grouping does not infer any encoding of information into datasets.

Table 10.3-1 identifies the defined modules within the entities which comprise the DICOM XA Image IOD. Modules are identified by Module Name.

See DICOM Part 3 for a complete definition of the entities, modules, and attributes.

TABLE 10-2 XA IMAGE DOCUMENT IOD MODULES

Entity Name	Module Name	Reference
Patient	Patient	**10.4.1**
	Clinical Trial Subject	**N/A**
Study	General Study	**10.4.2.1**
	Patient Study	**10.4.2.2**
	Clinical Trial Study	**N/A**
Series	General Series	**10.4.3**
	Clinical Trial Series	**N/A**
Equipment	General Equipment	**10.4.4**
Image	General Image	**10.4.5.1**
	Image Pixels	**10.4.5.2**
	Contrast/Bolus	**10.4.5.3**
	Cine	**10.4.5.4**
	Multi-Frame	**10.4.5.5**
	Frame Pointers	**10.4.5.6**
	Display Shutter	**N/A**
	Device	**N/A**
	Intervention	**N/A**
	X-Ray Image	**10.4.5.7**
	X-Ray Acquisition	**10.4.5.8**
	X-Ray Collimator	**10.4.5.9**
	X-Ray Table	**10.4.5.10**
	XA Positioner	**10.4.5.11**
	DX Detector	**10.4.5.12**
	Overlay Plane	**N/A**
	Multi-Frame Overlay	**N/A**
	Modality LUT	**N/A**
	VOI LUT	**10.4.5.13**
	SOP Common	**10.4.5.14**
	X-Ray Filtration (standard extended)	**10.4.5.15**
	Mask	**N/A**

10.4 XA IMAGE -INFORMATION MODULE DEFINITIONS

Please refer to DICOM Standard Part 3 (Information Object Definitions) for a description of each of the entities and modules contained within the XA Image Information Object.

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and from where these values are obtained. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions).

The XA Image IOD described here is the one generated by the applications 'Viewer' of Advantage Workstation 4.7, based on an original XA image.

In the following chapter, all new study, series and image instance UID are generated from AW 4.7 2D Multi-Modality Viewer base UID: **1.2.840.113619.2.378**

Also note that elements not listed in following modules are ignored and not copied.

10.4.1 Patient Module

This section specifies the attributes of the Patient that describe and identify the Patient who is the subject of a diagnostic Study. This Module contains attributes of the patient that are needed for diagnostic interpretation of the Image and are common for all studies performed on the patient.

TABLE 11.4-1 PATIENT MODULE

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	Copy from original
Patient ID	(0010,0020)	2	Copy from original
Issuer of Patient ID	(0010,0021)	3	Copy from original
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Copy from original
Patient's Birth Date	(0010,0030)	2	Copy from original
Patient's Sex	(0010,0040)	2	Copy from original
Other Patient Ids	(0010,1000)	3	Copy from original
Other Patient Ids Sequence	(0010,1002)	3	Copy from original

10.4.2 Study Modules

10.4.2.1 General Study Module

TABLE 11.4-2 GENERAL STUDY MODULE

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020,000D)	1	Copy from original
Study Date	(0008,0020)	2	Copy from original
Study Time	(0008,0030)	2	Copy from original
Referring Physician's Name	(0008,0090)	2	Copy from original
Study ID	(0020,0010)	2	Copy from original

Accession Number	(0008,0050)	2	Copy from original
Study Description	(0008,1030)	3	Copy from original
Name of Physician(s) Reading Study	(0008,1060)	3	Copy from original
Referenced Study Sequence	(0008,1110)	3	Copy from original if present, not present otherwise
>Referenced SOP Class UID	(0008,1150)	1	Copy from original
>Referenced SOP instance UID	(0008,1155)	1	Copy from original
Procedure Code Sequence	(0008,1032)	3	Copy from original if present, not present otherwise
>Code Value	(0008,0100)	1C	Copy from original
>Coding Scheme Designator	(0008,0102)	1C	Copy from original
>Code Meaning	(0008,0104)	1C	Copy from original

10.4.2.2 Patient Study Module

TABLE 11.4-3 PATIENT STUDY MODULE

Attribute Name	Tag	Type	Attribute Description
Patient's Age	(0010.1010)	3	Copy from original
Patient's Size	(0010,1020)	3	Copy from original
Patient's Weight	(0010,1030)	3	Copy from original
Admission ID	(0038,0010)	3	Copy from original

10.4.3 Series Module

TABLE 11.4-4 SERIES MODULE

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Copy from original
Series Instance UID	(0020,000E)	1	Generated
Series Number	(0020,0011)	2	Copy from original, in generation mode of one XA processed series per original series Or the value of the DICOM field (0020,0013) 'Instance Number' of the original image, in generation mode of one XA processed series per original image
Performing Physicians' Name	(0008,1050)	3	Copy from original
Protocol Name	(0018,1030)	3	Copy from original, in generation mode of one XA processed series per original series Or the value of the DICOM field (0020,4000) 'Image Comments' of the

			original image, in generation mode of one XA processed series per original image
Series Description	(0008,103E)	3	"Processed:" followed by original series description. Eventually truncated to 64 chars. , in generation mode of one XA processed series per original series Or “Processed: “ followed by the value of the DICOM field (0020,4000) ‘Image Comments’ of the original image, in generation mode of one XA processed series per original image
Operators' Name	(0008,1070)	3	Current user's name
Patient Position	(0018,5100)	3	Copy from original
Request Attributes Sequence	(0040,0275)	3	Copy from original if present, not present otherwise
>Requested Procedure ID	(0040,1001)	1C	Copy from original if present, not present otherwise
>Requested Procedure Description	(0032,1060)	3	Copy from original
>Requested Procedure Code Sequence	(0032,1064)	3	Copy from original if present, not present otherwise
>>Code Value	(0008,0100)	1C	Copy from original
>>Coding Scheme Designator	(0008,0102)	1C	Copy from original
>>Code Meaning	(0008,0104)	1C	Copy from original
>Scheduled Procedure Step ID	(0040,0009)	1C	Copy from original if present, not present otherwise
>Scheduled Procedure Step Description	(0040,0007)	3	Copy from original
>Scheduled Protocol Code Sequence	(0040,0008)	3	Copy from original if present, not present otherwise
>>Code Value	(0008,0100)	1C	Copy from original
>>Coding Scheme Designator	(0008,0102)	1C	Copy from original
>>Code Meaning	(0008,0104)	1C	Copy from original

10.4.4 Equipement Module

The following Equipment IE Module is common to all Composite Image IODs that reference the Equipment IE.

TABLE 11.4-4 EQUIPMENT MODULE

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	Copy from original
Institution Name	(0008,0080)	3	Copy from original
Institution Address	(0008,0081)	3	Copy from original

Station Name	(0008,1010)	3	Copy from original
Manufacturer's Model Name	(0008,1090)	3	Copy from original
Device Serial Number	(0018,1000)	3	Copy from original
Software versions	(0018,1020)	3	Copy from original

10.4.5 Image Modules

This section specifies the Attributes that describe the Image Entity Modules.

10.4.5.1 General Image Module

TABLE 11.4-5 GENERAL IMAGE MODULE

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020,0013)	2	Copy from original
Patient Orientation	(0020,0020)	2C	Copy from original if same number of frames than original, calculated otherwise
Content Date	(0008,0023)	2C	Copy from original
Content Time	(0008,0033)	2C	Copy from original
Image Type	(0008,0008)	3	"DERIVED\SECONDARY\SINGLE PLANE" or "DERIVED\SECONDARY\BIPLANE A" or "DERIVED\SECONDARY\BIPLANE B" Eventually followed by: - “DISTORTION FREE”, if the fourth field of original image is equal to “DISTORTION FREE”, - “IMAGE PASTING”, if the fourth field of original image is equal to “IMAGE PASTING”
Acquisition Date	(0008,0022)	3	Copy from original
Acquisition Time	(0008,0032)	3	Copy from original
Referenced Image Sequence	(0008,1140)	3	Not present in case of single plane
>Referenced SOP class UID	(0008,1150)	1C	SOP Class UID of the derived other plane of a biplane pair
>Referenced SOP instance UID	(0008,1155)	1C	Instance UID of the derived other plane of a biplane pair
>Purpose of Referenced Code Sequence	(0040,A170)	3	Generated

>>Code Value	(0008,0100)	1C	"121314"
>>Coding Scheme Designator	(0008,0102)	1C	"DCM"
>>Code meaning	(0008,0104)	1C	"Other image of biplane pair"
Source Image Sequence	(0008,2112)	3	Generated
>Referenced SOP class UID	(0008,1150)	1C	SOP class UID of the original XA image
>Referenced SOP instance UID	(0008,1155)	1C	Instance UID of the original XA image
> Referenced Frame Number	(0008,1160)	1C	Not present
Image Comments	(0020,4000)	3	Copy from original
Burned In Annotation	(0028,0301)	3	Copy from original
Lossy Image Compression	(0028,2110)	3	Copy from original

10.4.5.2 Image Pixels Module

TABLE 11.4-6 IMAGE PIXELS MODULE

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	Copy from original
Photometric Interpretation	(0028,0004)	1	Copy from original
Rows	(0028,0010)	1	Copy from original
Columns	(0028,0011)	1	Copy from original
Bits Allocated	(0028,0100)	1	Copy from original
Bits Stored	(0028,0101)	1	Copy from original
High Bit	(0028,0102)	1	Copy from original
Pixel Representation	(0028,0103)	1	Copy from original
Pixel Data	(7FE0,0010)	1	Derived from original pixel data

10.4.5.3 Contrast Bolus Module

This module is not present in generated image if it is not present in original one.

TABLE 11.4-7 CONTRAST BOLUS MODULE

Attribute Name	Tag	Type	Attribute Description
Contrast/Bolus Agent	(0018,0010)	2	Copy from original

10.4.5.4 Cine Module

This module is not present in generated image if it is not present in original one.

TABLE 11.4-8 CINE MODULE

Attribute Name	Tag	Type	Attribute Description
Frame Time	(0018,1063)	1C	Copy from original if present, not present otherwise

Frame Time Vector	(0018,1065)	1C	If present in original image: - Copy from original if same number of frames than original, - subset of original otherwise If not present in original image: Not Present
Start Trim	(0008,2142)	3	Copy from original if same number of frames than original, set to 1 otherwise
Stop Trim	(0008,2143)	3	Copy from original if same number of frames than original, set to number of frames (0028,0008) otherwise
Recommended Display Frame Rate	(0008,2144)	3	Copy from original
Cine Rate	(0018,0040)	3	Copy from original
Frame Delay	(0018,1066)	3	Copy from original if same number of frames than original, based on original otherwise

10.4.5.5 Multi Frame Module

TABLE 11.4-9 MULTI-FRAME MODULE

Attribute Name	Tag	Type	Attribute Description
Number Of Frames	(0028,0008)	1C	Set to number of opacified images, otherwise copy of original (if no mask)
Frame Increment Pointer	(0028,0009)	1C	Copy from original Note: if number of frames different than original, and if Frame Increment Pointer is (0018,1063), keep pointer to (0018,1063) Frame Time value.

10.4.5.6 Frame Pointers Module

TABLE 11.4-10 FRAME POINTERS MODULE

Attribute Name	Tag	Type	Attribute Description
Representative Frame Number	(0028,6010)	3	Copy from original if same number of frames than original, (new value = old value - first opacified frame number) otherwise

10.4.5.7 X-Ray Image Module

TABLE 11.4-11 X-RAY IMAGE MODULE

Attribute Name	Tag	Type	Attribute Description
Frame Increment Pointer	(0028,0009)	1C	Copy from original
Lossy Image Compression	(0028,2110)	1C	Copy from original
Image Type	(0008,0008)	3	"DERIVED\SECONDARY\SINGLE PLANE" or "DERIVED\SECONDARY\BIPLANE A" or "DERIVED\SECONDARY\BIPLANE B" Eventually followed by: - “DISTORTION FREE”, if the fourth field of original image is equal to “DISTORTION FREE”, - “IMAGE PASTING”, if the fourth field of original image is equal to “IMAGE PASTING”
Pixel Intensity Relationship	(0028,1040)	1	"DISP"
Samples per Pixel	(0028,0002)	1	Copy from original
Photometric Interpretation	(0028,0004)	1	Copy from original
Bits Allocated	(0028,0100)	1	Copy from original
Bits Stored	(0028,0101)	1	Copy from original
High Bit	(0028,0102)	1	Copy from original
Pixel Representation	(0028,0103)	1	Copy from original
Scan Options	(0018,0022)	3	Copy from original
Referenced Image Sequence	(0008,1140)	1C	Not present in case of single plane
>Referenced SOP class UID	(0008,1150)	1C	SOP Class UID of the derived other plane of a biplane pair
>Referenced SOP instance UID	(0008,1155)	1C	Instance UID of the derived other plane of a biplane pair
>Purpose of Referenced Code Sequence	(0040,A170)	3	See below
>>Code Value	(0008,0100)	1C	"121314"
>>Coding Scheme Designator	(0008,0102)	1C	"DCM"
>>Code meaning	(0008,0104)	1C	"Other image of biplane pair"
Calibration Image	(0050,0004)	3	Copy from original

10.4.5.8 X-Ray Acquisition Module

TABLE 11.4-12 X-RAY ACQUISITION MODULE

Attribute Name	Tag	Type	Attribute Description
KVP	(0018,0060)	2	Copy from original
Radiation Setting	(0018,1155)	1	Copy from original
X-Ray Tube Current	(0018,1151)	2C	Copy from original
Exposure Time	(0018,1150)	2C	Copy from original
Exposure	(0018,1152)	2C	Copy from original
Grid	(0018,1166)	3	Copy from original
Average Pulse Width	(0018,1154)	3	Copy from original
Radiation Mode	(0018,115A)	3	Copy from original
Intensifier Size	(0018,1162)	3	Copy from original
Field of View Shape	(0018,1147)	3	Copy from original
Field of View Dimension(s)	(0018,1149)	3	Copy from original
Focal Spot	(0018,1190)	3	Copy from original
Image and Fluoroscopy Area Dose Product	(0018,115E)	3	Copy from original

10.4.5.9 X-Ray Collimator Module

This module is not present in generated image if it is not present in original one.

TABLE 11.4-13 X-RAY COLLIMATOR MODULE

Attribute Name	Tag	Type	Attribute Description
Collimator Shape	(0018,1700)	1	Copy from original
Collimator Left Vertical Edge	(0018,1702)	1C	Copy from original
Collimator Right Vertical Edge	(0018,1704)	1C	Copy from original
Collimator Upper Horizontal Edge	(0018,1706)	1C	Copy from original
Collimator Lower Horizontal Edge	(0018,1708)	1C	Copy from original

10.4.5.10 X-Ray Table Module

This module is not present in generated image if it is not present in original one.

TABLE 11.4-14 X-RAY TABLE MODULE

Attribute Name	Tag	Type	Attribute Description
Table Motion	(0018,1134)	2	Copy from original
Table Vertical Increment	(0018,1135)	2C	Copy from original if same number of frames than original, based on original otherwise

Table Longitudinal Increment	(0018,1137)	2C	Copy from original if same number of frames than original, based on original otherwise
Table Lateral Increment	(0018,1136)	2C	Copy from original if same number of frames than original, based on original otherwise
Table Angle	(0018,1138)	3	Copy from original

10.4.5.11 XA Positioner Module

TABLE 11.4-15 XA POSITIONER MODULE

Attribute Name	Tag	Type	Attribute Description
Distance Source To Patient	(0018,1111)	3	Copy from original if same number of frames than original, based on original otherwise
Distance Source To Detector	(0018,1110)	3	Copy from original if same number of frames than original, based on original otherwise
Estimated Radiographic Magnification Factor	(0018,1114)	3	Copy from original
Positioner Motion	(0018,1500)	2C	Copy from original
Positioner Primary Angle	(0018,1510)	2	Copy from original if same number of frames than original, based on original otherwise
Positioner Secondary Angle	(0018,1511)	2	Copy from original if same number of frames than original, based on original otherwise
Positioner Primary Angle Increment	(0018,1520)	2C	If present in original image: - Copy from original if same number of frames than original, - based on original otherwise If not present in original image: Not Present
Positioner Secondary Angle Increment	(0018,1521)	2C	If present in original image: - Copy from original if same number of frames than original, - based on original otherwise If not present in original image: Not Present

10.4.5.12 DX Detector Module

This module is not present in generated image if it is not present in original one.

TABLE 11.4-16 DX DETECTOR MODULE

Attribute Name	Tag	Type	Attribute Description
Detector Type	(0018,7004)	2	Copy from original
Field of View Shape	(0018,1147)	3	Copy from original
Field of View Dimension(s)	(0018,1149)	3	Copy from original
Field of View Origin	(0018,7030)	1C	Copy from original if present, not present otherwise
Field of View Rotation	(0018,7032)	1C	Copy from original if present, not present otherwise
Field of View Horizontal Flip	(0018,7034)	1C	Copy from original if present, not present otherwise
Imager Pixel Spacing	(0018,1164)	3	Copy from original

10.4.5.13 VOI Lut Module

TABLE 11.4-17 VOI LUT MODULE

Attribute Name	Tag	Type	Attribute Description
Window Center	(0028,1050)	3	current one
Window Width	(0028,1051)	3	current one

10.4.5.14 SOP Common Module

TABLE 11.4-18 SOP COMMON MODULE

Attribute Name	Tag	Type	Attribute Description
Sop Class UID	(0008,0016)	1	XA SOP class UID
Sop Instance UID	(0008,0018)	1	Generated
Specific Character Set	(0008,0005)	1C	Copy from original
Instance Number	(0020,0013)	2	Copy from original

10.4.5.15 X-Ray Filtration Module (standard extended)

TABLE 11.4-19 X-RAY FILTRATION MODULE

Attribute Name	Tag	Type	Attribute Description
Filter Type	(0018,1160)	3	Copy from original

10.5 XA IMAGE-PRIVATE DATA DICTIONARY

This section describes the private attributes of this IOD.

Table 10.5-1 PRIVATE CREATOR IDENTIFICATION: DLX_SERIE_01

Attribute Name	Tag	VR	VM	Type

adx acq mode	(0019,xx14)	IS	1	3
ip address	(0019,xx20)	LO	1	3
Lambda cm pincushion distortion	(0019,xx24)	DS	1	3
Slope LV regression	(0019,xx25)	DS	1	3
Intercept LV regression	(0019,xx26)	DS	1	3
table vertical position	(0019,xx21)	DS	1	3
table longitudinal position	(0019,xx22)	DS	1	3
table lateral position	(0019,xx23)	DS	1	3
angle value 1	(0019,xx01)	DS	1	3
angle value 2	(0019,xx02)	DS	1	3
angle value 3	(0019,xx03)	DS	1	3
user spatial filter strength	(0019,xx17)	IS	1	3

Table 10.5-2 PRIVATE CREATOR IDENTIFICATION: GEMS_DL_IMG_01

Attribute Name	Tag	VR	VM	Type
patient orientation vector	(0019,xxBF)	CS	2-2N	3
patient position per image	(0019,xxC7)	CS	1	3
Acquisition plane	(0019,xxDE)	CS	1	3
contrast bolus ingredient relative absorption	(0019,xxE0)	FL	1	3
auto injection enabled	(0019,xxA4)	CS	1	3
injection phase	(0019,xxA5)	CS	1	3
injection delay	(0019,xxA6)	DS	1	3
reference injection frame number	(0019,xxA7)	IS	1	3
recommended display frame rate float	(0019,xxB8)	FL	1	3
fov dimension double	(0019,xx0B)	DS	1-2	3
Distance Object to Table Top	(0019,xx2B)	FL	1	3
detector gain	(0019,xx34)	DS	1	3
image detector rotation angle	(0019,xx92)	DS	1	3
image flip	(0019,xx95)	CS	2	3
can downscan 512	(0019,xxAA)	CS	1	3
Acquisition Mode Description	(0019,xxB1)	LO	1	3
Acquisition Mode Display Label	(0019,xxB2)	LO	1	3
Acquisition Protocol User Name	(0019,xxB3)	LO	1	3
Acquisition Region	(0019,xxBA)	CS	1	3
Acquisition SUB mode	(0019,xxBB)	CS	1	3
preselected pivot rotation speed	(0019,xxC5)	FL	1	3
detection gain value	(0019,xxD4)	FL	1	3
mR mAs calibration value	(0019,xxD5)	FL	1	3
DRM LUT file name	(0019,xxDC)	LO	1	3
DRM Strength	(0019,xxDD)	DS	1-N	3

Table Tilt Angle First frame	(0019,xxEE)	FL	1	3
table rotation angle	(0019,xxEA)	FL	1	3
table cradle angle	(0019,xxBC)	FL	1	3
table rotation status vector	(0019,xxBD)	CS	1-N	3
table rotation angle increment	(0019,xxC3)	FL	1-N	3
Table X Position to Isocenter	(0019,xxEB)	FL	1	3
Table Y Position to Isocenter	(0019,xxEC)	FL	1	3
Table Z Position to Isocenter	(0019,xxED)	FL	1	3
Table X Position to Isocenter increment	(0019,xxD7)	FL	1-N	3
Table Y Position to Isocenter increment	(0019,xxD8)	FL	1-N	3
Table Z Position to Isocenter increment	(0019,xxD9)	FL	1-N	3
Table Head Tilt Angle increment	(0019,xxDA)	FL	1-N	3
Table Cradle Tilt Angle increment	(0019,xxDB)	FL	1-N	3
angle 1 increment	(0019,xx97)	DS	1-N	3
angle 2 increment	(0019,xx98)	DS	1-N	3
angle 3 increment	(0019,xx99)	DS	1-N	3
SID vector	(0019,xxBE)	FL	1-N	3
SOD vector	(0019,xxE9)	FL	1-N	3
spectral filter thickness	(0019,xxC4)	IS	1	3
default spatial filter family	(0019,xx31)	IS	1	3
default spatial filter strength	(0019,xx32)	IS	1	3
current spatial filter strength	(0019,xxAB)	IS	1	3
applicable review mode	(0019,xx9D)	CS	1	3
log lut control points	(0019,xx9E)	DS	1-N	3
exp lut SUB control points	(0019,xx9F)	DS	1-N	3
ABD value	(0019,xxA0)	DS	1	3
sub window center	(0019,xxA1)	DS	1	3
sub window width	(0019,xxA2)	DS	1	3
exp lut NOSUB control points	(0019,xxAD)	DS	1-N	3
SUB operator LUTs names	(0019,xxAE)	LO	1-N	3
current spatial filter strength	(0019,xxAB)	IS	1	3

Table 10.5-3 PRIVATE CREATOR IDENTIFICATION: GEMS_DL_STUDY_01

Attribute Name	Tag	VR	VM	Type
study dose	(0015,xx80)	DS	1	3
study total dap	(0015,xx81)	DS	1	3
study fluoro dap	(0015,xx82)	DS	1	3
study fluoro time	(0015,xx83)	IS	1	3
study record dap	(0015,xx84)	DS	1	3
study record time	(0015,xx85)	IS	1	3

Study dose Frontal	(0015,xx92)	FL	1	3
Study total dap Frontal	(0015,xx93)	FL	1	3
study fluoro dap frontal	(0015,xx94)	FL	1	3
study fluoro time frontal	(0015,xx95)	IS	1	3
study record dap frontal	(0015,xx96)	FL	1	3
study record time frontal	(0015,xx97)	IS	1	3
study dose lateral	(0015,xx98)	FL	1	3
study total dap lateral	(0015,xx99)	FL	1	3
study fluoro dap lateral	(0015,xx9A)	FL	1	3
study fluoro time lateral	(0015,xx9B)	IS	1	3
study record dap lateral	(0015,xx9C)	FL	1	3
study record time lateral	(0015,xx9D)	IS	1	3

Table 10.5-4 PRIVATE CREATOR IDENTIFICATION: GEMS_FUNCTOOL_01

Attribute Name	Tag	VR	VM	Type
Bias	(0051,xx03)	SL	1	3
Scale	(0051,xx04)	FL	1	3

Table 10.5-5 PRIVATE CREATOR IDENTIFICATION: GEMS_IDEN_01

Attribute Name	Tag	VR	VM	Type
Full Fidelity	(0009,xx01)	LO	1	3
Suite id	(0009,xx02)	SH	1	3
Product ID	(0009,xx04)	SH	1	3
Image actual date	(0009,xx27)	SL	1	3
Unique Service ID from config file	(0009,xx30)	SH	1	3
Mobile Location Number	(0009,xx31)	SH	1	3
Equipment UID	(0009,xxE3)	UI	1	3
Genesis version - now - 09	(0009,xxE6)	SH	1	3
Exam record checksum	(0009,xxE7)	UL	1	3
Series suite id	(0009,xxE8)	SH	1	3
Actual series data time stamp	(0009,xxE9)	SL	1	3

Table 10.5-6 PRIVATE CREATOR IDENTIFICATION: GEMS_IMPS_01

Attribute Name	Tag	VR	VM	Type
Version of the hdr struct	(0029,xx26)	SS	1	3
Advantage comp. Overflow	(0029,xx34)	SL	1	3
Advantage comp. Underflow	(0029,xx35)	SL	1	3

Table 10.5-7 PRIVATE CREATOR IDENTIFICATION: GEMS_PARM_01

Attribute Name	Tag	VR	VM	Type
Decon kernel parameters	(0043,xx13)	SS	5	3

Table 10.5-8 PRIVATE CREATOR IDENTIFICATION: GEMS_RELA_01

Attribute Name	Tag	VR	VM	Type
Series from which Prescribed	(0021,xx03)	SS	1	3
Genesis version - now - 21	(0021,xx05)	SH	1	3
Series record checksum	(0021,xx07)	UL	1	3
Screen Format	(0021,xx37)	SS	1	3

Table 10.5-9 PRIVATE CREATOR IDENTIFICATION: GEMS_SERS_01

Attribute Name	Tag	VR	VM	Type
Images in Series	(0025,xx07)	SL	1	3
Last image number used	(0025,xx19)	SL	1	3
Primary Receiver Suite and Host	(0025,xx1A)	SH	1	3

11. PRIVATE OBJECT INFORMATION OBJECT IMPLEMENTATION

11.1 INTRODUCTION

AW4.7 supports the following DICOM Private Objects:

- GE Private 3D Model Objects are described in the AW Volume Viewer Applications DICOM Conformance Statement in the Workstation tab, see 1.6.
- GE private DICOM NM images aka Xeleris/eNTEGRA Protocol Data are described in the GENIE ACQUISITION GENIE DICOM Conformance Statement in the Nuclear Medicine DICOM tab, see 1.6.
- GE private DICOM PET images are described in the Discovery 710/610 and Optima 560 DICOM Conformance Statement in the Positron Emission Tomography (PET) DICOM tab see 1.6.

12. XA DOWNSCAN INFORMATION OBJECT IMPLEMENTATION

12.1 INTRODUCTION

This section specifies the modifications of XA images produced by this implementation during the *downscan* processing. This processing consists in modifying an existing GE XA 8bit image to reduce the resolution of an X-Ray 8bit image to 512x512.

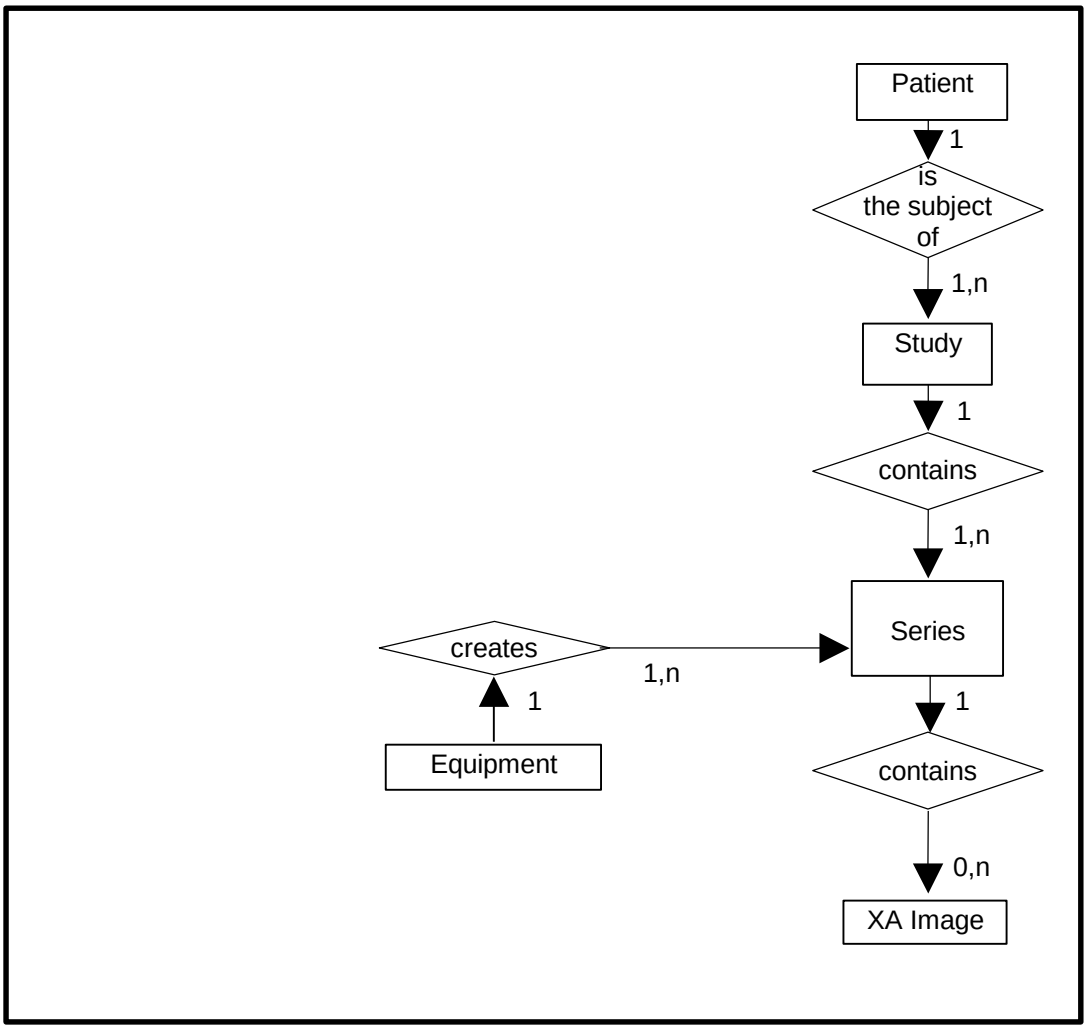
12.2 XA ENTITY-RELATIONSHIP MODEL

The Entity-Relationship diagram for the XA Image interoperability schema is shown in **Illustration 12.2.1.** In this figure, the following diagrammatic convention is established to represent the information organization:

- Each entity is represented by a rectangular box
- Each relationship is represented by a diamond shaped box.
- The fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.

The relationships are fully defined with the maximum number of possible entities in the relationship shown. In other words, the relationship between Series and Image can have up to n Images per Series, but the Patient to Study relationship has 1 Study for each Patient (a Patient can have more than one Study on the system, however each Study will contain all of the information pertaining to that Patient).

ILLUSTRATION 12.2-1
XA IMAGE ENTITY RELATIONSHIP DIAGRAM



12.2.1 Entity Descriptions

Please refer to DICOM Standard Part 3 (Information Object Definitions) for a full description of each of the entities contained within the XA Information Object.

12.2.2 Advantage Workstation 4.7 Mapping of DICOM entities

TABLE 12-1
MAPPING OF DICOM ENTITIES TO ADVANTAGE WORKSTATION 4.7 ENTITIES

DICOM	Advantage Workstation 4.7 Entity
Patient	Patient
Study	Exam
Series	Series
Image	Image

12.3 XA- DOWNSCAN IOD

The conditions to apply the downscan processing are indicated in 3.4.1.1.2 and below.

The modifications that are done to the XA image during the downscan processing are listed in the following tables, the other fields are copied as is, no IOD module explicitly defined for those fields.

TABLE 12-2
XA DOWNSCAN IMAGE DOCUMENT IOD MODULES

Entity Name	Module Name	Reference
Patient	Patient Information	**12.3.1**
Study	General Study	**12.3.2.1**
	Patient Study	**12.3.2.2**
Series	General Series	**12.3.3**
Image	Image Pixels	**12.3.4**
	Display Shutter	**12.3.10**
	X-Ray Acquisition	**12.3.7**
	X-Ray Collimator	**12.3.9**
	DX Detector	**12.3.8**
	SOP Common	**12.3.5**
	Frame Pixel Shift Macro	**12.3.6**
	Private Module for GEMS_DL_IMG_01	**12.3.11**
	Private Module for DLX_SERIE_01	**12.3.12**
	Private Module for GEMS_DL_FRAME_01	**12.3.13**

12.3.1 Patient Module

Attribute Name	Tag	VR	VM	Downscan image description
Patient's Name	(0010,0010)	PN	1	Copied
Patient ID	(0010,0020)	LO	1	Copied
Issuer of Patient ID	(0010,0021)	LO	1	Not filled
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	SQ	1	Not filled
Patient's Birth Date	(0010,0030)	DA	1	Copied
Patient’s Birth Time	(0010,0032)	TM	1	Copied
Patient's Sex	(0010,0040)	CS	1	Copied
Other Patient IDs	(0010,1000)	LO	1-N	Copied

12.3.2 Common Study Entity Modules

12.3.2.1 General Study Module

Attribute Name	Tag	VR	VM	Downscan image description
Study Instance UID	(0020,000D)	UI	1	Copied
Study Date	(0008,0020)	DA	1	Copied
Study Time	(0008,0030)	TM	1	Copied
Accession Number	(0008,0050)	SH	1	Copied
Referring Physician's Name	(0008,0090)	PN	1	Copied
Study Description	(0008,1030)	LO	1	Copied
Study ID	(0020,0010)	SH	1	Copied

12.3.2.2 Patient Study Module

Attribute Name	Tag	VR	VM	Downscan image description
Patient's Age	(0010,1010)	AS	1	Copied
Patient's Size	(0010,1020)	DS	1	Copied
Patient's Weight	(0010,1030)	DS	1	Copied
Admission ID	(0038,0010)	LO	1	Copied

12.3.3 General Series Module

Attribute Name	Tag	VR	VM	Downscan image description
Referenced Performed Procedure Step Sequence	(0008,1111)	SQ	1	Removed
Series Instance UID	(0020,000E)	UI	1	Generated with root UID: 1.2.840.113619.2.350
Performed Procedure Step ID	(0040,0253)	SH	1	Removed
Performed Procedure Step Start Date	(0040,0244)	DA	1	Removed
Performed Procedure Step Start Time	(0040,0245)	TM	1	Removed
Performed Procedure Step Description	(0040,0254)	LO	1	Removed
Performed Protocol Code Sequence	(0040,0260)	SQ	1	Removed

12.3.4 Image Pixels Module

Attribute Name	Tag	VR	VM	Downscan image description
Rows	(0028,0010)	IS	1	512
Columns	(0028,0011)	IS	1	512
Pixel Length	(7FE0,0000)	LO	1	This group length depends of the transfer syntax and of the length of the pixel data
Pixel Data	(7FE0,0010)	OB	1	Updated to match new size of 512x512

12.3.5 SOP Common Module

Attribute Name	Tag	VR	VM	Downscan image description
SOP Instance UID	(0008,0018)	UI	1	Copied from 0019, xx29, GEMS_DL_IMG_01 or Generated with root UID: 1.2.840.113619.2.350

12.3.6 Frame Pixel Shift Macro Module

Attribute Name	Tag	VR	VM	Downscan image description
Mask Sub-pixel Shift	(0028,6114)	FL	2	Updated to match new size of 512x512 Note: This attribute is found in an item of the Mask Substraction sequence (0028,6100).

12.3.7 X-RAY Acquisition Module

Attribute Name	Tag	VR	VM	Downscan image description
FOV Dimension(s)	(0018,1149)	IS	2	No change (both Horizontal and Vertical dimensions)
Imager Pixel Spacing	(0018,1164)	DS	2	Updated to match new size of 512x512

12.3.8 DX Detector Module

Attribute Name	Tag	VR	VM	Downscan image description
FOV Origin	(0018,7030)	DS	2	Updated to match new size of 512x512

12.3.9 X-RAY Collimator Module

Attribute Name	Tag	VR	VM	Downscan image description

Attribute Name	Tag	VR	VM	Downscan image description
Collimator Left Vertical Edge	(0018,1702)	IS	1	Updated to match new size of 512x512
Collimator Right Vertical Edge	(0018,1704)	IS	1	Updated to match new size of 512x512
Collimator Upper Horizontal Edge	(0018,1706)	IS	1	Updated to match new size of 512x512
Collimator Lower Horizontal Edge	(0018,1708)	IS	1	Updated to match new size of 512x512
Center of Circular Collimator	(0018,1710)	IS	2	Updated to match new size of 512x512
Radius of Circular Collimator	(0018,1712)	IS	1	Updated to match new size of 512x512
Vertices of the Polygonal Collimator	(0018,1720)	IS	2-2n	Updated to match new size of 512x512

12.3.10 Display Shutter Macro Module

Attribute Name	Tag	VR	VM	Downscan image description
Shutter Left Vertical Edge	(0018,1602)	IS	1	Updated to match new size of 512x512
Shutter Right Vertical Edge	(0018,1604)	IS	1	Updated to match new size of 512x512
Shutter Upper Horizontal Edge	(0018,1606)	IS	1	Updated to match new size of 512x512
Shutter Lower Horizontal Edge	(0018,1608)	IS	1	Updated to match new size of 512x512
Center of Circular Shutter	(0018,1610)	IS	2	Updated to match new size of 512x512 Note: This attribute is not present in actual DL images, see Notes for DL images.
Radius of Circular Shutter	(0018,1612)	IS	1	Updated to match new size of 512x512 Note: This attribute is not present in actual DL images, see Notes for DL images.
Vertices of the Polygonal Shutter	(0018,1620)	IS	2-2n	Updated to match new size of 512x512 Note: This attribute is not present in actual DL images, see Notes for DL images.

Note: An image is DL image if Manufacturer (0008,0070) is “GE MEDICAL SYSTEMS” and the Manufacturer’s Model Name (0008,1090) is “DL”

12.3.11 Private Module for GEMS_DL_IMG_01

Attribute Name	Tag	Private Creator	VR	VM	Downscan image description
Calibration Factor	(0019,xx84)	GEMS_DL_IMG_01	FL	1	Removed
Calibration Accuracy	(0019,xx87)	GEMS_DL_IMG_01	US	1	Removed
Calibration Points Row	(0019,xx8C)	GEMS_DL_IMG_01	US	1-n	Removed
Calibration Points Column	(0019,xx8D)	GEMS_DL_IMG_01	US	1-n	Removed
Can Dowsncan 512	(0019,xxAA)	GEMS_DL_IMG_01	CS	1	NO
fov_dim_double	(0019,xx0B)	GEMS_DL_IMG_01	DS	2	No change (both Horizontal and Vertical dimensions)
Detector Origin	(0019,xx4B)	GEMS_DL_IMG_01	IS	2	Updated to match new size of 512x512

12.3.12 Private Module for DLX_SERIE_01

Attribute Name	Tag	Private Creator	VR	VM	Downscan image description
X Zoom	(0019,xx19)	DLX_SERIE_01	IS	1	Updated to match new size of 512x512
Y Zoom	(0019,xx1A)	DLX_SERIE_01	IS	1	Updated to match new size of 512x512

12.3.13 Private Module for GEMS_DL_FRAME_01

Attribute Name	Tag	Private Creator	VR	VM	Downscan image description
FOV Origin	(0025,xx33)	GEMS_DL_FRAME_01	IS	2	Updated to match new size of 512x512 Note: This attribute is found in an item of the frame_sequence sequence (0025,xx0A,GEMS_DL_FRAME_01).

Attribute Name	Tag	Private Creator	VR	VM	Downscan image description
FOV Dimensions	(0025,xx30)	GEMS_DL_FRAME_01	IS	2	No change (both Horizontal and Vertical dimensions) Note: This attribute is found in an item of the frame_sequence sequence (0025,xx0A,GEMS_DL_FRAME_01).
Collimator Left Vertical Edge	(0025,xx34)	GEMS_DL_FRAME_01	IS	1	Updated to match new size of 512x512 Note: This attribute is found in an item of the frame_sequence sequence (0025,xx0A,GEMS_DL_FRAME_01).
Collimator Right Vertical Edge	(0025,xx35)	GEMS_DL_FRAME_01	IS	1	Updated to match new size of 512x512 Note: This attribute is found in an item of the frame_sequence sequence (0025,xx0A,GEMS_DL_FRAME_01).
Collimator Upper Horizontal Edge	(0025,xx36)	GEMS_DL_FRAME_01	IS	1	Note: This attribute is found in an item of the frame_sequence sequence (0025,xx0A,GEMS_DL_FRAME_01). Updated to match new size of 512x512
Collimator Lower Horizontal Edge	(0025,xx37)	GEMS_DL_FRAME_01	IS	1	Note: This attribute is found in an item of the frame_sequence sequence (0025,xx0A,GEMS_DL_FRAME_01). Updated to match new size of 512x512
Vertices of the Polygonal Collimator	(0025,xx38)	GEMS_DL_FRAME_01	IS	2-2n	Note: This attribute is found in an item of the frame_sequence sequence (0025,xx0A,GEMS_DL_FRAME_01). Updated to match new size of 512x512

12.4 IMPLEMENTATION IDENTIFYING INFORMATION

The Implementation UID for this DICOM downscan implementation is:

AW Downscan Implementation UID	1.2.840.113619.2.350

13. TOOL TO MODIFY FIRST AND LAST NAME OF PATIENTS

13.1 INTRODUCTION

This section describes the use of the tool that enables to modify the first and last name of the selected study. This tool is available on AW4.7. This implementation is intended to create new DICOM images from original DICOM images by removing and modifying specific elements that will be listed in 13.3.

13.2 DESCRIPTION

This implementation is conformant to the Basic Application Level Confidentiality Profile as a de-identifier (described in DICOM PS 3.15 – Annex E) but this conformance does not guarantee a complete de-identification of the generated objects.

The user is invited to check that the created DICOM objects are conformant to local regulations and hospital regulations.

In the following chapter, all UIDs except implementation class UID are generated from AW4.7 Anonymous Maker base UID: 1.2.840.113619.2.379.

Please note that UID chaining will be maintained within the same session: i.e: if an image references another image, the two anonymized images will still be correctly referenced.

13.3 REAL WORLD ACTIVITY

The user is able to modify the Patient Name and Patient ID and to select the following preferences when de-identifying a set of DICOM images.

- Keep or not Accession Number
- Keep or not Study ID
- Keep or not Institution Name
- Keep or not Study Description
- Keep or not Series Description
- Keep or not Protocol Name
- Keep or not Patient’s Sex
- Keep or not Patient’s Age
- Keep or not Patient’s Size, Patient’s Weight
- Keep the original dates or modify all dates relatively to a user defined reference date

Note: No option shall be kept in order to be compliant with the Basic Application Level Confidentiality Profile Attributes modifications as indicated in DICOM PS 3.15 – Annex E.

13.4 PROCESSING OF IODS

The following IODs are processed:

CR Image Stotage	1.2.840.10008.5.1.4.1.1.1
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital Mammography X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
Ultrasound Multi-Frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
Nuclear Medecine Image Storage	1.2.840.10008.5.1.4.1.1.20
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5

The following IODs are processed but a warning message is displayed to the user when such an IOD is processed.

Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1

The IODs containing the DICOM fields indicated in the table below are processed but a warning message is displayed to the user.

Curves	(50xx,xxxx)
Overlays	(60xx,xxxx)

Note: A warning may also be displayed to the user when some private DICOM fields generated by GE Medical Systems devices are present in the original IOD.

Note: Note: All other IODs are never processed:

TABLE 13-1
MODIFIED ATTRIBUTES DESCRIPTION

Attribute Name	Tag	Private Creator	VR	VM	Description
Media SOP Instance UID	(0002,0003)	n/a	UI	1	Generated from GE Based UID: <station configuration> and timestamp The generated UID is identical to the generated SOP Instance UID
Implementation Class UID	(0002,0012)	n/a	UI	1	1.2.840.113619.6.379
Implementation Version Name	(0002,0013)	n/a	SH	1	dynamically set through an environment variable
Source AET	(0002,0016)	n/a	AE	1	Removed attribute
Private Information Creator UID	(0002,0100)	n/a	UI	1	Removed attribute
Specific Character Set	(0008,0005)	n/a	CS	1-N	• If non present in the original image, and if the new Patient Name contains non English character(s), set to "ISO_IR 100" • Original value otherwise
Instance Creator UID	(0008,0014)	n/a	UI	1	Removed attribute
SOP Instance UID	(0008,0018)	n/a	UI	1	Generated from GE Based UID: <station configuration> and timestamp The generated UID is identical to the generated Media SOP Instance UID
Accession Number	(0008,0050)	n/a	SH	1	Following user preferences • Original Value • If present in the original image, set to an empty value

Institution Name	(0008,0080)	n/a	LO	1	Following user preferences • Original Value • If present in the original image, set to an empty value
Institution Address	(0008,0081)	n/a	ST	1	Removed attribute
Referring Physician's Name	(0008,0090)	n/a	PN	1	If present in the original image, set to an empty value
Referring Physician's Address	(0008,0092)	n/a	ST	1	Removed attribute
Referring Physician's Telephone Numbers	(0008,0094)	n/a	SH	1-N	Removed attribute
Station Name	(0008,1010)	n/a	SH	1	Removed attribute
Study Description	(0008,1030)	n/a	LO	1	Following user preferences • Original Value • If present in the original image, set to an empty value
Series Description	(0008,103E)	n/a	LO	1	Following user preferences • Original Value • Removed Attribute
Institutional Department Name	(0008,1040)	n/a	LO	1	Removed attribute
Physician(s) of Record	(0008,1048)	n/a	PN	1-N	Removed attribute
Performing Physicians' Name	(0008,1050)	n/a	PN	1-N	Removed attribute
Name of Physician(s) Reading Study	(0008,1060)	n/a	PN	1-N	Removed attribute
Operators' Name	(0008,1070)	n/a	PN	1-N	present in the original image, set to an empty value
Admitting Diagnoses Description	(0008,1080)	n/a	LO	1-N	Removed attribute
Referenced SOP Instance UID	(0008,1155)	n/a	UI	1	Generated from GE Based UID: <station configuration> and timestamp
Derivation Description	(0008,2111)	n/a	ST	1	Removed attribute
Patient's Name	(0010,0010)	n/a	PN	1	User defined value
Patient ID	(0010,0020)	n/a	LO	1	Set to a random value for all images
Patient's Birth Date	(0010,0030)	n/a	DA	1	If present in the original image, set to an empty value
Patient's Birth Time	(0010,0032)	n/a	TM	1	Removed attribute
Patient's Sex	(0010,0040)	n/a	CS	1	Following user preferences • Original Value • If present in the original image, set to an empty value
Other Patient Ids	(0010,1000)	n/a	LO	1-N	Removed attribute
Other Patient Names	(0010,1001)	n/a	PN	1-N	Removed attribute

Patient's Birth Name	(0010,1005)	n/a	PN	1	Removed attribute
Patient's Age	(0010,1010)	n/a	AS	1	Following the user preference • Original Value • Removed Attribute
Patient's Size	(0010,1020)	n/a	DS	1	Following the user preference • Original Value • Removed Attribute
Patient's Weight	(0010,1030)	n/a	DS	1	Following the user preference • Original Value • Removed Attribute
Patient's Address	(0010,1040)	n/a	LO	1	Removed attribute
Patient's Mother Birth Name	(0010,1060)	n/a	PN	1	Removed attribute
Military Rank	(0010,1080)	n/a	LO	1	Removed attribute
Branch of Service	(0010,1081)	n/a	LO	1	Removed attribute
Medical Record Locator	(0010,1090)	n/a	LO	1	Removed attribute
Region of Residence	(0010,2152)	n/a	LO	1	Removed attribute
Patient's Telephone numbers	(0010,2154)	n/a	SH	1-N	Removed attribute
Ethnic Group	(0010,2160)	n/a	SH	1	Removed attribute
Occupation	(0010,2180)	n/a	SH	1	Removed attribute
Additional Patient's History	(0010,21B0)	n/a	LT	1	Removed attribute
Patient Comments	(0010,4000)	n/a	LT	1	Removed attribute
Device Serial Number	(0018,1000)	n/a	LO	1	If present in the original image, set to an empty value
Protocol Name	(0018,1030)	n/a	LO	1	Following the user preference • Original Value • Removed Attribute
Study Instance UID	(0020,000D)	n/a	UI	1	Generated from GE Based UID: <station configuration> and timestamp
Series Instance UID	(0020,000E)	n/a	UI	1	Generated from GE Based UID: <station configuration> and timestamp
Study ID	(0020,0010)	n/a	SH	1	Following user preferences • Original Value • If present in the original image, set to an empty value
Frame of Reference UID	(0020,0052)	n/a	UI	1	If present in the original image, generated from GE Based UID: <station configuration> and timestamp
Synchronization Frame of Reference UID	(0020,0200)	n/a	UI	1	If present in the original image, generated from GE Based UID: <station configuration> and timestamp
Image Comments	(0020,4000)	n/a	LT	1	Removed attribute

Concatenation UID	(0020,9161)	n/a	UI	1	If present in the original image, generated from GE Based UID: <station configuration> and timestamp
Dimension Organization UID	(0020,9164)	n/a	UI	1	If present in the original image, generated from GE Based UID: <station configuration> and timestamp
Palette Color Lookup Table UID	(0028,1199)	n/a	UI	1	If present in the original image, generated from GE Based UID: <station configuration> and timestamp
Requesting Physician	(0032,1032)	n/a	PN	1	Removed attribute
Requesting Service	(0032,1033)	n/a	LO	1	Removed attribute
Scheduled Performing Physician's Name	(0040,0006)	n/a	PN	1	Removed attribute
Scheduled Station Name	(0040,0010)	n/a	SH	1-N	Removed attribute
Scheduled Procedure Step Location	(0040,0011)	n/a	SH	1	Removed attribute
Performed Station Name	(0040,0242)	n/a	SH	1	Removed attribute
Performed Location	(0040,0243)	n/a	SH	1	Removed attribute
Request Attributes Sequence	(0040,0275)	n/a	SQ	1	Removed attribute
Names of Intended Recipients of Results	(0040,1010)	n/a	PN	1-N	Removed attribute
Order Entered By	(0040,2008)	n/a	PN	1	Removed attribute
Order Enterer's Location	(0040,2009)	n/a	SH	1	Removed attribute
Order Callback Phone Number	(0040,2010)	n/a	SH	1	Removed attribute
Scheduled Station Name Code Sequence	(0040,4025)	n/a	SQ	1	Removed attribute
Scheduled Station Geographic Location Code Sequence	(0040,4027)	n/a	SQ	1	Removed attribute
Performed Station Geographic Location Code Sequence	(0040,4030)	n/a	SQ	1	Removed attribute
Human Performer's Organization	(0040,4036)	n/a	LO	1	Removed attribute
Human Performer's Name	(0040,4037)	n/a	PN	1	Removed attribute
Verifying Observer's Name	(0040,A075)	n/a	PN	1	If present in the original image, set to an empty value
Person Name	(0040,A123)	n/a	PN	1	If present in the original image, set to an empty value
UID	(0040,A124)	n/a	UI	1	If present in the original image, generated from GE Based UID: <station configuration> and timestamp
Content Sequence	(0040,A730)	n/a	SQ	1	Removed attribute

Presentation Creator's Name	(0070,0084)	n/a	PN	1	If present in the original image, set to an empty value
Fiducial UID	(0070,031A)	n/a	UI	1	If present in the original image, generated from GE Based UID: <station configuration> and timestamp
Storage Media File-set UID	(0088,0140)	n/a	UI	1	If present in the original image, generated from GE Based UID: <station configuration> and timestamp
Topic Author	(0088,0910)	n/a	LO	1	If present in the original image, set to an empty value
Digital Signature UID	(0400,0100)	n/a	UI	1	If present in the original image, generated from GE Based UID: <station configuration> and timestamp
Radiation Machine Name	(3002,0020)	n/a	SH	1	If present in the original image, set to an empty value
Referenced Frame of Reference UID	(3006,0024)	n/a	UI	1	If present in the original image, generated from GE Based UID: <station configuration> and timestamp
ROI Interpreter	(3006,00A6)	n/a	PN	1	If present in the original image, set to an empty value
Related Frame of Reference UID	(3006,00C2)	n/a	UI	1	If present in the original image, generated from GE Based UID: <station configuration> and timestamp
Dose Reference UID	(300A,0013)	n/a	UI	1	If present in the original image, generated from GE Based UID: <station configuration> and timestamp
Treatment Machine Name	(300A,00B2)	n/a	SH	1	If present in the original image, set to an empty value
Brachy Accessory Device Name	(300A,0266)	n/a	LO	1	Removed attribute
Source Applicator Name	(300A,0294)	n/a	LO	1	Removed attribute
Receiver Name	(300E,0008)	n/a	PN	1	If present in the original image, set to an empty value
Interpretation Recorder	(4008,0102)	n/a	PN	1	Removed attribute
Interpretation Transcriber	(4008,010A)	n/a	PN	1	Removed attribute
Interpretation Author	(4008,010C)	n/a	PN	1	If present in the original image, set to an empty value
Physician Approving Interpretation	(4008,0114)	n/a	PN	1	Removed attribute
Distribution Name	(4008,0119)	n/a	PN	1	Removed attribute
Distribution Address	(4008,011A)	n/a	LO	1	Removed attribute

Note: Fields which are used for DICOM encoding but have no semantics, for example a group length field, may be also modified.

Note: GE Medical Systems Private fields are specifically managed. However, this management is not described in this document.