6.2.3.2.1 IOD description

6.2.3.2.1.1 IOD modules

Module	Reference	Module Description
SOP Common	6.2.3.2.1.2	Contains SOP Common information
Image Box Pixel Presentation Module	6.2.3.2.1.3	Contains Image Box presentation information
Image Box Relationship Module	6.2.3.2.1.4	References to related SOPs

6.2.3.2.1.2 SOP Common Module

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	1.2.840.10008.5.1.1.4.1
SOP Instance UID	(0008,0018)	1	Generated from GE Based UID: <station configuration> and timestamp

6.2.3.2.1.3 Image Box Pixel Presentation Module

Attribute Name	Tag	Attribute Description
Image Position	(2020,0010)	Value depends of the position within the Film box (1-N)
Polarity	(2020,0020)	NORMAL
Magnification Type	(2010,0060)	Same value as defined in the Film box
Smoothing Type	(2010,0080)	Same value as defined in the Film box
Configuration Information	(2010,0150)	Same value as defined in the Film Box.
Requested Image Size	(2020,0030)	Not sent
Requested Decimate/Crop Behavior	(2020,0040)	Not sent
Basic Color Image Sequence	(2020,0111)	This sequence is always included if the Image Box is a Basic Color Image Box
>Samples Per Pixel	(0028,0002)	3
>Photometric Interpretation	(0028,0004)	RGB
>Planar Configuration	(0028,0006)	1
>Rows	(0028,0010)	Original image height
>Columns	(0028,0011)	Oiginal image width
>Pixel Aspect Ratio	(0028,0034)	1\1
>Bits Allocated	(0028,0100)	8
>Bits Stored	(0028,0101)	8
>High Bit	(0028,0102)	7
>Pixel Representation	(0028,0103)	0
>Pixel Data	(7FE0,0010)	
Original Image Sequence	(2130,00C0)	Not sent

6.2.3.2.1.4 Image Box Relationship Module

Attribute Name	Tag	Attribute Description
Referenced Image Sequence	(0008,1140)	Not used
>Referenced SOP Class UID	(0008,1150)	Not used
>Referenced SOP Instance UID	(0008,1155)	Not used
>Referenced Frame Number	(0008,1160)	Not used
Referenced Image Overlay Box Sequence	(2020,0130)	Not used
>Referenced SOP Class UID	(0008,1150)	Not used
>Referenced SOP Instance UID	(0008,1155)	Not used
>Referenced Frame Number	(0008,1160)	Not used
Referenced VOI LUT Sequence	(2020,0140)	Not used
>Referenced SOP Class UID	(0008,1150)	Not used
>Referenced SOP Instance UID	(0008,1155)	Not used

6.2.3.2.2 DIMSE Service Group

DIMSE Service Element	Usage SCU
N-SET	M

6.2.3.2.2.1 N-SET

6.2.3.2.2.1.1 Attributes

Attribute Name	Tag	Usage SCU
Image Position	(2020,0010)	M
Basic Color Image Sequence	(2020,0111)	M
>Samples Per Pixel	(0028,0002)	M
>Photometric Interpretation	(0028,0004)	M
>Planar Configuration	(0028,0006)	Used
>Rows	(0028,0010)	M
>Columns	(0028,0011)	M
>Pixel Aspect Ratio	(0028,0034)	M
>Bits Allocated	(0028,0100)	M
>Bits Stored	(0028,0101)	M
>High Bit	(0028,0102)	M
>Pixel Representation	(0028,0103)	M
>Pixel Data	(7FE0,0010)	M
Polarity	(2020,0020)	Used
Referenced Overlay Sequence	(0008,1130)	Not used
>SOP Class UID	(0008,1150)	Not used
>SOP Instance UID	(0008,1155)	Not used
Magnification Type	(2010,0060)	Used
Smoothing Type	(2010,0080)	Used. Not sent if magnfication is different of CUBIC
Configuration Information	(2010,0150)	Used, not sent if empty
Requested Image Size	(2020,0030)	Not used

6.2.3.2.2.1.2 Status

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Failure	C603	Image size is larger than image box size	Appropriate message is returned to the user. Association is aborted.
	C605	Insufficient memory in printer to store the image	Appropriate message is returned to the user. Association is aborted.
	C613	Combined Print Image size is larger than the Image Box size	Appropriate message is returned to the user. Association is aborted.
	0119	Class-instance conflict	Generic error message is returned to the user. Association is aborted.
	0210	Duplicate invocation	Generic error message is returned to the user. Association is aborted.
	0106	Invalid attribute value	Generic error message is returned to the user. Association is aborted.

	0212	Mistyped argument	Generic error message is returned to the user. Association is aborted.
	0117	Invalid SOP instance	Generic error message is returned to the user. Association is aborted.
	0121	Missing attribute value	Generic error message is returned to the user. Association is aborted.
	0105	No such attributes	Generic error message is returned to the user. Association is aborted.
	0118	No such SOP Class	Generic error message is returned to the user. Association is aborted.
	0112	No such SOP Instance	Generic error message is returned to the user. Association is aborted.
	0110	Processing failure	Generic error message is returned to the user. Association is aborted.
	0213	Resource limitation	Generic error message is returned to the user. Association is aborted.
	0211	Unrecognized operation	Generic error message is returned to the user. Association is aborted.
Warning	B604	Image size larger than image box size, the image has been demagnified.	Following printing choice (true size), the warning can be ignored (Association goes on) or considered as a failure (Association is aborted)
	B605	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	Considered as Success
	B609	Image size is larger than the Image Box size. The Image has been cropped to fit.	Following printing choice (true size), the warning can be ignored (Association goes on) or considered as a failure (Association is aborted)
	B60A	Image size or Combined Print Image size is larger than the Image Box size. The Image or Combined Print Image has been decimated to fit.	Following printing choice (true size), the warning can be ignored (Association goes on) or considered as a failure (Association is aborted)
Success	0000	Image successfully stored in Image Box	Association goes on
*	*	Any other status code.	Ignored

6.2.3.2.2.1.3 Behavior

There is no specific behavior.

6.2.4 Printer SOP Class

The DICOM Print SCU AE supports the following DIMSE Service Element for the Basic Printer SOP Class.

The N-EVENT_REPORT DIMSE Service element sent by the DICOM Print SCP to the local DICOM Print SCU AE. The DICOM Print SCU handles the Printer Status and Printer Status Info fields. All other received data are ignored.

The N-GET DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to give information on the Remote DICOM Printer.

6.2.4.1 IOD Description

6.2.4.1.1 IOD modules

Module	Reference	Module Description
SOP Common	6.2.4.1.2	Contains SOP Common information
Printer Module	6.2.4.1.3	Contains status information to monitor the printer

6.2.4.1.2 SOP Common Module

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	1.2.840.10008.5.1.1.16
SOP Instance UID	(0008,0018)	1	Generated from GE Based UID: <station configuration> and timestamp

6.2.4.1.3 Printer Module

Attribute Name	Tag	Attribute Description
Printer Status	(2110,0010)	The behaviour defined for the following term • NORMAL: Association goes on. • FAILURE: Association is aborted. • WARNING: Association is not released
Printer Status Info	(2110,0020)	Printer return value
Printer Name	(2110,0030)	Printer return value
Manufacturer	(0008,0070)	Printer return value if not empty
Manufacturer Model Name	(0008,1090)	Printer return value if not empty
Device Serial Number	(0018,1000)	Printer return value if not empty
Software Versions	(0018,1020)	Printer return value if not empty
Date Of Last Calibration	(0018,1200)	Printer return value if not empty
Time Of Last Calibration	(0018,1201)	Printer return value if not empty

6.2.4.2 DIMSE Service Group

DIMSE Service Element	Usage SCU
N-EVENT-REPORT	M
N-GET	U

6.2.4.2.1 N-EVENT-REPORT

6.2.4.2.1.1 Attributes

Event Type Name	Event Type ID	Attribute	Tag	Usage SCU
Normal	1	Printer Name	(2110,0030)	Used
		Printer Status Info	(2110,0020)	Used
Warning	2	Printer Name	(2110,0030)	Used
		Printer Status Info	(2110,0020)	Used
Failure	3	Printer Name	(2110,0030)	Used
		Printer Status Info	(2110,0020)	Used

6.2.4.2.1.2 Behavior

On reception Failure status, the Print SCU aborts the association.

If Event Report Type ID is FAILURE
    Signal print failure to the user, association is aborted
Else If Event Report Type ID is WARNING
    Signal print warning to the user
Else
    Signal print success to the user

In all cases, N-EVENT-REPORT_RSP with the status of Success is returned

6.2.4.2.2 N-GET

6.2.4.2.2.1 Attributes

Attribute name	Tag	Usage SCU
Printer Status	(2110,0010)	Used
Printer Status Info	(2110,0020)	Used
Printer Name	(2110,0030)	Used if returned by the printer
Manufacturer	(0008,0070)	Used if returned by the printer
Manufacturer Model Name	(0008,1090)	Used if returned by the printer
Device Serial Number	(0018,1000)	Used if returned by the printer
Software Versions	(0018,1020)	Used if returned by the printer
Date Last Calibration	(0018,1200)	Used if returned by the printer
Last Calibration	(0018,1201)	Used if returned by the printer

6.2.4.2.2.2 Behavior

If Printer Status is FAILURE
    Signal print failure to the user, association aborted
Else If Printer Status is WARNING
    Signal print warning to the user

Else

Signal print success to the user

In case of FAILURE or WARNING, the Printer Status Info is displayed to user under a readable message

7. SECONDARY CAPTURE INFORMATION OBJECT IMPLEMENTATION

7.1 INTRODUCTION

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

In the Viewer workflow, each secondary capture DICOM field (Screen Save image) will be filled with value present in the original image, except when a specific rule is applied and described in this chapter.

In the AngioViz workflow, each secondary capture DICOM field (Screen Save image) will be filled just like Viewer workflow, except when a specific rule is applied and described in this chapter.

7.2- SC Entity-Relationship Model

7.3- SC-IOD MODULE TABLE

7.4- SC-INFORMATION MODULE DEFINITIONS

7.5- SC-PRIvate data dictionary

In the following chapter, all new study, series and image instance UID are generated from base UID:

- for AW4.7 2D Multi-Modality Viewer: **1.2.840.113619.2.378**
- for AW 4.7 Filmer: **1.2.840.113619.2.377**

Note: Note: A Screen Save image is a DICOM Secondary Capture generated by Advantage Workstation 4.7.

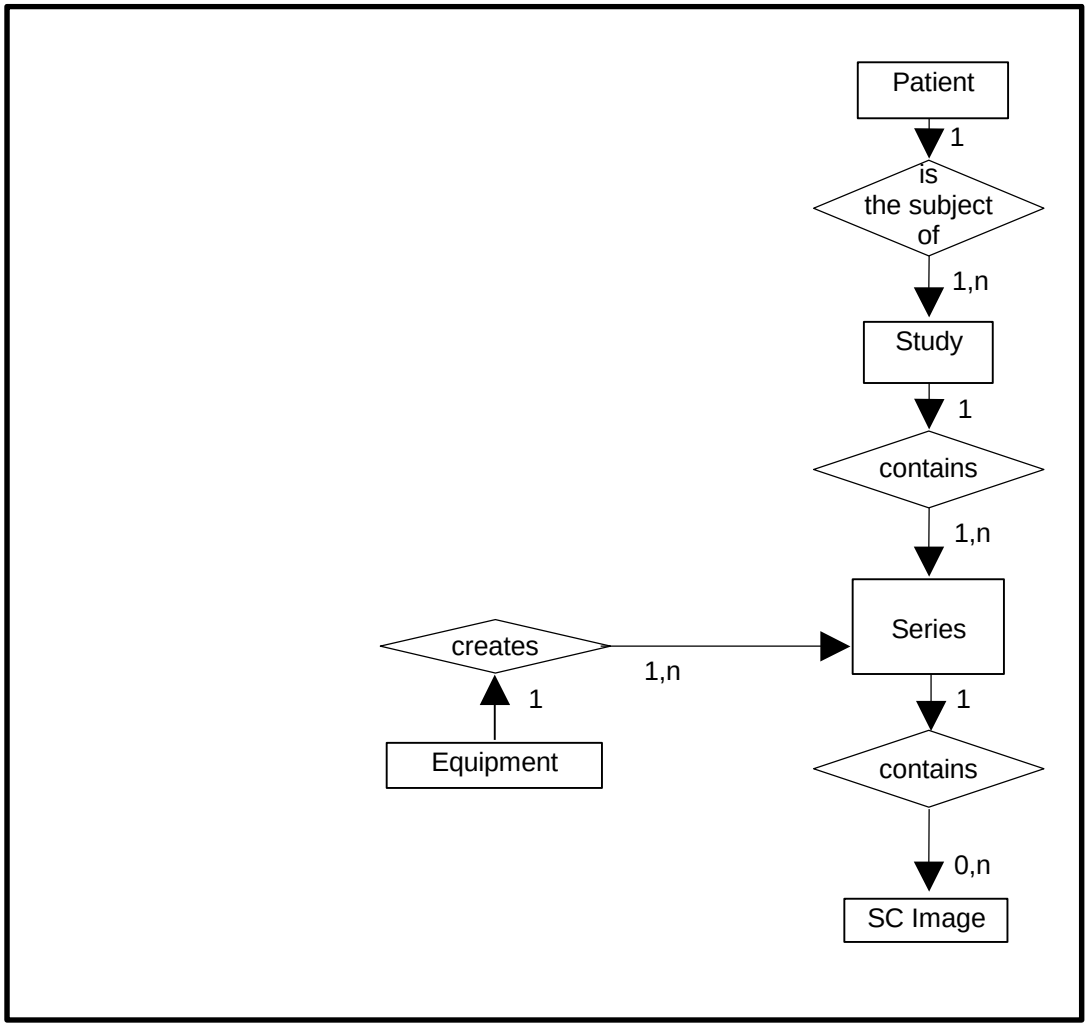
7.2 SC ENTITY-RELATIONSHIP MODEL

The Entity-Relationship diagram for the SC Image interoperability schema is shown in **Illustration 8.2.1.** 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 7.2-1
SC IMAGE ENTITY RELATIONSHIP DIAGRAM



Note: if the user needs to mix images from different series, exams or patients, Mix mode shall be set to create a new series, exam or patient

7.2.1 ENTITY DESCRIPTIONS

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

7.2.2 Advantage Workstation 4.7 Mapping of DICOM entities

TABLE 7-1 MAPPING OF DICOM ENTITIES TO ADVANTAGE WORKSTATION 4.7 ENTITIES

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

7.3 SC-IOD MODULE TABLE

Within an entity of the DICOM SC 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 6.3-1 identifies the defined modules within the entities that comprise the DICOM SC IOD. The modules are identified by their Module Name.

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

TABLE 7-2 SC IMAGE IOD MODULES

Entity Name	Module Name	Usage	Reference
Patient	Patient	Used	**7.4.1.1**
	Clinical Trial Subject	Not used	N/A
Study	General Study	Used	**7.4.2.1**
	Patient Study	Used	**7.4.2.2**
	Clinical Trial Study	Not used	N/A
Series	General Series	Used	**7.4.3.1**
	Clinical Trial Series	Not used	N/A
Equipment	General Equipment	Used	**7.4.4.1**
	SC Equipment	Used	**7.4.9.1**
Image	General Image	Used	**7.4.5.1**
	Image Pixel	Used	**7.4.5.2**
	Device	Not used	N/A
	SC Image	Used	**7.4.9.2**
	Overlay Plane	Not used	N/A
	Modality LUT	Used	**7.4.7.2**
	VOI LUT	Used	**7.4.7.1**
	SOP Common	Used	**7.4.8.1**

7.4 SC-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 SC 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 where these values are obtained from. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions).

Note: Elements not listed are not supported

7.4.1 Common Patient Entity Modules

7.4.1.1 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 7-3 PATIENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	Viewer/AngioViz Original Filmer Original if No Mix Mode or Mix Mode = Study User defined if Mix Mode = Patient
Patient ID	(0010,0020)	2	Viewer/AngioViz Original Filmer Original if No Mix Mode or Mix Mode = Study Function of pid and time if Mix Mode = Patient
Issuer of Patient ID	(0010,0021)	3	Not Present
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not Present
Patient's Birth Date	(0010,0030)	2	Viewer/AngioViz Original Filmer Original if No Mix Mode or Mix Mode = Study Empty if Mix Mode = Patient
Patient's Sex	(0010,0040)	2	Viewer/AngioViz Original Filmer Original if No Mix Mode or Mix Mode = Study Empty if Mix Mode = Patient
Other Patient ID	(0010,1000)	3	Not Present
Other Patient Ids Sequence	(0010,1002)	3	Not Present

7.4.2 Common Study Entity Modules

7.4.2.1 General Study Module

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

TABLE 7-4 GENERAL STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Type	Notes
Study Instance UID	(0020,000D)	1	Viewer/AngioViz Original Filmer Original if No Mix Mode Generated if Mix Mode = Patient or Mix Mode = Study
Study Date	(0008,0020)	2	Viewer/AngioViz Original (Empty if does not exist) Filmer Original (Empty if does not exist) if No Mix Mode Empty if Mix Mode = Patient or Mix Mode = Study
Study Time	(0008,0030)	2	Viewer/AngioViz Original (Empty if does not exist) Filmer Original (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/AngioViz Original (Empty if does not exist) Filmer Original (Empty if does not exist) if No Mix Mode Empty if Mix Mode = Patient or Mix Mode = Study
Study ID	(0020,0010)	2	Viewer/AngioViz Original (Empty if does not exist) Filmer Original (Empty if does not exist) if No Mix Mode Generated if Mix Mode = Patient or Mix Mode = Study

Accession Number	(0008,0050)	2	Viewer/AngioViz Original (Empty if does not exist) Filmer Original (Empty if does not exist) if No Mix Mode Empty if Mix Mode = Patient or Mix Mode = Study
Study Description	(0008,1030)	3	Viewer/AngioViz Original (Empty if does not exist) Filmer Original (Empty if does not exist) if No Mix Mode User defined if Mix Mode = Patient or Mix Mode = Study

7.4.2.2 Patient Study Module

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

TABLE 7-5 PATIENT STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Patient's Age	(0010,1010)	3	Viewer/AngioViz Original Filmer Original if No Mix Mode Not present if Mix Mode = Patient or Mix Mode = Study
Patient's Size	(0010,1020)	3	Viewer/AngioViz Original Filmer Original if No Mix Mode Not present if Mix Mode = Patient or Mix Mode = Study
Patient's Weight	(0010,1030)	3	Viewer/AngioViz Original Filmer Original if No Mix Mode Not present if Mix Mode = Patient or Mix Mode = Study

7.4.3 Common Series Entity Modules

7.4.3.1 General Series Module

This section specifies the Attributes that identify and describe general information about the Series within a Study.

TABLE 7-6 GENERAL SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Viewer/AngioViz Original Filmer • Original if all Filmer data have the same defined modality • OT (Other) otherwise
Series Instance UID	(0020,000E)	1	Generated
Series Number	(0020,0011)	2	Generated
Series Date	(0008,0021)	3	Not present except for AngioViz: - Date of the creation of the series with the AngioViz SCPT's
Series Time	(0008,0031)	3	Not present except for AngioViz - Time of the creation of the series with the AngioViz SCPT's
Series Description	(0008,103E)	3	Viewer • For XA image, when the secondary capture image is generated per original image, the series description is set to the secondary capture image comments if valued: (0020,4000) • "SCREEN SAVE" otherwise Filmer User defined (AW Electronic film by default) AngioViz "AngioViz"
Performing Physician Name	(0008,1050)	3	Not present
Operator's Name	(0008,1070)	3	Name of the current user logged on the station, present only if the name encoding is compatible with the Specific Character Set specified.
Protocol Name	(0018,1030)	3	Not present except for AngioViz: - Equals Series Description ("AngioViz")

7.4.4 Common Equipment Entity Modules

7.4.4.1 General Equipment Module

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

TABLE 7-7 GENERAL EQUIPMENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	Copied from original image
Institution Name	(0008,0080)	3	Viewer Copied from original image Filmer Copied from original image if No Mix Mode Empty if Mix Mode = Patient or Mix Mode = Study AngioViz Institution name configured on the AW
Institution Address	(0008,0081)	3	Viewer/AngioViz Copied from original image Filmer Copied from original image if No Mix Mode Empty if Mix Mode = Patient or Mix Mode = Study
Station Name	(0008,1010)	3	Copied from original image except for AngioViz: - Station Name of the AW
Manufacturer's Model Name	(0008,1090)	3	Model Name of the AW
Software Versions	(0018,1020)	3	Copied from original image except for AngioViz: - SW Version of the AW

7.4.5 Common Image Entity Modules

7.4.5.1 General Image Module

This section specifies the Attributes that identify and describe an image within a particular series.

TABLE 7-8 GENERAL IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020,0013)	2	Generated
Patient Orientation	(0020,0020)	2C	See 7.4.5.1.1.1.
Content Date	(0008,0023)	2C	Derived from original image, except for AngioViz: Date of the creation of the AngioViz SCPT
Content Time	(0008,0033)	2C	Derived from original image, except for AngioViz: Time of the creation of the AngioViz SCPT
Image Type	(0008,0008)	3	See 7.4.5.1.1.2.

Source image Sequence	(0008,2112)	3	Viewer/AngioViz Set in Screen save image created by AW4.7 2D Multi-Modality Viewer Filmer Defined by the application that sends the image to the Filmer
>Referenced SOP Class UID	(0008,1150)	1C	SOP Class UID of the original image
>Referenced SOP Instance UID	(0008,1155)	1C	SOP Instance UID of the original image
>Referenced frame number	(0008,1160)	3	Not present, except for AngioViz: Multi-valued, as many values as number of frames used for the processing, i.e. (last_frame used - first-frame used + 1). The values are the frame numbers, i.e. first_frame\first_frame+1\first_frame+2…
>Distance Source to Detector	(0018,1110)	1C	Not present, except for AngioViz, Derived from original image
>Distance Source to Patient	(0018,1111)	3	Not present, except for AngioViz, Derived from original image
>Table Angle	(0018,1138)	3	Not present, except for AngioViz, Derived from original image
>Positioner Primary Angle	(0018,1510)	3	Not present, except for AngioViz, Derived from original image
>Positioner Secondary Angle	(0018,1511)	3	Not present, except for AngioViz, Derived from original image
Burned In Annotation	(0028, 0301)	3	YES
Image Comments	(0020,4000)	3	For XA modality, application defined (based on original value). For AngioViz, IMG_DESCRIPTION, or empty field Otherwise, not defined

7.4.5.1.1 General Image Attribute Descriptions

7.4.5.1.1.1 Patient Orientation

Derived from original if Screen Save Viewer/AngioViz.

Empty if Filmer

7.4.5.1.1.2 Image Type

If a third value is defined in the original DICOM Image Type, then the image type is set to:

DERIVED\SECONDARY\<Originaltype>\SCREEN SAVE

If no third value is defined in the original DICOM Image Type or if the Image Type is empty, then the image type is set to:

DERIVED\SECONDARY\SCREEN SAVE

7.4.5.1.1.3 Derivation Description

This field is not encoded

7.4.5.2 Image Pixel Module

This section specifies the Attributes that describe the pixel data of the image.

TABLE 7-9 IMAGE PIXEL MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	1 - if image is displayed in levels of gray 3 - if image is displayed in full colors
Photometric Interpretation	(0028,0004)	1	Set to MONOCHROME1 if the minimum pixels value 0=white and the element (0028, 0002) is set to the value 1. Set to MONOCHROME2 if the minimum pixels value 0=black and the element (0028, 0002) is set to the value 1. Set to RGB If the element (0028, 0002) is set to the value of 3.
Planar Configuration	(0028, 0006)	1C	0, if element (0028, 0002) is 3 Not present otherwise
Pixel Aspect Ratio	(0028, 0034)	1C	Derived from original image. Not present if equal to 1\1
Rows	(0028,0010)	1	Viewer/AngioViz If original image rows < 512, then 512 If 512<= original image rows <= 2560, then original image rows If 2560 < original image rows, then 2560 Filmer If original image rows < 256, then 256 If 256 <= original image rows <= 2560, then original image rows If 2560 < original image rows, then 2560

Columns	(0028,0011)	1	Viewer/AngioViz If original image columns < 512, then 512 If 512<= original image columns <= 2560, then original image columns If 2560 < original image columns, then 2560 Filmer If original image columns < 256, then 256 If 256 <= original image columns <= 2560, then original image columns If 2560 < original image columns, then 2560
Bits Allocated	(0028,0100)	1	Copy of original image *Bits Allocated* value or 8 if the element (0028, 0002) has value 3.
Bits Stored	(0028,0101)	1	Copy of original image *Bits Stored* value or 8 if the element (0028, 0002) has value 3
High Bit	(0028,0102)	1	Bits Stored - 1
Pixel Representation	(0028,0103)	1	Copy of original image *Pixel Representation* value or 0000h if the element (0028, 0002) has value 3
Pixel Data	(7FE0,0010)	1	Derived from original pixel data

7.4.5.2.1 Image Pixel Module Augmentation

This section specified the DICOM tags added for the Secondary Captures in the Image Pixel Module.

Pixel Spacing	(0028,0030)	3	Derived from the original image *Pixel Size* if defined in original image Not Present if *Pixel Size* is not defined in original image

7.4.6 Overlay Plan Modules

This module is not implemented for this IOD.

7.4.7 Lookup Table Modules

7.4.7.1 VOI LUT module

This section specifies the Attributes that describe the VOI LUT.

TABLE 7-10 VOI LUT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
VOI LUT Sequence	(0028, 3010)	3	Present when the image displayed uses a private VOI LUT or when present in the original image.
> LUT Descriptor	(0028, 3002)	1C	See 7.4.7.1.1

> LUT Data	(0028, 3006)	1C	The VOI LUT Data in the item. If the number of data is < 2^16-1, then the Value Representation is set to US. If the number of data is > 2^16-1, then the Value Representation is set to OW.
Window Center	(0028,1050)	3	Current *Window Center (WL)* + value of element (0x0028,0x1052) of original image if found in the original image header. This element is applicable only with *Photometric Interpretation* (0x0028,0x0004) value of MONOCHROME1 and MONOCHROME2 otherwise this element is *Not Present*
Window Width	(0028,1051)	1C	If *Window Width* (0x0028,0x1050) value is stored a window width value is stored in this element. This element is written only with *Photometric Interpretation* (0x0028,0x0004) value of MONOCHROME1 and MONOCHROME2 otherwise this element is *Not Present*

Note: When the VOI LUT Sequence is present in the image, there is always only one item present in this sequence.

7.4.7.1.1 Description of the LUT descriptor

The first value is set to the number of entries in the look up table. It is set to 0 if the number of entries is equal to 2^16.

The second value is set to the first input value mapped.

The third value is always 16.

If the possible range after application of rescale slope/rescale intercept is signed, the Value Representation is set to SS. Otherwise, the Value Representation is set to US.

7.4.7.2 Modality LUT module

This section specifies the Attributes that describe the Modality LUT.

TABLE 7-11 MODALITY LUT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Rescale Intercept	(0028,1052)	1C	If original image header contains *Rescale intercept* value then the SC image contains its copy or the element is *Not applicable* if the element (0028, 0002) has value 3 or, if neither condition can be satisfied this element is *Not Present.*
Rescale Slope	(0028,1053)	1C	If original image header contains *Rescale slope* value then the SC image contains its copy or the element is *Not applicable* if the element (0028, 0002) has value 3 or, if neither condition can be satisfied this element is *Not Present*.
Rescale Type	(0028,1054)	1C	If the element (0028, 0002) has value of 3 or if the image header does not contain *Rescale intercept*, this element is not present, otherwise it is set to US.

7.4.8 General Modules

7.4.8.1 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 7-12 SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	1.2.840.10008.5.1.4.1.1.7
SOP Instance UID	(0008,0018)	1	Generated from GE Based UID: <station configuration> and timestamp

Specific Character Set	(0008,0005)	1C	• If original field is not present:
			  • Set to ISO_IR 100 if some fields contain non-English characters.
			  • Otherwise the field is not generated
			• If original field is present, original value
			
			NOTE: Multi valued Specific Character Set with first value non-null and Specific Character Set ISO_IR 13 are not supported.

7.4.9 SC Modules

This Section describes SC Equipment, and Image Modules. These Modules contain Attributes that are specific to SC Image IOD.

7.4.9.1 SC Equipment Module

This Module describes equipment used to convert images into a DICOM format.

TABLE 7-13 SC IMAGE EQUIPMENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Conversion Type	(0008,0064)	1	WSD
Modality	(0008,0060)	3	Original if Screen Save Image Original if all Filmer data have the same defined modality, OT otherwise
Secondary Capture Device ID	(0018,1010)	3	Real station host name
Secondary Capture Device Manufacturer	(0018,1016)	3	GE MEDICAL SYSTEMS
Secondary Capture Device Manufacturer's Model Name	(0018,1018)	3	Filmer FILMER_5 Viewer / AngioViz VIEWER_5
Secondary Capture Device Software Version	(0018,1019)	3	Application defined (Software version build identifier)

7.4.9.2 SC Image Module

The table in this Section contains IOD Attributes that describe SC images.

TABLE 7-14 SC IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Date of Secondary Capture	(0018,1012)	3	Creation date of the Secondary Capture
Time of Secondary Capture	(0018,1014)	3	Creation time of the Secondary Capture

7.5 SC-PRIVATE DATA DICTIONARY

This section describes the private attributes of this IOD.

TABLE 7.5-1 PRIVATE CREATOR IDENTIFICATION: GEMS_IDEN_01

Attribute Name	Tag	Type	VR	VM
Full fidelity	(0009,xx01)	3	LO	1
Suite id	(0009,xx02)	3	SH	1
Product id	(0009,xx04)	3	SH	1
Image actual date	(0009,xx27)	3	SL	1
Service id	(0009,xx30)	3	SH	1
Mobile location number	(0009,xx31)	3	SH	1
Equipment UID	(0009,xxE3)	3	UI	1
Genesis Version - now	(0009, xxE6)	3	SH	1
Exam Record checksum	(0009, xxE7)	3	UL	1
Series Suite Id	(0009, xxE8)	3	SH	1
Actual series data time stamp	(0009, xxE9)	3	SL	1

TABLE 7.5-3 PRIVATE CREATOR IDENTIFICATION: GEMS_RELA_01

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

TABLE 7.5-4 PRIVATE CREATOR IDENTIFICATION: GEMS_SERS_01

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

TABLE 7.5-5 PRIVATE CREATOR IDENTIFICATION: GEMS_IMPS_01

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

TABLE 7.5-6 PRIVATE CREATOR IDENTIFICATION: GEMS_PARM_01

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

TABLE 7.5-7 PRIVATE CREATOR IDENTIFICATION: DLX_SERIE_01

Only in AngioViz

Attribute Name	Tag	Type	VR	VM
Angle value 1	(0019,xx01)	3	DS	1
Angle value 2	(0019,xx02)	3	DS	1
Angle value 3	(0019,xx03)	3	DS	1
Table vertical position	(0019,xx21)	3	DS	1
Table longitudinal position	(0019,xx22)	3	DS	1
Table lateral position	(0019,xx23)	3	DS	1

TABLE 7.5-8 PRIVATE CREATOR IDENTIFICATION: GEMS_DL_IMG_01

Attribute Name	Tag	Type	VR	VM
Acquisition plane	(0019,xxDE)	3	CS	1
Only for AngioViz				
table cradle tilt angle	(0019,xxBC)	3	FL	1
table rotation angle	(0019,xxEA)	3	FL	1
Table X Position to Isocenter	(0019,xxEB)	3	FL	1
Table Y Position to Isocenter	(0019,xxEC)	3	FL	1
Table Z Position to Isocenter	(0019,xxED)	3	FL	1

table head tilt angle	(0019,xxEE)	3	FL	1
patient position per image	(0019,xxC7)	3	CS	1

TABLE 7.5-9 PRIVATE CREATOR IDENTIFICATION: GEMS_INTVL_FLOW_01
Only in AngioViz

Attribute Name	Tag	Type	VR	VM
AngioViz Processing Mode	(0033,xx01)	3	CS	1
AngioViz Mask Frame	(0033,xx02)	3	IS	1
AngioViz First Frame	(0033,xx03)	3	IS	1
AngioViz Last Frame	(0033,xx04)	3	IS	1
AngioViz Contrast Agent	(0033,xx05)	3	CS	1
AngioViz Saturation Percentage	(0033,xx06)	3	FL	1
AngioViz Time Zero Frame	(0033,xx07)	3	IS	1
AngioViz Maximum Time	(0033,xx08)	3	FL	1
AngioViz Algorithm version	(0033,xx09)	3	LO	1

Note: These elements are present in the generated Secondary Capture if these elements were present in the original images

8. ENHANCED SR INFORMATION OBJECT IMPLEMENTATION

8.1 INTRODUCTION

This section specifies the use of the DICOM Enhanced SR IOD to represent the information included in Enhanced SR produced by this implementation. Corresponding attributes are conveyed using the module construct.

The enhanced SR is a way for the Filmer to generate Electronic Film and reload it, using DICOM standard.

The contents of this section are:

8.2- ENHANCED SR Entity-Relationship Model

8.3- ENHANCED SR-IOD MODULE TABLE

8.4- ENHANCED SR -INFORMATION MODULE DEFINITIONS

8.5- ENHANCE SR – PRIVATE DATA DICTIONARY

8.6- ENHANCE SR – TEMPLATE IDENTIFICATION

8.7- ENHANCE SR - Private Coded Entries

Note: The Enhanced DICOM SR produced by this implementation is also named: "Electronic Film"

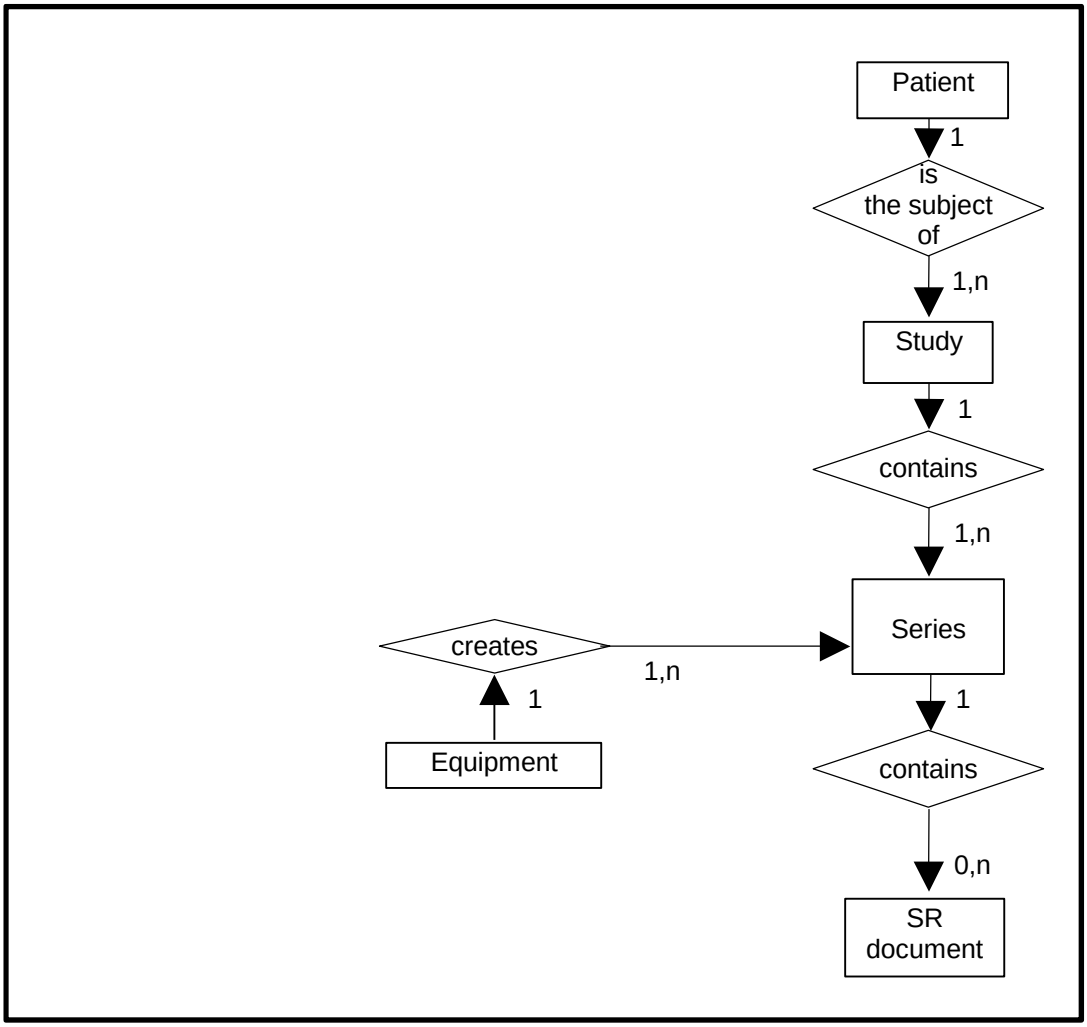
8.2 ENHANCED SR ENTITY-RELATIONSHIP MODEL

The Entity-Relationship diagram for the ENHANCED SR interoperability schema is shown in **Illustration 8.2.1.** 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 8.2-1
ENHANCED SR IMAGE ENTITY RELATIONSHIP DIAGRAM



8.2.1 ENTITY DESCRIPTIONS

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

8.2.2 Advantage Workstation 4.7 Mapping of DICOM entities

TABLE 8-1 MAPPING OF DICOM ENTITIES TO ADVANTAGE WORKSTATION 4.7 ENTITIES

DICOM	Advantage Workstation 4.7 Entity
Patient	Patient
Study	Exam
Series	Series
Equipment	Equipment
SR document	SR document

8.3 ENHANCED SR-IOD MODULE TABLE

Within an entity of the DICOM ENHANCED SR 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 8.3.1 identifies the defined modules within the entities which comprise the DICOM SR IOD. Modules are identified by Module Name.

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

TABLE 8-2 ENHANCED SR DOCUMENT IOD MODULES

Entity Name	Module Name	Reference
Patient	Patient	**8.4.1.1**
	Specimen Identification	**N/A**
	Clinical Trial Subject	**N/A**
Study	General Study	**9.4.2.1**
	Patient Study	**8.4.2.2**
	Clinical Trial Study	**N/A**
Series	SR document Series	**8.4.3.1**
	Clinical Trial Series	**N/A**
Equipment	General Equipment	**8.4.4.1**
Document	SR document General	**8.4.5.1**
	SR document Content	**8.4.5.2**
	SOP Common	**8.4.6.1**

8.4 ENHANCED SR -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 ENHANCED SR 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).

An Electronic Film is a DICOM ENHANCED SR IOD generated by the application 'Filmer' of Advantage Workstation 4.7.

In the following chapter, all new study, series and image instance UID are generated from Filmer base UID: **1.2.840.113619.2.377**

Note: Elements not listed are not supported

8.4.1 Common Patient Entity Modules

8.4.1.1 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 8-3 PATIENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	Patient name of first referenced image if No Mix Mode or Mix Mode = Study User defined if Mix Mode = Patient
Patient ID	(0010,0020)	2	Patient ID of first referenced image if No Mix Mode or Mix Mode = Study Function of pid and time if Mix Mode = Patient
Issuer of Patient ID	(0010,0021)	3	Not filled
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not filled
Patient's Birth Date	(0010,0030)	2	Patient's Birth Date of first referenced image if No Mix Mode or Mix Mode = Study Empty if Mix Mode = Patient
Patient's Sex	(0010,0040)	2	Patient's Sex of first referenced image if No Mix Mode or Mix Mode = Study Empty if Mix Mode = Patient
Other Patient IDs	(0010,1000)	3	Not filled
Other Patient Ids Sequence	(0010,1002)	3	Not filled

8.4.2 Common Study Entity Modules

The following Study IE Modules are common to all Composite Image IODs that reference the Study IE.

8.4.2.1 General Study Module

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

TABLE 8-4 GENERAL STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Type	Notes
Study Instance UID	(0020,000D)	1	Original if No Mix Mode Generated if Mix Mode = Patient or Mix Mode = Study
Study Date	(0008,0020)	2	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	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	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	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	Study Description of first referenced image (Empty if does not exist) if No Mix Mode User defined if Mix Mode = Patient or Mix Mode = Study
Study ID	(0020,0010)	2	Study ID of first referenced image (Empty if does not exist) if No Mix Mode Generated if Mix Mode = Patient or Mix Mode = Study

8.4.2.2 Patient Study Module

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

TABLE 8-5 PATIENT STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Patient's Age	(0010,1010)	3	Patient's Age of first referenced image if No Mix Mode Not present if Mix Mode = Patient or Mix Mode = Study
Patient's Size	(0010,1020)	3	Patient's Size of first referenced image if No Mix Mode Not present if Mix Mode = Patient or Mix Mode = Study
Patient's Weight	(0010,1030)	3	Patient's Weight of first referenced image if No Mix Mode Not present if Mix Mode = Patient or Mix Mode = Study

8.4.3 SR Document Series Entity Modules

The following SR Document Series IE Modules are common to all Composite Image IODs that reference the SR Document Series IE.

8.4.3.1 SR Document Series Module

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

TABLE 8-6 SR DOCUMENT SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	SR
Series Instance UID	(0020,000E)	1	Generated
Series Number	(0020,0011)	1	Generated
Referenced Performed Procedure Step Sequence	(0008,1111)	2	Empty
Series Description	(0008,103E)	3	User defined, filled by default with “AW Electronic Film”
Series Date	(0008,0021)	3	Not present
Series Time	(0008,0031)	3	Not present

Note: The series description is also present in the content of the SR. (See AW41 EF TID template description in section 7.6)

8.4.4 Common Equipment Entity Modules

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

8.4.4.1 General Equipment Module

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

TABLE 8-7 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
Station Name	(0008,1010)	3	Host name provided on the platform
Manufacturer's Model Name	(0008,1090)	3	FILMER_5
Software Versions	(0018,1020)	3	Application defined (Software version build identifier)

8.4.5 SR document Entity Modules

The following SR document Modules are common to all Composite Image IODs that reference the Image IE.

8.4.5.1 SR document General

This section specifies the attributes that identify and describe the SR document.

TABLE 8-8 SR DOCUMENT GENERAL MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020, 0013)	1	Generated
Completion flag	(0040, A491)	1	COMPLETE
Verification flag	(0040, A493)	1	VERIFIED
Content Date	(0008, 0023)	1	Generated at the date when the Electronic film is created
Content Time	(0008, 0033)	1	Generated at the time when the Electronic film is created
Verifying Observer Sequence	(0040,A073)	1C	
> Verifying Observer Name	(0040,A075)	1	Name of the user that currently is logged on the station
> Verifying Observer Code Sequence	(0040,A088)	2	Empty
> Verifying Organization	(0040,A027)	1	Institution Name (0008,0080) of General Equipment Module
> Verifying Date Time	(0040,A030)	1	Generated at the time when the Electronic film is created
Performed Procedure Code Sequence	(0040, A372)	2	Empty
Current Requested Procedure Evidence Sequence	(0040,A375)	1C	List of images from all studies considered as input of the Electronic Film

> 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)

8.4.5.2 SR Document Content Module

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

TABLE 8-9 SR DOCUMENT CONTENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Content Template Sequence	(0040, A504)	1C	Template that describes the content of the content item
> Mapping Resource	(0008, 0105)	1	PRIVATE
> Template Identifier	(0040, DB00)	1	AW41 EF TID
Content Sequence	(0040, A730)	1C	Content of the DICOM SR
Value Type	(0040, A040)	1	CONTAINER
Concept Name code Sequence	(0040, A043)	1C	
> Code Value	(0008, 0100)	1C	AWVF-0001
> Coding Scheme Designator	(0008, 0102)	1C	99GEMS
> Code Meaning	(0008, 0104)	1C	Electronic Film Presentation
Continuity Of Content	(0040, A050)	1C	SEPARATE

8.4.6 General Modules

The SOP Common Module is mandatory for all DICOM IODs.

8.4.6.1 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 8-10 SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	1.2.840.10008.5.1.4.1.1.88.22
SOP Instance UID	(0008,0018)	1	Generated from GE Based UID, <station configuration> and timestamp.

Specific Character Set	(0008,0005)	1C	• 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.

8.5 ENHANCE SR – PRIVATE DATA DICTIONARY

This section describes the private attributes of this IOD.

TABLE 8-11 PRIVATE CREATOR IDENTIFICATION: GEMS_ADWSOFT_DPO1

Attribute Name	Tag	Type	VR	VM	Attribute Description
Private Entity Launch Command	(0039,xx95)	3	LO	1	Name of application to launch

8.6 ENHANCE SR – TEMPLATE IDENTIFICATION

This section describes the Electronic Film Presentation Template

This template describes how the SR Document Content Module of the Enhanced SR Information Object Definition is constrained for the purpose of implementing the Electronic Film. This template is non-standard, Mapping Resource (0008,0105) = PRIVATE, Template Identifier (0040,DB00) = AW41 EF TID.

8.6.1 TID Electronic Film Presentation

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV(AWVF-0001,99GEMS, "Electronic Film Presentation")	1	M		Root Node, SEPARATE
2	>	HAS OBS	INCLUDE	DTID (1003) Person observer	1	M		

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
		CONTEXT		identifying attributes				
3	>	CONTAINS	INCLUDE	ETID Page Presentation	1-n	U		
4	>	HAS CONCEPT MOD	CODE	EV (113011, DCM, "Document Title Modifier")	1	MC		Present and equal to (0008,103E)

8.6.2 TID Page Presentation

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		-	CONTAINER	EV(AWVF-0002, 99GEMS, “Page Presentation”)	1	M		SEPARATE
2	>	CONTAINS	INCLUDE	ETID Slot Group Presentation	1-n	U		

8.6.3 TID Slot Group Presentation

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		-	CONTAINER	EV(AWVF-0003, 99GEMS, "Slot Group Presentation")	1	M		SEPARATE
2	>	CONTAINS	INCLUDE	ETID Geometry	1	M		
3	>	CONTAINS	INCLUDE	ETID Slot Presentation	1-n	U		

8.6.4 TID Slot Presentation

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		-	CONTAINER	EV(AWVF-0004, 99GEMS, "Slot Presentation")	1	M		SEPARATE
2	>	CONTAINS	INCLUDE	ETID Geometry	1	M		
3	>	CONTAINS	TEXT	EV(AWVF-0009, 99GEMS, "Notepad")	1	UC	IF rows 4 and 5 absent	
4	>	CONTAINS	IMAGE		1	UC	IF rows 3 and 5 absent	
5	>	-	INCLUDE	ETID Cine Sequence	1	UC	IF rows 3 and 4 absent	

8.6.5 TID Cine Sequence

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		CONTAINS	NUM	EV(AWVF-0010, 99GEMS, "Time between cine frames")	1	M		UNITS=EV(s, UCUM,”second”)
2		CONTAINS	IMAGE		1-n	M		

8.6.6 TID Geometry

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		-	NUM	EV(AWVF-0005, 99GEMS, "Relative horizontal position of top left corner")	1	M		UNITS=EV(1, UCUM, ”ratio”)
2		-	NUM	EV(AWVF-0006, 99GEMS, "Relative vertical position of top left corner")	1	M		UNITS=EV(1, UCUM, ”ratio”)
3		-	NUM	EV(AWVF-0007, 99GEMS, "Relative horizontal size")	1	M		UNITS=EV(1, UCUM, ”ratio”)
4		-	NUM	EV(AWVF-0008, 99GEMS, "Relative vertical size")	1	M		UNITS=EV(1, UCUM, ”ratio”)

8.7 ENHANCE SR - PRIVATE CODED ENTRIES

The private coded entries that are required for implementing the Electronic Film are listed below (these are referred to in the Electronic Film Presentation Template).

TABLE 8-12 PRIVATE CODED ENTRIES: 99GEMS

Coded Entries		
Coding Scheme Designator (0008,0102)	**Code Value (0008,0100)**	**Code Meaning (0008,0104)**
99GEMS	AWVF-0001	Electronic Film Presentation
99GEMS	AWVF-0002	Page Presentation
99GEMS	AWVF-0003	Slot Group Presentation
99GEMS	AWVF-0004	Slot Presentation
99GEMS	AWVF-0005	Relative horizontal position of top left corner
99GEMS	AWVF-0006	Relative vertical position of top left corner
99GEMS	AWVF-0007	Relative horizontal size
99GEMS	AWVF-0008	Relative vertical size
99GEMS	AWVF-0009	Notepad
99GEMS	AWVF-0010	Time between cine frames

9. KEY OBJECT SELECTION INFORMATION OBJECT IMPLEMENTATION

9.1 INTRODUCTION

This section specifies the use of the DICOM Key Object Selection IOD to represent the information included in KOS produced by this implementation. Corresponding attributes are conveyed using the module construct.

KOS: Key Object Selection - Is used to flag significant images. The radiologist selects Key Images, and creates appropriate Notes. The referring physician views the Key Image Note prepared by radiologist.

The Viewer works on original images, while the Filmer can concatenate in the same series derived images coming from multiple applications and series.

Therefore the DICOM mapping reflecting these differences is different.

The contents of this section are:

9.2 - KEY OBJECT SELECTION Entity-Relationship Model

9.3 - KEY OBJECT SELECTION-IOD MODULE TABLE

9.4 - KEY OBJECT SELECTION -INFORMATION MODULE DEFINITIONS

9.5 - KEY OBJECT SELECTION – TEMPLATE IDENTIFICATION

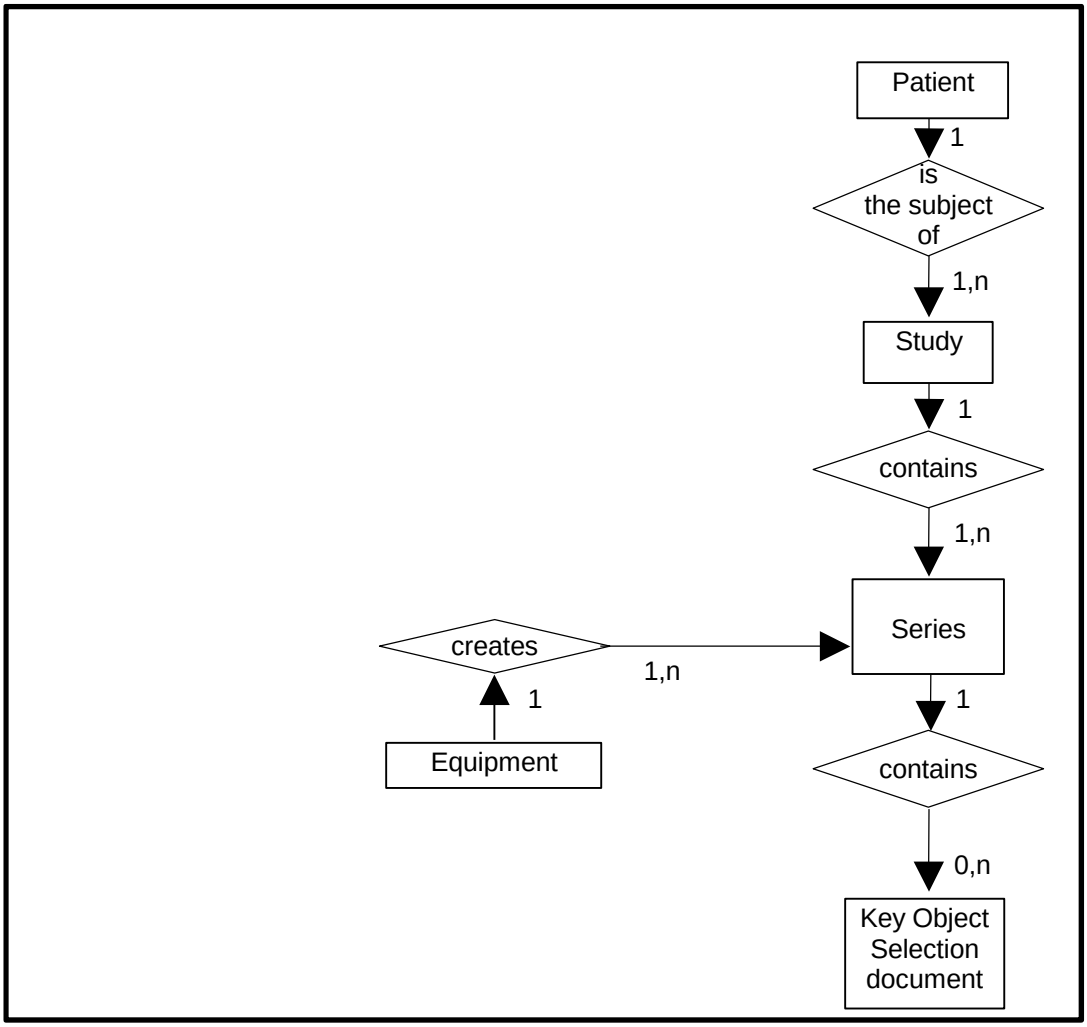
9.2 KEY OBJECT SELECTION ENTITY-RELATIONSHIP MODEL

The Entity-Relationship diagram for the Key Object Selection interoperability schema is shown in **Illustration 9.2.1.** 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 9.2-1
KEY OBJECT SELECTION IMAGE ENTITY RELATIONSHIP DIAGRAM



9.2.1 ENTITY DESCRIPTIONS

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

9.2.2 Advantage Workstation 4.7 Mapping of DICOM entities

TABLE 9-1 MAPPING OF DICOM ENTITIES TO ADVANTAGE WORKSTATION 4.7 ENTITIES

DICOM	Advantage Workstation 4.7 Entity
Patient	Patient
Study	Exam
Series	Series
Equipment	Equipment
Key Object Selection document	Key Object Selection document

9.3 KEY OBJECT SELECTION-IOD MODULE TABLE

Within an entity of the DICOM KEY OBJECT SELECTION 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 9.3.1 identifies the defined modules within the entities which comprise the DICOM KEY OBJECT SELECTION IOD. Modules are identified by Module Name.

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

TABLE 9-2 KEY OBJECT SELECTION DOCUMENT IOD MODULES

Entity Name	Module Name	Reference
Patient	Patient	**9.4.1.1**
	Specimen Identification	**N/A**
	Clinical Trial Subject	**N/A**
Study	General Study	**9.4.2.1**
	Patient Study	**9.4.2.2**
	Clinical Trial Study	**N/A**
Series	Key Object Document Series	**9.4.3.1**
	Clinical Trial Series	**N/A**
Equipment	General Equipment	**9.4.4.1**
Document	Key Object Document	**9.4.5.1**
	SR document Content	**10.4.5.2**
	SOP Common	**9.4.6.1**

9.4 KEY OBJECT SELECTION -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 KEY OBJECT SELECTION 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 Key Object Selection IOD described here is the one generated by the applications 'Viewer' and 'Filmer' of Advantage Workstation 4.7.

In the following chapter, all new study, series and image instance UID are generated from AW4.7 2D Multi-Modality Viewer base UID: **1.2.840.113619.2.378**, and AW4.7 Filmer base UID: **1.2.840.113619.2.377**

Also note that elements not listed in following modules are not supported.

9.4.1 Common Patient Entity Modules

9.4.1.1 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 9-3 PATIENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	Viewer Original Filmer Patient name of first referenced image if No Mix Mode or Mix Mode = Study User defined if Mix Mode = Patient
Patient ID	(0010,0020)	2	Viewer Original Filmer Patient ID of first referenced image if No Mix Mode or Mix Mode = Study Function of pid and time if Mix Mode = Patient
Issuer of Patient ID	(0010,0021)	3	Not filled
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not filled
Patient's Birth Date	(0010,0030)	2	Viewer Original Filmer Patient's Birth Date of first referenced image if No Mix Mode or Mix Mode = Study Empty if Mix Mode = Patient
Patient’s Birth Time	(0010,0032)	3	Viewer Original if present, empty otherwise Filmer Empty
Patient's Sex	(0010,0040)	2	Viewer Original Filmer Patient's Sex of first referenced image if No Mix Mode or Mix Mode = Study Empty if Mix Mode = Patient
Other Patient IDs	(0010,1000)	3	Not filled
Other Patient Ids Sequence	(0010,1002)	3	Not filled