Converting the DICOM Presentation State to AIM Version 3.0

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1. Scope and Purpose

This document provides technical guidance on how to convert a Digital Imaging and Communications in Medicine (DICOM) Presentation State object [1] to an instance of Annotation and Image Markup (AIM) [2].

This document can be used by other developers to create a software tool to convert a DICOM presentation object to an AIM XML document or AIM DICOM SR object, using the provided AIM library [2].

2. Overview

AIM is used to express and capture image annotation and markup information relevant to images. An annotation can contain explanatory or descriptive information that is generated by humans or machines; this information directly relates to the content of a referenced image or images. An annotation describes the meaning of pixel information in images. Image markups include the graphical symbols or textual descriptions associated with an image. They can be used to show textual information and regions-of-interest (graphical drawing) that are next to, or more typically, overlaid upon, an image. Information from annotations and markups are used to populate an AIM instance via the AIM software library for the purpose of generating AIM DICOM SR objects and AIM native XML documents.

A DICOM Presentation State captures image manipulations, such as window-level, pan, zoom, text and graphics placed on the image, flip and rotate, and applied to image. However, this information does not include semantic meaning provided by a human or machine (e.g. Computer Aided Detection). The AIM information model provides a mechanism to capture both graphical markups and explanatory information.

In the real world, imaging vendors capture image manipulations in DICOM Presentation State objects. They may want to convert these DICOM objects to AIM XML documents or AIM DICOM SR objects. This document explains how imaging software developers can convert a DICOM Presentation State object to an AIM instance.

2.1. Technology Stack

Technology	Remarks
Annotation and Image Markup	A UML Information Model
Digital Imaging and Communications in Medicine	A Information Model for Medical Related Images
Standard C++	Microsoft Visual Studio 2008
XMI	Enterprise Architect 4.5

2.2. Background Knowledge and Assumption

Readers are assumed to have a good knowledge about DICOM, particularly the DICOM Presentation State, and the AIM information model. Additional DICOM information can be found in the DICOM Standard Part 3, *Softcopy Presentation State Information Object Definitions*. Information about the AIM model can be found in the AIM Project Report [2].

2.3. DICOM Presentation State

2.3.1. Presentation State Information Entity

A DICOM Presentation State Information Entity provides a standard approach for a software developer to capture a device-independent grayscale space (P-Value) and color space (PCS-Value) along with graphical annotations. These graphical annotations contain spatial coordinates and grayscale contrast transformations that can be applied to the pixel data in the referenced image(s) for display purposes.

2.3.2. Grayscale Softcopy Presentation State

The Grayscale Softcopy Presentation State (GSPS) includes grayscale space in P-values, grayscale contrast transformations of modality and VOI LUT [1], multi-frame images mask subtraction, section of an image to be displayed with zoom, rotation and/or flip, and graphical annotations, text and overlays.

2.3.3. Color Softcopy Presentation State

Color Softcopy Presentation State (CSPS) can include color space in PCS-Values, color contrast transformations from device-dependent color to PCS-Value using ICC profile, section of an image to be displayed with zoom, rotation and/or flip, and graphical annotations, text and overlays.

2.3.4. Pseudo-Color Softcopy Presentation State

Pseudo-Color Softcopy Presentation State (PCSPS) can include color space in PCS-Values, grayscale contrast transformations of modality and VOI LUT, a color palette to map the transformed grayscale values to pseudo-color, mask subtraction for multi-frame image, section of an image to be displayed with zoom, rotation and/or flip, and graphical annotations and text overlays.

2.3.5. Capturing GSPS, CSPS and PCSPS in the AIM Information Model

AIM information model has a class called PresentationState that captures a SOP Instance UID of a referenced DICOM Presentation State object. The Presentation State object(s) have a collection of information stated in sections 2.3.2, 2.3.3 and 2.3.4 above. This information can be applied to the related image(s) referenced in the Presentation State object.

2.3.6. Missing Information from DICOM Presentation State

The DICOM Presentation State does not have all of the information required by the AIM information model. Software developers shall provide missing information to the AIM information model.

2.4. AIM Model

2.4.1. Overview

The AIM information model is described using an UML class diagram [3]. The model is used to express and capture image annotation and markup information relevant to images. Before you transform data from DICOM Presentation State to the AIM model, it is very important to fully understand the AIM model.

The AIM 3.0 information model consists of 45 classes and 248 attributes. Most of AIM classes are optional. Three classes required for a valid AIM Image Annotation instance are ImageAnnotation, Person and ImageReference.

2.4.2. Types of AIM Instances

An AIM instance can be of type ImageAnnotation or AnnotationOfAnnotation. Converting the DICOM Presentation State to an AIM instance can only be of type ImageAnnotation.

3. Converting DICOM Presentation State to AIM Instance

This section explains how to map information from the DICOM Presentation State to the AIM information model.

3.1.1. Converting GSPS to AIM 3.0

Table 3.1.1-1 depicts information in DICOM GSPS that can be captured in the AIM model.

GSPS Capabilities	AIM Model
Grayscale space in P-Value	Not applicable
Grayscale contrast transformations of modality and VOI LUT	Not applicable
Multi-frame images mask subtraction	Not applicable
Section of an image to be display with zoon, rotation and/or flip	Not applicable
Graphical annotations, text and overlays	Captured graphical annotations and text

Table 3.1.1-1. AIM Information Model and GSPS Capabilities

Table 3.1.1-2 depicts AIM classes that can be mapped to Grayscale Softcopy Presentation State IOD Module, see DICOM part 3 (2009). In order to create a correct AIM instance, there are classes that must be created, namely ImageAnnotation, Person, DICOMImageReference, ImageStudy, ImageSeries, and Image.

AIM Class Name	DICOM GSPS IOD MODULES
Circle	Graphic Annotation (C.10.5)
DICOMImageReference	Not applicable but must be generated
Ellipse	Graphic Annotation (C.10.5)
Image	Presentation State Relationship (C.11.11)
ImageAnnotation	Not applicable but must be generated
ImageSeries	General Series (C.7.3.1)
ImageStudy	General Study (C.7.2.1)
MultiPoint	Graphic Annotation (C.10.5)
Person	Patient (C.7.1.1)
Point	Graphic Annotation (C.10.5)
Polyline	Graphic Annotation (C.10.5)
PresentationState	SOP Common Module (C.12.1)
TextAnnotation	Graphic Annotation (C.10.5)
TwoDimensionSpatialCoordinate	Graphic Annotation (C.10.5)

Table 3.1.1-2. AIM Information Model and GSPS Capabilities

3.1.1.1. AIM ImageAnnotation

DICOM GSPS does not have information for the AIM ImageAnnotation class. This is required information for an AIM instance. Developers must provide the information in table 3.1.1.1-1.

AIM ImageAnnotaiton	Information Required	Required	Appropriate Values
cagridId	Integer value used to identify, name, or characterize the nature, properties, or contents of a thing.	Yes	0
aimVersion	The version of the AIM model used by this annotation.	Yes	Library generates default
comment	Free text about the annotation not intended for rendering on the image.	No	
dateTime	Date and Time (Julian) that the annotation was created.	Yes	Valid date & time

name	Human readable colloquial name of the annotation not guaranteed to be unique.	Yes	string
uniqueIdentifier	A DICOM (style) unique identifier for this particular instance of an annotation. Used to reference a specific annotation.	Yes	New DICOM UID (ISO 8824)
codeValue	codeValue represents the identifier of the particular term in a coded vocabulary. Should be unique within a given coding scheme.	Yes	code sequence value
codeMeaning	The human understandable meaning of the coded value.	Yes	Code sequence meaning
codingSchemeDesignator	The designator of the vocabulary from which the term was selected.	Yes	Coding scheme designator
codingSchemeVersion	Identifies the version of the coding scheme used.	No	
precedentReferencedAnnotationUID	A Digital Imaging and Communication in Medicine (DICOM) (style) unique identifier for referencing earlier instance of AIM annotation.	No	DICOM UID

Table 3.1.1.1-1. AIM ImageAnnotation and External Information Required

3.1.1.2. Converting GSPS Patient to AIM Person

Table 3.1.1.2-1 depicts information in the DICOM GSPS Patient module (C.7.1.1, DICOM 2009) that can be captured in the AIM model.

AIM Person	**Patient Module Attributes**	**Required**	**Appropriate Values**
cagridId	Integer value used to identify, name, or characterize the nature, properties, or contents of a thing.	Yes	0
name	Patient's Name (0010,0010)	Yes	String
id	Patient ID (0010,0020)	Yes	String
birthDate	Patient's Birth Date (0010,0030)	No	Valid date
sex	Patient's Sex (0010,0040)	No	Valid value for DICOM tag (0010,0040)
ethnicGroup	Ethnic Group (0010,2160)	No	Valid value for DICOM tag (0010,0040)

Table 3.1.1.2-1. AIM Person and GSPS Patient Module

3.1.1.3. AIM DICOMImageReference

Table 3.1.1.3-1 depicts information in DICOM GSPS that can be captured in the AIM model.

AIM Person	**Information Required**	**Required**	**Appropiate Values**
cagridId	Integer value used to identify, name, or characterize the nature, properties, or contents of a thing.	Yes	0

Table 3.1.1.3-1. AIM DICOMImageReference and External Information Required

3.1.1.4. Converting GSPS General Study to AIM ImageStudy

Table 3.1.1.4-1 depicts information in DICOM GSPS General Study module (C.7.2.1, DICOM 2009) that can be captured in the AIM model.

AIM ImageStudy	General Study Module Attributes	Required	Appropriate Values
cagridId	Integer value used to identify, name, or characterize the nature, properties, or contents of a thing.	Yes	0
instanceUID	Study Instance UID (0020,000D)	Yes	
startDate	Study Date (0008,0020)	Yes	
startTime	Study Time (0008,0030)	Yes	

Table 3.1.1.4-1. AIM ImageStudy and DICOM GSPS General Study Module

3.1.1.5. Converting GSPS General Series to AIM ImageSeries

Table 3.1.1.5-1 depicts information in DICOM GSPS General Series module (C.7.3.1, DICOM 2009) that can be captured in the AIM model.

AIM ImageSeries	General Series Module Attributes	Required	Appriopriate Values
cagridId	Integer value used to identify, name, or characterize the nature, properties, or contents of a thing.	Yes	0
instanceUID	Series Instance UID (0020,000E)	Yes	

Table 3.1.1.5-1. AIM ImageStudy and DICOM GSPS General Series Module

3.1.1.6. Converting GSPS Presentation State Relationship to AIM Image

Table 3.1.1.6-1 depicts information in the DICOM GSPS Presentation State Relationship module (C.11.11, DICOM 2009) that can be captured in the AIM model. The developer examines the Reference Image Sequence (0008,1140) that may contain one or more Image SOP Instance Reference Macro Attributes (Table 10-3) and one SOP Instance Reference Macro Attributes (Table 10-11).

AIM Image	General Series Module Attributes	Required	Appropruiate Values
cagridId	Integer value used to identify, name, or characterize the nature, properties, or contents of a thing.	Yes	0
sopIinstanceUID	Referenced SOP Instance UID (0008,1155)	Yes	

Table 3.1.1.6-1. AIM ImageStudy and DICOM GSPS Presentation State Relationship Module

3.1.1.7. Converting GSPS Graphical Annotation to AIM TextAnnotation, MultiPoint and TwoDimensionSpatialCoordinate

DICOM GSPS Graphical Annotation module (C.10.5, DICOM 2009) may contain textual descriptions and graphical drawings. The information can be captured in the AIM model. This section explains how to extract textual information from GSPS Graphical Annotation module and store the information in AIM classes.

First, textual information shall be extracted if the information exists in the Graphical Annotation module. It is stored in the TextAnnotation class. The coordinate is stored in two classes, MultiPoint and TwoDimensionSpatialCoordinate. The two classes indicate where the text value can be displayed.

Table 3.1.1.7-1 captures the text value. The AIM model can have multiple instances of TextAnnotation.

AIM TextAnnotation	Graphic Annotation Module Attributes	Required	Appropriate Values
cagridId	Integer value used to identify, name, or characterize the	Yes	0

	nature, properties, or contents of a thing.		
font	Not applicable. Enter empty	No	
fontColor	Not applicable. Enter empty	No	
fontEffect	Not applicable. Enter empty	No	
fontSize	Not applicable. Enter empty	No	
fontStyle	Not applicable. Enter empty	No	
text	Unformatted Text Value (0070,0006)	Yes	String
textJustify	Bounding Box Text Horizontal Justification (0070,0012) if TLHC (0070,0010) is present.	No	
fontOpacity	Not applicable. Enter empty	No	

Table 3.1.1.7-1. AIM TextAnnotation

Every instance of TextAnnotation must have an instance of Multipoint, which must also have an instance of TwoDimensionSpatialCoordinate. Table 3.1.1.7-2 only requires a unique integer value for shapeIdentifier that applies to all TextAnnotation, MultiPoint, Point, Circle, Ellipse and Polyline instances within an AIM instance.

AIM MultiPoint	**Graphic Annotation Module Attributes**	**Required**	**Appropriate Values**
cagridId	Integer value used to identify, name, or characterize the nature, properties, or contents of a thing.	Yes	0
lineColor	Not applicable. Enter empty	No	
lineOpacity	Not applicable. Enter empty	No	
lineStyle	Not applicable. Enter empty	No	
lineThickness	Not applicable. Enter empty	No	
includeFlag	Value is always true.	Yes	True
shapeIdentifier	A unique Integer number within a collection of text and graphical markups	Yes	0, 1, 2, etc.

Table 3.1.1.7-2. AIM MultiPoint

The current TwoDimensionSpatialCoordinate does not have explicit support for the enumerated value of "PIXEL" or "DISPLAY", as defined in DICOM standard, to indicate how a given coordinate shall be used. The x and y coordinates contain a value of type Double. If extracted values are between 0.0 and 1.0 for x and y, they are in the "DISPLAY" coordinate. Otherwise, the values are in the "PIXEL" space.

The x and y coordinates can be extracted from either the Bounding Box Top Left Hand Corner (0070,0010) or Anchor Point (0070,0014).

AIM TwoDimensionSpatialCoordinate	**Graphic Annotation Module Attributes**	**Required**	**Appropriate Values**
cagridId	Integer value used to identify, name, or characterize the nature, properties, or contents of a thing.	Yes	0
coordinateIndex	0	Yes	0
imageReferenceUID	Referenced SOP Instance UID (0008,1155)	Yes	
referencedFrameNumber	Referenced Frame Number (0008,1160)	Yes	0, 1, etc
x	Bounding Box Annotation Units (0070,0003) or Anchor Point (0070,0014). The row offset of the pixel from TLHC.	Yes	
y	Bounding Box Annotation Units (0070,0003) or Anchor Point (0070,0014). The column offset of the pixel from TLHC.	Yes	

Table 3.1.1.7-3. AIM TwoDimensionSpatialCoordinate

3.1.1.8. Converting GSPS Graphical Annotation to AIM MultiPoint, Point, Circle, Ellipse, Polyline and TwoDimensionSpatialCoordinate

DICOM GSPS Graphical Annotation module (C.10.5, DICOM 2009) may contain textual descriptions and graphical drawings. The information can be captured in the AIM model. This section explains how to extract graphical drawings from the GSPS Graphical Annotation module and store the information in AIM classes.

The graphic type stored in AIM model can be of type MultiPoint, Point, Circle, Ellipse and Polyline. DICOM 2009 graphic type is mapped to AIM graphic type as shown in Table 3.1.1.8-1.

AIM Graphic Type	DICOM 2009 Graphic Type
POINT	POINT
POLYLINE	POLYLINE
MULTIPOINT	INTERPOLATED
CIRCLE	CIRCLE
ELLIPSE	ELLIPSE

Table 3.1.1.8-1. Graphic Type Mapping

DICOM Presentation State objects may contain one or more graphic types. If all graphic types are referenced to the same anatomical location, there will be only one AIM instance required. However, if graphical drawings do not share the same region of interest, there must be multiple AIM instances created for each region of interest. For example, an abdomen CT image has two graphical drawings. First, a polyline (closed polygon) covers a liver area. Second, a line measures a region on a kidney. Since the two graphical drawings were done on different parts of the anatomy, there must be two AIM instances created for each graphical drawing.

Graphic information shall be extracted if the information exists in the Graphical Annotation module. It is stored in MultiPoint, Point, Circle, Ellipse or Polyline class. These classes mark a region of interest. Graphic data contains one or more points corresponding to a class. These points are stored in TwoDimensionSpatialCoordinate. Therefore, every graphic type must have one or more instances of type TwoDimensionSpatialCoordinate.

AIM MultiPoint	Graphic Annotation Module Attributes	Required
cagridId	Integer value used to identify, name, or characterize the nature, properties, or contents of a thing.	Yes
lineColor	Not applicable. Enter empty	No
lineOpacity	Not applicable. Enter empty	No
lineStyle	Not applicable. Enter empty	No
lineThickness	Not applicable. Enter empty	No
includeFlag	Value is always true.	Yes
shapeIdentifier	A unique Integer number within a collection of text and graphical markups	Yes

Table 3.1.1.8-2. AIM MultiPoint

AIM Point	Graphic Annotation Module Attributes	Required
cagridId	Integer value used to identify, name, or characterize the nature, properties, or contents of a thing.	Yes
lineColor	Not applicable. Enter empty	No
lineOpacity	Not applicable. Enter empty	No
lineStyle	Not applicable. Enter empty	No
lineThickness	Not applicable. Enter empty	No
includeFlag	Value is always true.	Yes
shapeIdentifier	A unique Integer number within a collection of text and graphical markups	Yes

Table 3.1.1.8-3. AIM Point

AIM Circle	Graphic Annotation Module Attributes	Required
cagridId	Integer value used to identify, name, or characterize the nature, properties, or contents of a thing.	Yes
lineColor	Not applicable. Enter empty	No
lineOpacity	Not applicable. Enter empty	No
lineStyle	Not applicable. Enter empty	No
lineThickness	Not applicable. Enter empty	No
includeFlag	A Boolean flag that indicates if the shape is to be included (true) or excluded (false) from the annotation. Intended to allow specific components of a lesion to be excluded such as in a donut.	Yes
shapeIdentifier	A unique Integer number within a collection of text and graphical markups	Yes

Table 3.1.1.8-4. AIM Circle

AIM Ellipse	Graphic Annotation Module Attributes	Required
cagridId	Integer value used to identify, name, or characterize the nature, properties, or contents of a thing.	Yes
lineColor	Not applicable. Enter empty	No
lineOpacity	Not applicable. Enter empty	No
lineStyle	Not applicable. Enter empty	No
lineThickness	Not applicable. Enter empty	No
includeFlag	A Boolean flag that indicates if the shape is to be included (true) or excluded (false) from the annotation. Intended to allow specific components of a lesion to be excluded such as in a donut.	Yes
shapeIdentifier	A unique Integer number within a collection of text and graphical markups	Yes

Table 3.1.1.8-5. AIM Ellipse

AIM Polyline	Graphic Annotation Module Attributes	Required
cagridId	Integer value used to identify, name, or characterize the nature, properties, or contents of a thing.	Yes
lineColor	Not applicable. Enter empty	No
lineOpacity	Not applicable. Enter empty	No
lineStyle	Not applicable. Enter empty	No
lineThickness	Not applicable. Enter empty	No
includeFlag	A Boolean flag that indicates if the shape is to be included (true) or excluded (false) from the annotation. Intended to allow specific components of a lesion to be excluded such as in a donut.	Yes
shapeIdentifier	A unique Integer number within a collection of text and graphical markups	Yes

Table 3.1.1.8-6. AIM Polyline

Note: In order to set the “includeFlag” attribute properly for Circle, Ellipse and Polyline (closed polygon) instances, there shall be two types of these graphical drawings, one inside another. The enclosed graphical drawing “includeFlag” value shall be set to “false” if the shape is to be excluded such as in a donut shape. The other graphical drawing, “includeFlag”, shall be set to true.

The current TwoDimensionSpatialCoordinate does not have an explicit support for enumerated value “PIXEL” or “DISPLAY”, defined in DICOM standard, to indicate how a given coordinate shall be used. The x and y coordinate contain a value of type double. If extracted values are between 0.0 and 1.0 for x and y, they are in “DISPLAY” coordinate. Otherwise, the values are in “PIXEL” space.

A set of x and y coordinates can be extracted from Graphic Data (0070,0022). Table 3.1.1.8-7 displays how extracted values are mapped to AIM attributes.

AIM	Graphic Annotation Module Attributes	Required

TwoDimensionSpatialCoordinate		
cagridId	Integer value used to identify, name, or characterize the nature, properties, or contents of a thing.	Yes
coordinateIndex	The order in which a coordinate appears.	Yes
imageReferenceUID	Referenced SOP Instance UID (0008,1155)	Yes
referencedFrameNumber	Referenced Frame Number (0008,1160)	Yes
x	Graphic Data (0070,0022)	Yes
y	Graphic Data (0070,0022)	Yes

Table 3.1.1.8-7. AIM TwoDimensionSpatialCoordinate

3.1.2. Converting CSPS to AIM 3.0

The same approach from section 3.1.1.1 to 3.1.1.8 can be used to convert DICOM CSPS to AIM model.

3.1.3. Converting PCSPS to AIM 3.0

The same approach from section 3.1.1.1 to 3.1.1.8 can be used to convert DICOM PCSPS to AIM model.

4. Gap Analysis between DICOM Presentation State and AIM

4.1. Mapping Between DICOM Presentation State and AIM

The AIM information model can store other types of information that have semantic meaning associated with medical images, such as anatomical location, imaging observation related to anatomic entity, and calculation results that may or may not be related directly to graphical drawings. Section 3 describes how to extract information from the DICOM Presentation State and store in the AIM model. However, it does not discuss what additional information may be entered to the AIM model.

Table 4.1-1 illustrates information mapping between the two models. AIM classes that match "Not applicable" do not have information that can be extracted from the DICOM Presentation State object.

AIM Class Name	DICOM GSPS IOD MODULES
AimStatus	Not applicable
AnatomicEntity	Not applicable
AnatomicEntityCharacteristic	Not applicable
Annotation	Not applicable
AnnotationOfAnnotation	Not applicable
AnnotationRole	Not applicable
Calculation	Not applicable
CalculationData	Not applicable
CalculationResult	Not applicable
CharacteristicQuantification	Not applicable
Circle	Graphic Annotation (C.10.5)
Coordinate	Not applicable
DICOMImageReference	Not applicable but must be generated
Dimension	Not applicable
Ellipse	Graphic Annotation (C.10.5)
Equipment	Not applicable
GeometricShape	Not applicable
Image	Presentation State Relationship (C.11.11)
ImageAnnotation	Not applicable but must be generated
ImageReference	Not applicable
ImageSeries	General Series (C.7.3.1)
ImageStudy	General Study (C.7.2.1)
ImagingObservation	Not applicable
ImagingObservationCharacteristic	Not applicable
Inference	Not applicable
Interval	Not applicable
MultiPoint	Graphic Annotation (C.10.5)
NonQuantifiable	Not applicable
Numerical	Not applicable
Person	Patient (C.7.1.1)
Point	Graphic Annotation (C.10.5)
Polyline	Graphic Annotation (C.10.5)
PresentationState	SOP Common Module (C.12.1)
Quantile	Not applicable
ReferencedAnnotation	Not applicable
ReferencedCalculation	Not applicable
ReferencedGeometricShape	Not applicable
Scale	Not applicable
Segmentation	Not applicable

SpatialCoordinate	Not applicable
TextAnnotation	Graphic Annotation (C.10.5)
ThreeDimensionSpatialCoordinate	Not applicable
TwoDimensionSpatialCoordinate	Graphic Annotation (C.10.5)
User	Not applicable
WebImageReference	Not applicable

Table 4.1-1. AIM Information Model and GSPS Capabilities

There are some AIM classes that can be completed with valuable information provided by developers of a DICOM Presentation State to AIM conversion program.

4.1.1. AIM User

The AIM User class collects information about the creator of an AIM instance. The creator can be a human or a machine. In this case, we use a program to convert DICOM Presentation State to an AIM instance. The program is the creator.

AIM User	**Information Required**	**Required**
cagridId	Integer value used to identify, name, or characterize the nature, properties, or contents of a thing.	Yes
name	The name of the conversion program. (recommended)	Yes
loginName	The name of the conversion program. (recommended)	Yes
roleInTrial	Not applicable. Enter empty	No
numberWithinRoleOfClinicalTrial	Not applicable. Enter empty	No

Table 4.1.1-1. AIM User

4.1.2. AIM Equipment

The Equipment class stores information about the equipment used to create an AIM instance. The software that is used to create AIM instances shall have its information store in this class.

AIM Equipment	**Information Required**	**Required**
cagridId	Integer value used to identify, name, or characterize the nature, properties, or contents of a thing.	Yes
manufacturerName	The name of the organization created the converter program.	Yes
manufacturerModelName	The name of the software.	No
softwareVersion	The version number of the converter program.	No

Table 4.1.2-1. AIM Equipment

4.2. AIM Image Semantic Content

The AIM information model has a collection of classes that store explanatory or descriptive information and findings of images using coded terminology. These classes are Anatomic Entity and its characteristic, Characteristic Quantification for the Anatomic Entity's characteristic, Imaging Observation and its characteristic, Characteristic Quantification for the Imaging Observation's characteristic, and Inference. An inference is a conclusion derived by observing an imaging study and/or medical history. This type of information cannot be found in the DICOM Presentation State object. For example, a computer-aided detection program that can identify an anatomic entity and its characteristic may be used to automatically create values from AnatomicEntity and AnatomicEntityCharacteristic. This type of an approach is not covered in this document. It is mentioned here as a possible solution for adding more information to an AIM instance.

Appendix A References

No	Artifact	Type	Link
1	09_03pu2.pdf	PDF file	ftp://medical.nema.org/medical/dicom/2009/09_03pu3.doc
2	02_03_AIM_Project_Report.doc	Microsoft Word	https://gforge.nci.nih.gov/frs/download.php/9112/AIM_v3.0.1_rv11.rar
3	AIM_v3_rv11_XMI_XML_Schemas.zip	XMI file	https://gforge.nci.nih.gov/frs/download.php/8990/AIM_v3_rv11_XMI_XML_Schemas.zip

Appendix B Glossary

Term	Definition
AIM	Annotation and Image Markup
API	Application Programming Interface
caAERS	Cancer Adverse Events Reporting System
CSPS	Color Softcopy Presentation State
CT	Computed Tomography
DICOM	Digital Imaging and Communications in Medicine
GSPS	Grayscale Softcopy Presentation State
GUI	Graphical User Interface
IOD	Information Object Definition
PCSPS	Pseudo-Color Softcopy Presentation State
SOP	Sevice-Object-Pair
SR	Structured Report
TLHC	Top Left Hand Corner
XML	eXtended Markup Language

Term	Definition
UID	Unique Identifier
UML	Unified Modeling Language
VOI LUT	Volume of Interest Look Up Table