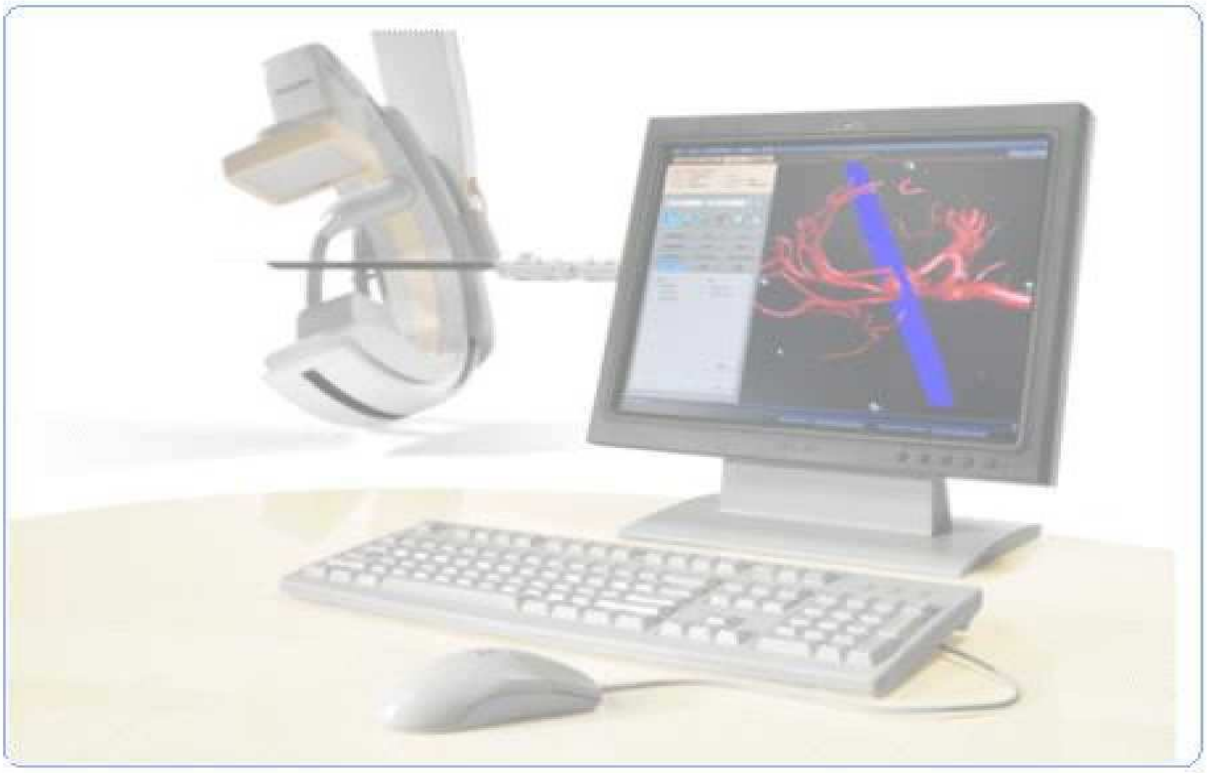
DICOM Conformance Statement

Application Annex:

AneurysmFlow R1.0 for Interventional Workspot



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1. Introduction

This DICOM Conformance Statement annex is applicable to the AneurysmFlow R1.0 for Interventional Workspot hosting platform, later referred to as AneurysmFlow R1.0.

AneurysmFlow is a software tool intended to provide relevant information to the interventionalist during cerebral aneurysm embolization treatment, based on quantification of blood flow changes.

AneurysmFlow is a software medical device and is intended to be used in combination with a Philips interventional X-ray system and 3DRA data

AneurysmFlow is a software product (Interventional Tool) that provides color coded representation of a digital subtraction angiography (DSA). It can quantify blood flow rates in the artery and visualize blood flow patterns in an aneurysm. It also provides a comparison between pre-, peri- and post-procedural color coded images and calculates the Mean Aneurysm Flow Amplitude (MAFA value) representing the reduction of blood flow in the Aneurysm.

1.1. Revision History

The revision history below provides dates and differences among individual document versions.

Table 1: Revision History

Document Version	Date of Issue	Status	Description
00	03-Mar-2015	Proposal version	Proposal Version

1.2. Terminology

DICOM	Digital Imaging and Communications in Medicine
IOD	Information Object Definition
UID	Unique Identifier
VR	Value Representation

2. Data Specifications

2.1. Supported IOD's

This section specifies each IOD accepted and / or created by AneurysmFlow R1.0.

ACCEPTED The applicable IOD is accepted for storage in the repository of the hosting platform and supported for import in AneurysmFlow R1.0 for viewing and analysis.

CREATED The AneurysmFlow R1.0 supports generation of derived data by using the applicable IOD and is able to store this data in the repository of the hosting platform.

Table 2: Supported IOD's

IOD		Support	
Name	**UID**	**ACCEPTED**	**CREATED**
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Raw Data Storage	1.2.840.10008.5.1.4.1.66	Yes	Yes

2.1.1. Acceptance Criteria

This section specifies the acceptance criteria applied by AneurysmFlow R1.0 to which a dataset should adhere before it can be imported into the application. This can be criteria on the highest level (e.g. data from a certain manufacturer or system model) or certain DICOM attributes mandatory to be present into the dataset holding a specific value. In case one or more Philips private attributes are required, then a list of supported Philips system models will be mentioned.

Table 3: Accepted system models

Manufacturer	Modality	System Model Name(s)
Not applicable	Not applicable	Not applicable

Table 4: Accepted transfer syntaxes per IOD

IOD		Transfer Syntax	
Name	**UID**	**Name**	**UID**
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2
		Explicit VR Little Endian	1.2.840.10008.1.2.1
		Implicit VR Big Endian	1.2.840.10008.1.2.2
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70
		RLE Lossless	1.2.840.10008.1.2.5
Raw Data Storage	1.2.840.10008.5.1.4.1.66	Implicit VR Little Endian	1.2.840.10008.1.2
		Explicit VR Little Endian	1.2.840.10008.1.2.1
		Implicit VR Big Endian	1.2.840.10008.1.2.2
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70
		RLE Lossless	1.2.840.10008.1.2.5

Table 5: Accepted attribute values

Attribute Name	Attribute Number	Values / Comments
Not applicable	Not applicable	Not applicable

2.1.2. Contents of Created IOD's

This section specifies in detail the attribute contents of created data objects. Attributes are grouped together by its corresponding module as specified by DICOM standard. Philips private attributes are excluded for specification.

Abbreviations used in the Module table for the column "Presence of Value" are:

ALWAYS	The attribute is always present with a value
EMPTY	The attribute is always present without any value (attribute sent zero length)
VNAP	The attribute is always present and its Value is Not Always Present (attribute sent zero length if no value is present)
ANAP	The attribute is present under specified condition – if present then it will always have a value

The abbreviations used in the Module table for the column "Source" are:

AUTO	The attribute value is generated automatically
CONFIG	The attribute value source is a configurable parameter
COPY	The attribute value source is another SOP instance
FIXED	The attribute value is hard-coded in the application
IMPLICIT	The attribute value source is a user-implicit setting
MPPS	The attribute value is the same as that use for Modality Performed Procedure Step
MWL	The attribute value source is a Modality Worklist
USER	The attribute value source is explicit user input

2.1.2.1. List of created SOP Classes

Table 6: List of created SOP Classes

SOP Class Name	SOP Class UID
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7
Raw Data Storage	1.2.840.10008.5.1.4.1.66

2.1.2.2. Secondary Capture Image Storage SOP class

Table 7: IOD of Created Secondary Capture Image Storage SOP Class Instances

Information Entity	Module	Presence Of Module
Patient	Patient Module	ALWAYS
Study	General Study Module	ALWAYS
Study	Patient Study Module	CONDITIONAL
Series	General Series Module	ALWAYS
Equipment	General Equipment Module	CONDITIONAL
Equipment	SC Equipment Module	ALWAYS
Image	General Image Module	ALWAYS
Image	Image Pixel Module	ALWAYS
Image	SC Image Model	ALWAYS
Image	VOI LUT Module	CONDITIONAL
Image	SOP Common Module	ALWAYS
	Extended DICOM and private attributes	ALWAYS

Table 8: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Name	0010,0010	PN		VNAP	AUTO	
Patient ID	0010,0020	LO		VNAP	AUTO	
Issuer of Patient ID	0010,0021	LO		ANAP	AUTO	
Patient's Birth Date	0010,0030	DA		VNAP	AUTO	
Patient's Sex	0010,0040	CS		VNAP	AUTO	
Other Patient Names	0010,1001	PN		ANAP	AUTO	

Table 9: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Date	0008,0020	DA		VNAP	AUTO	
Study Time	0008,0030	TM		VNAP	AUTO	
Referring Physician's Name	0008,0090	PN		VNAP	AUTO	
Study Description	0008,1030	LO		ANAP	AUTO	
Study Instance UID	0020,000D	UI		ALWAYS	AUTO	
Study ID	0020,0010	SH		VNAP	AUTO	
Accession Number	0008,0050	SH		VNAP	AUTO	
Procedure Code Sequence	0008,1032	SQ		ANAP	AUTO	
> Code Value	0008,0100	SH		ALWAYS	AUTO	
> Coding Scheme Designator	0008,0102	SH		ALWAYS	AUTO	
> Code Meaning	0008,0104	LO		ALWAYS	AUTO	
Physician(s) of Record	0008,1048	PN		ANAP	AUTO	
Name of Physician(s) Reading Study	0008,1060	PN		ANAP	AUTO	

Table 10: Patient Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Admitting Diagnoses Description	0008,1080	LO		ANAP	AUTO	
Patient's Age	0010,1010	AS		ANAP	AUTO	
Additional Patient History	0010,21B0	LT		ANAP	AUTO	

Table 11: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Date	0008,0021	DA		ANAP	AUTO	
Series Time	0008,0031	TM		ANAP	AUTO	
Modality	0008,0060	CS		ALWAYS	AUTO	
Related Series Sequence	0008,1250	SQ		ANAP	AUTO	
> Study Instance UID	0020,000D	UI		ALWAYS	AUTO	
>Series Instance UID	0020,000E	UI		ALWAYS	AUTO	
> Purpose of Reference Code Sequence	0040,A170	SQ		VNAP	AUTO	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO	
Series Number	0020,0011	IS		VNAP	AUTO	
Performed Procedure Step ID	0040,0253	SH		ANAP	AUTO	
Request Attributes Sequence	0040,0275	SQ		ANAP	AUTO	

Table 12: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips Medical Systems	VNAP	FIXED	
Manufacturer's Model Name	0008,1090	LO	Interventional Workspot	ANAP	FIXED	
Software Version(s)	0018,1020	LO	1.3.0.0	ANAP	FIXED	

Table 13 : SC Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Conversion Type	0008,0064	CS		ALWAYS		
Modality	0008,0060	CS	XA	ANAP		

Table 14: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Type	0008,0008	CS	DERIVED\SECONDARY	ANAP	AUTO	For Segmentation Object, value is DERIVED\SECONDARY\VESSEL_NAVIGA002
Content Date	0008,0023	DA		VNAP	AUTO	
Content Time	0008,0033	TM		VNAP	AUTO	
Instance Number	0020,0013	IS		VNAP	AUTO	
Patient Orientation	0020,0020	CS		VNAP	AUTO	

Table 15: Image Pixel Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Rows	0028,0010	US		ALWAYS	AUTO	
Columns	0028,0011	US		ALWAYS	AUTO	
Pixel Representation	0028,0103	US	0000	ALWAYS	AUTO	
Pixel Data	7FE0,0010	OW/OB		ALWAYS	AUTO	
Samples per Pixel	0028,0002	US	1	ALWAYS	AUTO	
Photometric Interpretation	0028,0004	CS	RGB, MONOCHROME2	ALWAYS	AUTO	For Segmentation object, value is MONOCHROME2
Bits Allocated	0028,0100	US	8	ALWAYS	AUTO	
Bits Stored	0028,0101	US	8	ALWAYS	AUTO	
High Bit	0028,0102	US	7	ALWAYS	AUTO	

Table 16: SC Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Date of Secondary Capture	0018,1012	CS		ANAP	FIXED	
Time of Secondary Capture	0018,1014	UI		ANAP	FIXED	

Table 17: VOI LUT Module e Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Window Center	0028,1050	DS		ALWAYS	FIXED	
Window Width	0028,1051	DS		ALWAYS	FIXED	

Table 18: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.7	ALWAYS	FIXED	
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO	
Instance Creation Date	0008,0012	DA		ANAP	AUTO	
Instance Creation Time	0008,0013	TM		ANAP	AUTO	
Instance Number	0020,0013	IS		ANAP	AUTO	

Table 19 : Extended DICOM and private attributes for Secondary Capture Image Storage SOP Class Instances (Snapshot)

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Private	2001,0010	LO		ANAP		
Private	2001,0011	LO		ANAP		
Private	2001,1063	CS		ANAP		
Private	2001,116C	LO		ANAP		
Private	2003,0010	LO		ANAP		
Private	2003,0020	LO		ANAP		
Private	2003,0023	LO		ANAP		
Private	2003,1024	FD		ANAP		
Private	2003,1053	LO		ANAP		
Private	2003,2047	LO		ANAP		
Private	2003,20C3	DT		ANAP		
Private	2003,2313	DS		ANAP		
Private	2003,2314	DS		ANAP		
Private	2003,2617	SQ		ANAP		
>Private	2003,0027	LO		ANAP		
>Private	2003,2710	SL		ANAP		
>Private	2003,2711	SQ		ANAP		
>>Private	2003,0027	LO		ANAP		

>>Private	2003,2710	FD		ANAP		
>>Private	2003,2711	LO		ANAP		
>Private	2003,2712	SQ		ANAP		
Imager Pixel Spacing	0018,1164	DS		ANAP		
Shutter Left Vertical Edge	0018,1602	IS		ANAP		
Shutter Right Vertical Edge	0018,1604	IS		ANAP		
Shutter Upper Horizontal Edge	0018,1606	IS		ANAP		
Shutter Lower Horizontal Edge	0018,1608	IS		ANAP		
Application Version	0018,9525	LO		ANAP		
Requesting Physician	0032,1032	PN		ANAP		
Requesting Service	0032,1033	LO		ANAP		
Requested Procedure Description	0032,1060	LO		ANAP		
Requested Procedure Code Sequence	0032,1064	SQ		ANAP		
> Code Value	0008,0100	SH		ANAP		
> Coding Scheme Designator	0008,0102	SH		ANAP		
> Code Meaning	0008,0104	LO		ANAP		

2.1.2.3. Raw data Storage SOP class

Table 7: IOD of Created Raw Data Storage SOP Class Instances

Information Entity	Module	Presence Of Module
Patient	Patient Module	ALWAYS
Study	General Study Module	ALWAYS
Series	General Series Module	ALWAYS
Frame of Reference	Frame of Reference	OPTIONAL
Equipment	General Equipment Module	ALWAYS
Image	Acquisition Context Module	ALWAYS
	Raw Data Module	ALWAYS
	SOP Common Module	ALWAYS

Table 8 : Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Name	0010,0010	PN		ALWAYS	AUTO	
Patient ID	0010,0020	LO		ALWAYS	AUTO	
Patient's Birth Date	0010,0030	DA		VNAP	AUTO	
Patient's Sex	0010,0040	CS		ALWAYS	AUTO	

Table 9 : General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Date	0008,0020	DA		ALWAYS	AUTO	
Study Time	0008,0030	TM		ALWAYS	AUTO	
Referring Physician's Name	0008,0090	PN		VNAP	AUTO	
Study Instance UID	0020,000D	UI		ALWAYS	AUTO	
Study ID	0020,0010	SH		ALWAYS	AUTO	
Accession Number	0008,0050	SH		EMPTY	AUTO, USER	

Table 10 : General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Date	0008,0021	DA		ALWAYS	AUTO	
Series Time	0008,0031	TM		ALWAYS	AUTO	
Modality	0008,0060	CS		ALWAYS	AUTO	
Performing Physicians' name	0008,1050	PN				
Related Series Sequence	0008,1250	SQ				
>Study Instance UID	0020,000D	UI				
>Series Instance UID	0020,000E	UI		ALWAYS	AUTO	
>Purpose of Reference Code Sequence	0040,A170	SQ				
Series Number	0020,0011	IS		ALWAYS	AUTO	
Laterality	0020,0060	CS		ANAP		

Table 11: Frame of Reference Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Frame of Reference UID	0020,0052	UI		ALWAYS	AUTO	
Position Reference Indicator	0020,1040	LO		VNAP	AUTO	

Table 12: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips Medical Systems	VNAP	FIXED	
Institution Name	0008,0080	LO		ANAP	USER	
Station Name	0008,1010	SH		ANAP		
Manufacturer's Model Name	0008,1090	LO	Interventional Workspot	ANAP	FIXED	
Device Serial Number	0018,1000	LO		ANAP	AUTO	
Software Version(s)	0018,1020	LO	1.3.0	ANAP	FIXED	

Table 13: Acquisition Context Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Acquisition Context Sequence	0040,0555	SQ		VNAP	AUTO	

Table 14: Raw Data Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Content Date	0008,0023	DA		ALWAYS	AUTO	
Content Time	0008,0033	TM		ALWAYS	AUTO	
Creator Version UID	0008,9123	UI		ALWAYS	AUTO	
Instance Number	0020,0013	IS		ANAP	AUTO	

Table 15: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.66	ALWAYS	AUTO	
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO	
Original Specialized SOP Class UID	0008,001B	UI		VNAP	AUTO	
Instance Creation Date	0008,0012	DA		VNAP	AUTO	
Instance Creation Time	0008,0013	TM		VNAP	AUTO	
Instance Number	0020,0013	IS		VNAP		

Table 16: Extended DICOM and private attributes for Raw Data Image Storage SOP class

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Date	0040,A121	DA		VNAP	AUTO	
Time	0040,A122	TM		VNAP	AUTO	
Private	2001,0011	LO		VNAP		
Private	2001,115F	SQ		VNAP		
>Laterality	0020,0060	CS		VNAP		
>Position Reference Indicator	0020,1040	LO		VNAP		
>Acquisition Context Sequence	0040,0555	SQ		VNAP		
>Institution Name	0008,0080	LO		VNAP		
>Referring Physician's Name	0008,0090	PN		VNAP		
>Patient's Birth Date	0010,0030	DA		VNAP		
>Patient's Sex	0010,0040	CS		VNAP		
>Device Serial Number	0018,1000	LO		VNAP		
>Distance Source to Detector	0018,1110	DS		VNAP		
>Requested Procedure ID	0040,1001	SH		VNAP		
>Private	2001,0010	LO		VNAP		
>Private	2001,1063	CS		VNAP		
>Private	2003,0020	LO		VNAP		
>Private	2003,2043	UL		VNAP		
>Private	2003,2044	LO		VNAP		
>Private	2003,2047	LO		VNAP		
>Private	2003,2084	SQ		VNAP		
>>Private	2003,0020	LO		VNAP		
>>Private	2003,2047	LO		VNAP		
>>Private	2003,2085	FD		VNAP		
>>Private	2003,2086	FD		VNAP		
>>Private	2003,2087	FD		VNAP		
>>Private	2003,2088	UI		VNAP		
>>Private	2003,2089	LO		VNAP		
>>Private	2003,208A	IS		VNAP		
>>Private	2003,208B	DS		VNAP		
>>Private	2003,208C	DS		VNAP		