DICOM Correction Item

Correction Number CP-846	
Log Summary: Update Staged Protocol Informative Annex	
Type of Modification Modification	Name of Standard PS 3.17 2008
Rationale for Correction: CP-476 replaced transducer position attributes with View Codes, and defined pre-coordinated view codes for echocardiography. CP-817 replaced codes for Protocols and Stages. The IHE Echocardiography Profile has required use of codes for stage and view. These need to be reflected in PS3.17 Annex K Ultrasound Staged Protocol Data Management.	
Sections of documents affected PS 3.17 Annex K	
Correction Wording:	

Note to editor: correct capitalization in the table titles and header rows when updating PS3.17

K.4 ATTRIBUTES USED IN STAGED PROTOCOL EXAMS

The DICOM standard includes a number of attributes of significance to Staged Protocol Exams. This Annex explains how scheduling and acquisition systems may use these attributes to convey Staged Protocol related information.

Table K.4-1 lists all the attributes relevant to convey Staged Protocol related information. (see PS 3.3 for details about these attributes).

Table K.4-1
Attributes THAT convey Staged Protocol Related Information

Modality Worklist (TAg) [Return Key Type]	**US Image and US MULTI-FRAME IOD (TAG) [TyPe]**	**MPPS IOD (tag) [SCU/SCP Type]**
----	----	Scheduled Step Attributes Sequence (0040,0270) [1/1] (b)
Study Instance UID (0020,000D) [1]	Study Instance UID (0020,000D) [1]	>Study Instance UID (0020,000D) [1/1]
~~----~~**Scheduled Procedure Step Sequence (0040,0100)**	Request Attributes Sequence (0040,0275) [3] (a,b)	----
~~**Scheduled Procedure Step Sequence (0040,0100)**~~ >Scheduled Procedure Step Description (0040,0007) [1C]	>Scheduled Procedure Step Description (0040,0007) [3]	>Scheduled Procedure Step Description (0040,0007) [2/2]
~~**Scheduled Procedure Step Sequence (0040,0100)**~~ >Scheduled Protocol Code Sequence (0040,0008) [1C]	>Scheduled Protocol Code Sequence (0040,0008) [3]	>Scheduled Protocol Code Sequence (0040,0008) [2/2]

----	Performed Procedure Step Description (0040,0254) [3]	Performed Procedure Step Description (0040,0254) [2/2]
----	Protocol Name (0018,1030) [3]	Performed Series Sequence (0040,0340) >Protocol Name (0018,1030) [1/1]
----	Performed Protocol Code Sequence (0040,0260) [3]	Performed Protocol Code Sequence (0040,0260) [1/1]
----	Number of Stages (0008,2124) [2C]	----
----	Number of Views In Stage (0008,212A) [2C]	----
----	Stage Name (0008,2120) [3]	----
----	Stage Number (0008,2122) [3]	----
----	Stage Code Sequence (0040,000A) [3]	----
----	View Name (0008,2127) [3]	----
----	View Number (0008,2128) [3]	----
----	Number of Event Timers (0008,2129) [3]	----
----	Event Elapsed Time(s) (0008,2130) [3]	----
----	Event Timer Name(s) (0008,2132) [3]	----
----	~~**Transducer Position**~~ **View Code** Sequence ~~**(0008,2240) (0054,0220)**~~ [3]	----
----	> ~~**Transducer Position Modifier Sequence (0008,2242)**~~ **View Modifier Code Sequence (0054,0222)** [3]	----
~~----~~	~~**Transducer Orientation Sequence (0008,2244) [3]**~~	~~----~~
~~----~~	~~**> Transducer Orientation Modifier Sequence (0008,2246) [3]**~~	~~----~~

(a) Recommended if the Modality conforms as a SCU to the Modality Worklist SOP Class and Modality Performed Procedure Step

(b) Sequence may have one or more Items

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K.5.2 STAGE AND VIEW IDENTIFICATION

Display devices usually include capabilities that aid in the organization and presentation of images acquired as part of the Staged Protocol. These capabilities allow a clinician to display images of a given View acquired during different Stages of the Protocol side by side for comparison. A View is a particular combination of the transducer position and orientation at the time of image acquisition. Images are acquired at the same View in different Protocol Stages for the purpose of comparison. For these features to work

properly, the display device must be able to determine the Stage and View of each image in an unambiguous fashion.

There are three possible mechanisms for conveying Stage and View identification in the image SOP Instances:

"Numbers" (Stage Number (0008,2122) and View Number (0008,2128)) which number Stages and Views, starting with one.

"Names" (Stage Name (0008,2120) and View Name (0008,2127)) which specify textual names for each Stage and View, respectively.

~~**One or more**~~ "Code sequences" (Stage Code Sequence (0040,000A) for Stage identification, and ~~**Transducer Position**~~ **View** Code Sequence ~~(0008,2240)~~**(0054,0220)** ~~**and Transducer Orientation Code Sequence (0008,2244)**~~ for View identification) which give identification "codes" to the Stage and View respectively.

~~**View Number (0008,2128) and View Name (0008,2127) enable correlating the Views amongst the different Stages. The value set for Stage Name (0008,2120) and View Name are undefined. Therefore, this Annex recommends that the creator always send Stage Number (0008,2122) and View Number (0008,2128) to identify the Stage and View. Stages and Views are numbered sequentially and suggest a display sequence. There is a one-to-one correspondence between the number and the name for the images in the staged protocol. Names or code sequences allow the display device to label Stages and Views for the clinical user.**~~
The use of code sequences to identify Stage and View, using Context Group values specified in PS3.16 (e.g., CID 12002 and CID 12226), allows a display application with knowledge of the code semantics to render a display in accordance with clinical domain uses and user preferences (e.g., populating each quadrant of an echocardiographic display with the user desired stage and view). The IHE Echocardiography Workflow Profile requires such use of code sequences for stress-echo studies.

Table K.5-1 provides an example of the Staged Protocol relevant attributes in images acquired during a typical cardiac stress-echo ultrasound exam.

Table K.5-1
Staged Protocol Image attributes example

BASELINE STAGE – VIEW 1	MID-STRESS Stage – VIEW 1	MID-STRESS Stage – VIEW 2
Study Instance UID : "1.2.840….123.1"	Study Instance UID : "1.2.840….123.1"	Study Instance UID : "1.2.840….123.1"
Request Attributes Sequence:	Request Attributes Sequence:	Request Attributes Sequence:
>Scheduled Procedure Step Description : "Exercise stress echocardiography"	>Scheduled Procedure Step Description : "Exercise stress echocardiography"	>Scheduled Procedure Step Description : "Exercise stress echocardiography"
>Scheduled Protocol Code Sequence:	>Scheduled Protocol Code Sequence:	>Scheduled Protocol Code Sequence:
>>Code Value: "P5-B3050"	>>Code Value: "P5-B3050"	>>Code Value: "P5-B3050"
>>Coding Scheme Designator: "SRT"	>>Coding Scheme Designator: "SRT"	>>Coding Scheme Designator: "SRT"
>>Code Meaning: "Exercise stress echocardiography"	>>Code Meaning: "Exercise stress echocardiography"	>>Code Meaning: "Exercise stress echocardiography"
Performed Procedure Step Description: "Exercise stress echocardiography"	Performed Procedure Step Description: "Exercise stress echocardiography"	Performed Procedure Step Description: "Exercise stress echocardiography"

Protocol Name: "EXERCISE STRESS-ECHO"	Protocol Name: "EXERCISE STRESS-ECHO"	Protocol Name: "EXERCISE STRESS-ECHO"
Performed Protocol Code Sequence:	Performed Protocol Code Sequence:	Performed Protocol Code Sequence:
>Code Value: "P5-B3050"	>Code Value: "P5-B3050"	>Code Value: "P5-B3050"
>Coding Scheme Designator: "SRT"	>Coding Scheme Designator: "SRT"	>Coding Scheme Designator: "SRT"
>Code Meaning: "Exercise stress echocardiography"	>Code Meaning: "Exercise stress echocardiography"	>Code Meaning: "Exercise stress echocardiography"
Number of Stages: "4"	Number of Stages: "4"	Number of Stages: "4"
Number of Views In Stage: "2"	Number of Views In Stage: "2"	Number of Views In Stage: "2"
Stage Name: "BASELINE"	Stage Name: "MID-STRESS"	Stage Name: "MID-STRESS"
Stage Number : "1"	Stage Number : "2"	Stage Number : "2"
Stage Code Sequence:	Stage Code Sequence:	Stage Code Sequence:
>Code Value: **~~"P5-01202"~~ "F-01602"**	>Code Value: **~~"P5-01203"~~ "109091"**	>Code Value: **~~"P5-01203"~~ "109091"**
>Coding Scheme Designator: "SRT"	>Coding Scheme Designator: **~~"SRT"~~ "DCM"**	>Coding Scheme Designator: **~~"SRT"~~ "DCM"**
>Code Meaning: **~~"Pre -stress image acquisition"~~ "Baseline state"**	>Code Meaning:**~~"Mid-stress image acquisition"~~ "Cardiac Stress State"**	>Code Meaning:**~~"Mid-stress image acquisition"~~ "Cardiac Stress State"**
View Name: "Para-sternal long axis"	View Name: "Para-sternal long axis"	View Name: "Para-sternal short axis"
View Number : "1"	View Number : "1"	View Number : "2"
----	Number of Event Timers: "1"	Number of Event Timers: "1"
----	Event Elapsed Time(s): "10000" (ms)	Event Elapsed Time(s): "25000" (ms)
----	Event Elapsed Timer Name(s): "Time Since Exercise Halted"	Event Elapsed Timer Name(s): "Time Since Exercise Halted"
~~Transducer Position~~ View Code Sequence:	**~~Transducer Position~~ View Code** Sequence:	**~~Transducer Position~~ View Code** Sequence:
>Code Value: "**~~T-D3136~~G-0396**"	>Code Value: "**~~T-D3136~~G-0396**"	>Code Value: "**~~T-D3136~~G-0397**"
>Coding Scheme Designator: "SRT"	>Coding Scheme Designator: "SRT"	>Coding Scheme Designator: "SRT"
>Code Meaning: "Parasternal **long axis**"	>Code Meaning: "Parasternal **long axis**"	>Code Meaning: "Parasternal **short axis**"
~~Transducer Orientation Sequence:~~	**~~Transducer Orientation Sequence:~~**	**~~Transducer Orientation Sequence:~~**
~~>Code Value: "G-A185"~~	**~~>Code Value: "G-A185"~~**	**~~>Code Value: "G-A186~~**
~~>Coding Scheme Designator: "SRT"~~	**~~>Coding Scheme Designator: "SRT"~~**	**~~>Coding Scheme Designator: "SRT"~~**
~~>Code Meaning: "Long axis"~~	**~~>Code Meaning: "Long axis"~~**	**~~>Code Meaning: "Short axis"~~**

K.5.3 EXTRA-PROTOCOL IMAGE IDENTIFICATION

At any Stage of a Staged Protocol exam, the operator may acquire images that are not part of the Protocol. These images are so-called “extra-Protocol images”. Information regarding the performed Protocol is still included because such images are acquired in the same Procedure Step as the Protocol images. The Stage number and optionally other Stage identification attributes (Stage Name and/or Stage Code Sequence) should still be conveyed in extra-Protocol images. However, the View number should be omitted to signify that the image is not one of the standard Views in the Protocol. Other View identifying information, such as name or code sequences, may indicate the image location.

Table K.5-2
COMPARISON OF Protocol AND EXTRA-PROTOCOL Image attributes example

MID-STRESS Stage – VIEW 1 Protocol Image	MID-STRESS Stage Extra-Protocol Image
Study Instance UID : “1.2.840….123.1”	Study Instance UID : “1.2.840….123.1”
Request Attributes Sequence:	Request Attributes Sequence:
>Scheduled Procedure Step Description : ” Exercise stress echocardiography protocol”	>Scheduled Procedure Step Description : ” Exercise stress echocardiography protocol”
>Scheduled Protocol Code Sequence:	>Scheduled Protocol Code Sequence:
>>Code Value: ” P5-B3050”	>>Code Value: ” P5-B3050”
>>Coding Scheme Designator: “SRT”	>>Coding Scheme Designator: “SRT”
>>Code Meaning:” Exercise stress echocardiography”	>>Code Meaning:” Exercise stress echocardiography”
Performed Procedure Step Description: “Exercise stress echocardiography”	Performed Procedure Step Description: “Exercise stress echocardiography”
Protocol Name: “EXERCISE STRESS-ECHO”	Protocol Name: “EXERCISE STRESS-ECHO”
Performed Protocol Code Sequence:	Performed Protocol Code Sequence:
>Code Value: ”P5-B3050”	>Code Value: ”P5-B3050”
>Coding Scheme Designator: “SRT”	>Coding Scheme Designator: “SRT”
>Code Meaning:” Exercise stress echocardiography”	>Code Meaning:” Exercise stress echocardiography”
Number of Stages: “4”	Number of Stages: “4”
Number of Views In Stage: “2”	Number of Views In Stage: “2”
Stage Name: “MID-STRESS”	Stage Name: “MID-STRESS”
Stage Number : “2”	Stage Number : “2”
Stage Code Sequence:	Stage Code Sequence:
>Code Value: ~~**”P5-01203”**~~ **“109091”**	>Code Value: ~~**”P5-01203”**~~ **“109091”**
>Coding Scheme Designator: ~~**“SRT”**~~ **“DCM”**	>Coding Scheme Designator: ~~**“SRT”**~~ **“DCM”**

>Code Meaning:**~~"Mid-stress image acquisition"~~ "Cardiac Stress state"**	>Code Meaning:**~~"Mid-stress image acquisition"~~ "Cardiac Stress state"**
View Name: "Para-sternal long axis"	----
View Number : "1"	----
~~Transducer Position~~ View Code Sequence:	----
>Code Value: "**~~T-D3136~~G-0396**"	----
>Coding Scheme Designator: "SRT"	----
>Code Meaning: "Parasternal **long axis**"	----
~~Transducer Orientation Sequence:~~	**~~----~~**
~~>Code Value: "G-A185"~~	**~~----~~**
~~>Coding Scheme Designator: "SRT"~~	**~~----~~**
~~>Code Meaning: "Long axis"~~	**~~----~~**