Digital Imaging and Communications in Medicine (DICOM)

Supplement 210: Paradigm Protocol Storage

Prepared by:

DICOM Standards Committee, Working Group 16 (MR sub group Functional MRI)

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Table of Contents

DOCUMENT HISTORY

Document Version	Date	Content
01	20-Dec-2017	Initial Draft
v1	02-March-2018	Added definitions and typical workflow diagram.
V2	17-10-2018	Rework with model defined separately, add performed as procedure log, add stimuli as object definition (proposed)

Scope and Field

This IOD describes the storage of Paradigm Protocols, the Defined and Performed one. Also adding definition of a Stimuli object for Storage.

OPEN ISSUES

1	
2	

CLOSED ISSUES

2	

DICOM PS 3.2 Conformance

Item: Add SOP Class to Table A.1-2

Table A.1-2
UID VALUES

UID Value	UID NAME	Category
…		
1.2.840.10008.5.1.4.1.1.200.x1	**Paradigm Defined Protocol Storage**	**Transfer**
1.2.840.10008.5.1.4.1.1.??.x2	**Paradigm Procedure Log Storage**	**Transfer**
1.2.840.10008.5.1.4.1.1.x	**Stimuli Object Storage**	**Transfer**
…		

DICOM PS 3.3: Information Object Definitions

Item: Add in Section A.1.4, rows and column to Table A.1-6

A.1.4 Overview of the Composite IOD Module Content

IODs Modules	Paradigm Performed Procedure Protocol	Paradigm Defined Procedure Protocol	Stimuli
Patient	M		
Clinical Trial Subject	U		
General Study	M		
Patient Study	U		
Clinical Trial Study	U		
General Series	M		
Clinical Trial Series	U		
Enhanced Series	M		
Frame of Reference	M		
General Equipment	M	M	
Enhanced General Equipment	M	M	
SOP Common	M	M	
Protocol Context	M	M	
Clinical Trial Context		U	
Patient Protocol Context	U		
Patient Specification		M	
Equipment Specification		M	
Instructions	M	M	
Patient Positioning	M	M	

Item: Add in the following new section in Annex A

A.35.x Paradigm Procedure Log IOD

A.35.x.1 Paradigm Procedure Log IOD Description

The Paradigm Procedure Log IOD is intended for the representation of reports or logs of time-stamped events occurring during the execution of a Paradigm procedure.

A.35.x.2 Paradigm Procedure Log IOD Entity-Relationship Model

This IOD uses the E-R Model in Section A.1.2, with only the SR Document IE below the Series IE.

Note

Unlike some other SR IODs, the Frame of Reference IE is critical to the synchronized time stamping of events in the Paradigm Procedure Log IOD and to multi-modality coordination.

A.35.x.3 Paradigm Performed Procedure Protocol IOD Module Table

Table A.35.x-1. Table Paradigm Procedure Log IOD Modules

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	Clinical Trial Subject	C.7.1.3	U
Study	General Study	C.7.2.1	M
	Clinical Trial Study	C.7.2.3	U
Series	SR Document Series	C.17.1	M
	Clinical Trial Series	C.7.3.2	U
Frame of Reference	Synchronization	C.7.4.2	M
Equipment	General Equipment	C.7.5.1	M
Document	SR Document General	C.17.2	M
	SR Document Content	C.17.3	M
	SOP Common	C.12.1	M

A.35.x.3.1 Procedure Log IOD Content Constraints

A.35.x.3.1.1 Template

The document may be constructed from Baseline TID newtid1 “Paradigm Procedure Log” invoked at the root node.

Note

This template defines a container (the root) with subsidiary Content Items, each of which represents a single paradigm procedure log entry. There is a defined recording observer (the person responsible for recording the log, generally a technician or nurse). The log entries follow a canonical model of a coded log entry type (the concept name of the Content Item), the value associated with the concept name as one of the SR Value Types,

and optionally a subsidiary free text comment and/or an identifier of the author or device source of the log entry (which may be other than the recording observer).

Commented [CvWW1]: Do we need this as I assume a single person will be responsible for the full procedure?

A.35.x.3.1.2 Observation DateTime

Each Item in Content Sequence (0040,A730) of the SR Document Content Module that is a target of a "CONTAINS" relationship from the root node, i.e., the first level Log Content Items, shall include Observation DateTime (0040,A032) as a Type 1 Attribute. This Attribute shall represent the DateTime at which the event recorded in the Content Item occurred, not the time at which the Item was recorded.

The first level Procedure Log Content Items in the Content Sequence shall be strictly ordered by monotonically increasing Observation DateTime (0040,A032) values.

Observation DateTime (0040,A032) shall be specified to a precision of one second or finer.

A.35.x.3.1.3 Value Type

Value Type (0040,A040) in Content Sequence (0040,A730) of the SR Document Content Module is constrained to the following Enumerated Values (see Table C.17.3-7 for Value Type definitions):

Enumerated Values:

TEXT
CODE
NUM
DATETIME
DATE
TIME
UIDREF
PNAME
COMPOSITE
IMAGE
WAVEFORM
CONTAINER

A.35.x.3.1.4 Relationship Constraints

Relationships between Content Items in the content of this IOD shall be conveyed in the by-value mode. See Table C.17.3-8 for Relationship Type definitions.

Note

1. Relationships by-reference are forbidden. Therefore, Referenced Content Item Identifier (0040,DB73) is not present in any of the Content Items within the SR Document Content Module.
2. CONTAINERs are not permitted as a target of any relationship.

Table A.35.x-2 specifies the relationship constraints of this IOD.

Table A.35.x-2. Relationship Content Constraints for Paradigm Procedure Log IOD

Source Value Type	Relationship Type (Enumerated Values)	Target Value Type
CONTAINER	CONTAINS	TEXT, CODE, NUM, PNAME, COMPOSITE, IMAGE, WAVEFORM
any type	HAS OBS CONTEXT	TEXT, CODE, NUM, DATETIME, UIDREF, PNAME
CONTAINER, IMAGE, WAVEFORM, COMPOSITE	HAS ACQ CONTEXT	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME

Source Value Type	Relationship Type (Enumerated Values)	Target Value Type
any type	HAS CONCEPT MOD	TEXT, CODE
any type (except CONTAINER)	HAS PROPERTIES	TEXT, CODE, NUM, DATETIME, UIDREF, PNAME
TEXT, CODE, NUM	INFERRED FROM	IMAGE, WAVEFORM, COMPOSITE

Item: Add in the following new section in Annex A

A.82.x1 Paradigm Defined Procedure Protocol IOD

A.82x1.1 Paradigm Defined Procedure Protocol IOD Description

The Paradigm Defined Procedure Protocol IOD describes acquisition protocol parameters and related details for a defined Paradigm procedure.

See Annex YY1 “Protocol Storage Examples and Concepts (informative)” in PS3.17 for explanatory information and examples.

A.82.x1.2 Paradigm Defined Procedure Protocol IOD Entity-Relationship Model

The Procedure Protocol in a Paradigm Defined Procedure Protocol IOD is not associated with a specific patient, however it is associated with the equipment that created the instance.

The E-R model for the Paradigm Defined Procedure Protocol IOD is shown in Figure A.82.2.2-1.

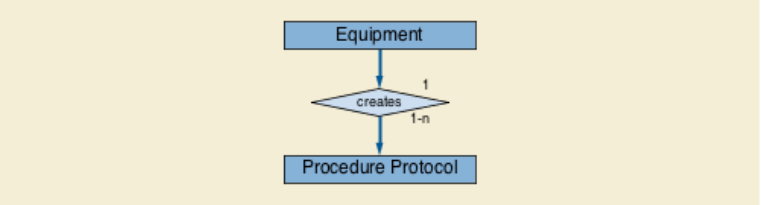


Figure A.82.x1.2-1. Paradigm Defined Procedure Protocol IOD E-R Model

A.82.x1.3 Paradigm Defined Procedure Protocol IOD Module Table

Table A.82.x1.3-1. Paradigm Defined Procedure Protocol IOD Modules

IE	Module	Reference	Usage
Equipment	General Equipment	C.7.5.1	M
	Enhanced General Equipment	C.7.5.2	M
Procedure Protocol	Protocol Context	C.34.2	M
	Clinical Trial Context	C.34.4	U
	Patient Specification	C.34.5	U
	Equipment Specification	C.34.6	M
	Instructions	C.34.7	U
	Patient Positioning	C.34.8	U
	Defined Paradigm	C.34.c2	M
	Stimuli	C.34.c4	M
	Paradigm Presentation	C.34.c5	M
	Epoch	C.34.c6	M
	Imaging Model	C.34.c7	M
	Statistical Model	C.34.c8	M
	Defined Storage	C.34.13	U
	SOP Common	C.12.1	M

Commented [CvWW2]: Will change as we have changed the model.

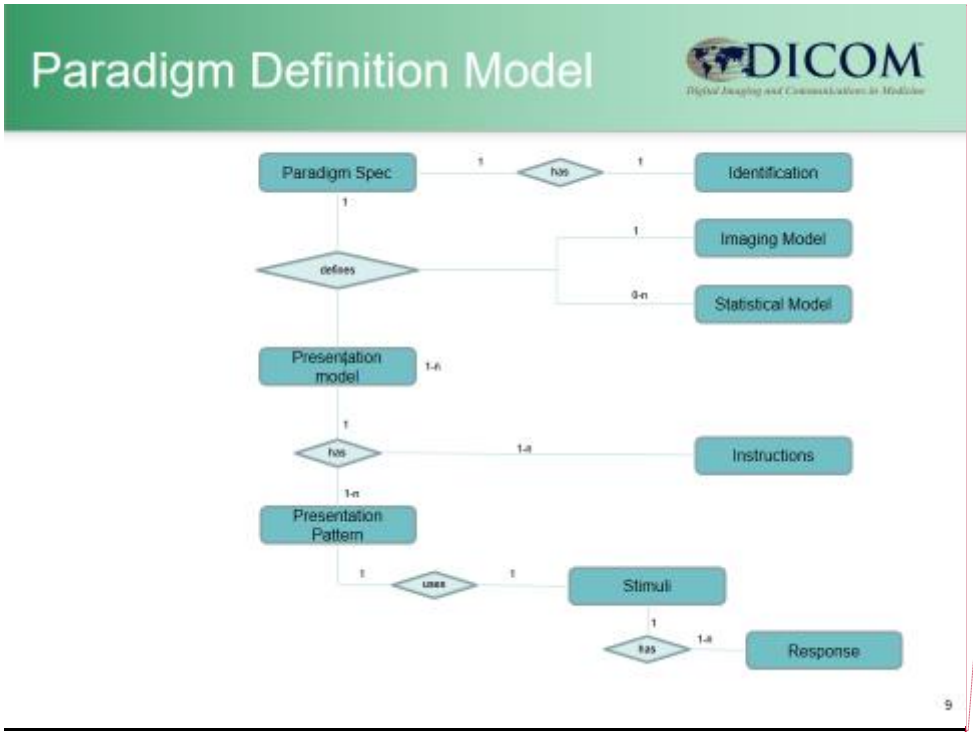
A.82.x1.3.1 Paradigm Defined Procedure Protocol IOD Content Constraints

A.82.x1.3.1.1 Equipment Modality Attribute

The value of Equipment Modality (0008,0221) shall be PARADIGM.

Note

An application can query for Protocols by matching on the modality-specific Defined Protocol SOP Class.



Commented [CvWW3]: Temporary illustration for mapping.
Paradigm Spec ➔ C.34.c2 Defined Paradigm
Identification ➔ C.34.2 Protocol Context
Presentation Model ➔ C.34.c5 Paradigm Presentation
Instructions ➔ C.34.7 Instructions

Presentation Pattern ➔ C.34.c6 Presentation Pattern
Imaging Model ➔ C.34.c7 Imaging Model
Statistical Model ➔ C.344.c8 Statistical Model
Stimulus Set ➔ C.34.c4 Stimuli
Response ➔ C.34.c4 Stimuli

Item: Amend

C.7.3.1.1 General Series Attribute Descriptions

C.7.3.1.1.1 Modality

Defined Terms:

….

OT	Other
PARADIGM	**Paradigm (Protocol)**
PLAN	Plan

…

Item: Amend

C.34.7 Instructions Module

Table C.34.7-1 contains instructions relating to preparation and performance of the Protocol.

Table C.34.7-1. Instructions Module Attributes

Attribute Name	Tag	Type	Attribute Description
Instruction Sequence	(0018,9914)	1	Instructions relating to preparation and performance of the Protocol. See Section C.34.7.1. One or more Items shall be included in this Sequence.
>Instruction Index	(0018,9915)	1	Identifies the order in which instruction sequence items are performed. The value shall be an integer, increasing monotonically by 1, starting from 1.
>Instruction Text	(0018,9916)	1	A short displayable string indicating what should be done.
>Instruction Description	(0018,9917)	3	A detailed description explaining what should be done.
>Instruction Performed Flag	(0018,9918)	2C	Whether or not this instruction was followed in the performed Protocol. Required if the value of SOP Class UID (0008,0016) equals 1.2.840.10008.5.1.4.1.1.200.2 (CT Performed Procedure Protocol Storage) **or equals 1.2.840.10008.5.1.4.1.1.200.s1 (Paradigm Performed Protocol Storage)** Enumerated Values: **YES** **NO**
>Instruction Performed DateTime	(0018,9919)	2C	Date and time the instruction was performed. Required if Instruction Performed Flag (0018,9918) is present with a value of YES.
>Instruction Performance Comment	(0018,991A)	3	Comment about how the instruction was actually performed, about the outcome of performing the instruction or about why the instruction was not performed.

Item: Add in the following new section in Annex C.34

C.34.c1 Paradigm Protocol Series Module

The Paradigm Protocol IODs use the General Series module described in Section C.7.3.1, specialized by the Paradigm Protocol Series Module, to describe the DICOM Series Entity described in Section A.1.2.3, and to define what constitutes a Series for the context of a Protocol.

Table C.34.1-t1 specifies the Attributes that describe a Paradigm Protocol Series.

Table C.34.c1-1. Paradigm Protocol Series Module Attributes

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Type of data in this Series. Enumerated Values: **PARADIGM** See Section C.7.3.1.1.1 for further explanation.

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C.34.c2 Defined Paradigm Module

Table C.34.c2-1 contains a specification of acceptable values and ranges of acquisition parameters for an imaging procedure.

Table C.34.c2-1. Defined Paradigm Module Attributes

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Attribute Name	Tag	Type	Attribute Description
Paradigm Identification			Use Macro for identification: i. Title: Text description ii. Class (one of): Motor, Hearing, Vision, Language, Cognitive, Memory, etc. iii. Difficulty (one of): Nominal, Fast/Hard, Slow/Easy, etc. iv. Natural Language: English, etc. v. Author vi. Creation date vii. Revision
Paradigm Element Specification Sequence	(0018,xx01)	1	Specification of the parameters for paradigm protocol elements in an ima procedure. There shall be one item in this sequer for each Acquisition Protocol Element the Protocol. See Section C.34.9.1. One or more Items shall be included in this Sequence.
>Protocol Element Number	(0018,9921)	1	The Protocol Element Number of the Acquisition Protocol Element being specified in this item.

Commented [CvWW4]: Need to define the way a Paradigm is described.
I expect something like:
- Waveform(s) for switching on and off
- Description of Elements to be used during the paradigm steps.

Attribute Name	Tag	Type	Attribute Description
>Stimuli Element index		1	Stimuli Element applicable for this Protocol Element
>Instruction Index	(0018,9915)	1	Instruction related to this Paradigm element
>Imaging Model			Create new Macro for green elements
>>Modality			
>>Scan type			
>>Scan Duration			
>>Parameters Specification Sequence	(0018,9913)	3	Constraints on one or more acquisition parameters. One or more Items are permitted in this Sequence.
>>>Include Table 10.25-1 "Attribute Value Constraint Macro Attributes"		Only Attributes defined in Table C.34.c5 (i.e., in the Acquisition Protocol Element Sequence (0018,9920) in the Performed CT Acquisition Module) and private Data Elements associated with this acquisition protocol element may be specified as Selector Attributes. The semantics of values of Constraint Violation Significance (0082,0036) in the macro are assigned in C.34.9.3. The same Attribute shall not appear in more than one item in the sequence with the same values for Selector Sequence Pointer (0072,0052) and Selector Sequence Pointer Items (0074,1057).	
>>>Modifiable Constraint Flag	(0082,0038)	1C	Specifies whether this constraint may be encoded in a derived instance with a different value. See Section C.34.9.4. Enumerated Values: **YES** The constraint may be modified. **NO** The constraint may not be modified. Required if the constraint may not be modified, may be present otherwise.

Commented [CvWW5]: Do we want to define a specific set of attributes or leave it open as it can be from "any" modality in the future.

Note

The Performed CT Acquisition Module in the CT Performed Procedure Protocol will generally be "fully populated". The Defined CT Acquisition Module in the CT Defined Procedure Protocol Object may be "sparsely populated" (i.e., contains only the Attributes the system that is specifying the protocol "cares about").

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C.34.c3 Performed Paradigm Module (TBD)

This Module contains acquisition parameter values for a performed Paradigm procedure. The purpose of this module is to record all relevant parameters, not just to record the values that were constrained in the executed Defined Paradigm Protocol (if any).

This Module contains Attributes that are "set" on the machine, e.g., to affect its behavior, but not those that describe the results. The latter may be found in the reconstructed images.

Table C.34.c3-1. Performed Paradigm Module Attributes

Attribute Name	Tag	Type	Attribute Description
Paradigm Protocol Element Sequence	(0018,9920)	2	Parameter values for each Protocol Element in the paradigm protocol. Each item in the sequence describes one Element. Elements are performed in the order of their Protocol Element Number (0018,9921). See Section C.34.9.1. Zero or more Items shall be included in this Sequence.
>Include Table 10.28-1 "Protocol Element Identification Macro Attributes"			
>..			
>..			

Commented [CvWW6]: Describe all elements that would be mandatory.

C.34.c4 Stimuli Module

This Module contains attributes specifying the Stimuli to be used in the Paradigm procedure. The purpose of this module is

Attribute Name	Tag	Type	Attribute Description
Stimuli Element Sequence	(yyy1,xxx1)	2	Parameter values for each Stimuli Element in the paradigm protocol. Each item in the sequence describes one Stimuli Element. Each element can be used multiple times during the execution. See Section C.34.9.1. Zero or more Items shall be included in this Sequence.
>Stimuli Element Number	(yyy1,xxx2)	1	Number of the Stimuli Set being specified in this Item.
>Stimuli Name	(yyy1,xxx3)	1	Name of the Stimuli Set being specified in this Item.
>Stimuli form code	(yyy1,xxx1)		Code describing the type of stimuli pattern (block
~~>Stimuli Activation Pattern Sequence~~	~~(yyy1,xxx1)~~		
~~>>Stimuli State~~	~~(yyy1,xxx1)~~		~~Rest/Active more options?~~

Attribute Name	Tag	Type	Attribute Description
~~>>Stimuli Duration~~	~~(yyy1,xxx1)~~		~~Time the state needs to be maintained~~
~~>>Stimuli Flexible Duration~~	~~(yyy1,xxx1)~~		~~Time interval to be used as duration for the stimuli~~
~~>>Stimuli Trigger~~	~~(yyy1,xxx1)~~		~~Actual Stimuli to be used as trigger, defines the item to be used from the Stimuli Content Sequence~~
~~>Stimuli Activation Pattern Repeat~~	~~(yyy1,xxx1)~~		~~Number of times to repeat the described pattern~~
>Stimuli Set Sequence	(yyy1,xxx1)		
>>Stimuli Set Description	(yyy1,xxx1)		
>>Stimuli Reference	(yyy1,xxx1)		Reference to place actual Stimuli objects are located
>>Stimuli Item Sequence	(yyy1,xxx1)		This might be several attributes to link to actual Stimuli to be used (pictures/ sounds/ etc.)
>>>Stimuli Item Identification			
>>>Stimuli Item Format			
>>>Stimuli Item			
>Response Sequence	(yyy1,xxx1)		Defines the expected response, can this also be used for the actual response? Macro?
>>Response Window	(yyy1,xxx1)		Start and End time, what about open ended?
>>Response period length	(yyy1,xxx1)		??
>>Response Type	(yyy1,xxx1)		Set of Defined Terms? key-press, eye tracking, physiological change, etc.
>>Expected Response Value	(yyy1,xxx1)		??

C.34.c5 Paradigm Acquisition Protocol Module

215 This Module contains attributes specifying used during the Protocol Acquisition in the Paradigm procedure. The purpose of this module is

Commented [CvWW7]: How to define the "body part" / activity to perform, is that defined in the specific protocol or is it left as parameter that will be selected during execution. Means the protocol is more generic or is the protocol specific and "copied" for other "body part".

Attribute Name	Tag	Type	Attribute Description
Paradigm Acquisition Protocol Element Sequence	(0018,9920)	2	Parameter values for each Stimuli Element in the paradigm protocol. Each item in the sequence describes one

Attribute Name	Tag	Type	Attribute Description
			Element. Elements are performed in the order of their Protocol Element Number (0018,9921). See Section C.34.9.1. Zero or more Items shall be included in this Sequence.
>Include Table 10.28-1 "Protocol Element Identification Macro Attributes"			
>Slice Thickness	(0018,0050)		
>Repetition Time	(0018,0080)		
>Protocol Name	(0018,1030)		
>Acquisition Duration	(0018,9073)		
>Discarded Acquisitions at Start	(00yy,xx01)		
>Discarded Acquisitions at End	(00yy,xx02)		
>Number of Temporal Positions	(0020,0105)		
>Procedure Comments	(0040,1400)		
>Number of Slices	(0054,0081)		

Commented [CvWW8]: Elements can be reused, so need to rephrase this part.

DICOM PS3.4: Service Class Specifications

Amend DICOM PS 3.4 Annex B.5 Standard SOP Classes as follows:

Table B.5-1. Standard SOP Classes

SOP Class Name	SOP Class UID	IOD Specification (defined in PS3.3)
…	…	…
CT Performed Procedure Protocol Storage	1.2.840.10008.5.1.4.1.1.200.2	CT Performed Procedure Protocol IOD
Paradigm Performed Procedure Protocol Storage	**1.2.840.10008.5.1.4.1.1.200.s1**	**Paradigm Performed Procedure Protocol IOD**
…	…	…

Amend DICOM PS 3.4 Annex GG.3 SOP Classes as follows:

Table GG.3-1. Standard SOP Classes

SOP Class Name	SOP Class UID	IOD Specification (defined in PS3.3)
…	…	…
CT Defined Procedure Protocol Storage	1.2.840.10008.5.1.4.1.1.200.1	CT Defined Procedure Protocol IOD
Paradigm Defined Procedure Protocol Storage	**1.2.840.10008.5.1.4.1.1.200.s2**	**Paradigm Defined Procedure Protocol IOD**
…	…	…

DICOM PS 3.6: Data Dictionary

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Amend DICOM PS 3.6 – Data Dictionary – Section 6 Registry of DICOM Data Elements as follows:

Table 6-1. Registry of DICOM Data Elements

Commented [CvWW9]: TODO update to latest elelments

Tag	Name	Keyword	VR	VM	

DICOM PS 3.16: Content Mapping Resource

Item: Add in Section B DCMR Context Groups (Normative)

TID newtid1 Paradigm Procedure Log

The Paradigm Procedure Log Template is intended for the representation of reports or logs of time-stamped events occurring during a paradigm procedure.

This Template does not require a particular ordering of the subsidiary Content Items.

Note

1. The Paradigm Procedure Log IOD (PS3.3) requires ordering by Observation DateTime; thus log entries of different types (i.e., specified by different Rows in the Template) may appear in any order.
2. While this Template is extensible, the Paradigm Procedure Log IOD forbids Container Content Items subsidiary to the top level Container.

Type: **Extensible**
Order: **Non-Significant**
Root: **Yes**

Table TID newtid1. Paradigm Procedure Log

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	DCID 3400 “Procedure Log Titles”	1	M		Root node
2	>		INCLUDE	DTID 1002 “Observer Context”	1-n	M		
3	>		INCLUDE	DTID 3601 “Procedure Context”	1	M		
4	~~>~~	~~HAS ACQ CONTEXT~~	~~TEXT~~	~~EV (121121, DCM, “Room identification”)~~	~~1~~	~~U~~		
5	>	HAS ACQ CONTEXT	TEXT	EV (121122, DCM, "Equipment identification")	1-n	U		
6	>	CONTAINS	TEXT	DCID 3401 “Types of Log Notes”	1-n	U		
7	>>		INCLUDE	DTID 3010 “Log Entry Qualifiers”	1	U		
8	>	CONTAINS	CODE	EV (121123, DCM, "Patient Status or Event")	1-n	U		DCID 3402 “Patient Status and Events”
9	>>		INCLUDE	DTID 3010 “Log Entry Qualifiers”	1	U		

Commented [CvWW10]: Can we extend CID 3400 with “Paradigm Procedure Log”?

Commented [CvWW11]: Seems ok

Commented [CvWW12]: Seems ok

Commented [CvWW13]: Seems not relevant

Commented [CvWW14]: What to capture here, might be useful

Commented [CvWW15]: Would this be the right ones?

Commented [CvWW16]: Might need specific Paradigm version.

Commented [CvWW17]: This set seems not all relevant, need other list.

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
10	>	CONTAINS	PNAME	DCID 3404 "Staff Actions"	1-n	U		
11	>>		INCLUDE	DTID 3010 "Log Entry Qualifiers"	1	U		
12	>	CONTAINS	TEXT	DCID 3427 "Equipment Events"	1-n	U		Equipment identifier
13	>>		INCLUDE	DTID 3010 "Log Entry Qualifiers"	1	U		
14	>	CONTAINS	INCLUDE	DTID 3100 "Procedure Action"	1-n	U		
15	>	CONTAINS	INCLUDE	DTID 3101 "Image Acquisition"	1-n	U		
16	>	CONTAINS	INCLUDE	DTID 3102 "Waveform Acquisition"	1-n	U		
17	>	CONTAINS	INCLUDE	DTID 3103 "Referenced Object"	1-n	U		
18	>	CONTAINS	INCLUDE	DTID 3104 "Consumables"	1-n	U		
19	>	CONTAINS	INCLUDE	DTID 3105 "Lesion Identification and Properties"	1-n	U		
20	>	CONTAINS	INCLUDE	DTID 3106 "Drugs/Contrast Administered"	1-n	U		
21	>	CONTAINS	INCLUDE	DTID 3107 "Device Used"	1-n	U		
22	>	CONTAINS	INCLUDE	DTID 3108 "Intervention"	1-n	U		
23	>	CONTAINS	CODE	EV (DD-60002, SRT, "Complication of Procedure")	1-n	U		DCID 3413 "Adverse Outcomes"
24	>>		INCLUDE	DTID 3010 "Log Entry Qualifiers"	1	U		
25	>	CONTAINS	INCLUDE	DTID 3109 "Measurements"	1-n	U		
26	>	CONTAINS	INCLUDE	DTID 3110 "Impressions or Findings"	1-n	U		
27	>	CONTAINS	INCLUDE	DTID 3111 "Percutaneous Entry"	1-n	U		
28	>	CONTAINS	INCLUDE	DTID 3112 "Specimen Obtained"	1-n	U		

Commented [CvWW18]: Seems not relevant

Commented [CvWW19]: Seems not relevant.

Commented [CvWW20]: Set in BCID 3405 is not relevant, do we need a different set or can we skip this?

Commented [CvWW21]: Do we need to capture the act of Image acquisition, or is this done on high study level as the data belongs to the same study?

Commented [CvWW22]: Can be used for physiology data captured, but might need extension to make the link to the data

Commented [CvWW23]: Seems not relevant

Commented [CvWW24]: Seems not relevant

Commented [CvWW25]: Do we want/need to identify devices?

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
~~29~~	~~>~~	~~CONTAINS~~	~~INCLUDE~~	~~DTID 3113 "Patient Support"~~	~~1-n~~	~~U~~		
~~30~~	~~>~~	~~CONTAINS~~	~~INCLUDE~~	~~DTID 3114 "Patient Assessment"~~	~~1-n~~	~~U~~		
~~31~~	~~>~~	~~CONTAINS~~	~~INCLUDE~~	~~DTID 3115 "ECG ST Assessment"~~	~~1-n~~	~~U~~		
	>	CONTAINS	INCLUDE	"Stimuli Presented"	1-n	U		
	>	CONTAINS	CODE	"Patient Response"	1-n	U		
	>>		INCLUDE	DTID newtid2 "Paradigm Log Entry Qualifiers"	1	U		

Content Item Descriptions

Row 2	Includes TID 1002 "Observer Context", which shall be used to record the identity of the person responsible for recording the log, as well as all other participants in the procedure, even though these personnel may not technically be "observers" of the Procedure Log. As participants in the procedure, they are potential sources for events and observations recorded in the Log. TID 1002 "Observer Context" allows the specification of the person's role in the organization (e.g., physician, nurse), as well as the role in the procedure (e.g., circulating, performing, etc.).
Row 5	Shall be used to record the identity of the major equipment used in the procedure.
Row 6	May be used to record any event not covered by a specific log entry Template.

TID newtid2 Paradigm Log Entry Qualifiers

The Paradigm Log Entry Qualifiers Template provides a common means for adding additional description to a procedure log Content Item. It allows identification of a source for the procedure log entry (other than the recording observer for the log as a whole), a free text comment, a link to a particular Procedure Action item, a link to a particular lesion, or the date/time of recording (if different than the time of the event occurrence recorded in the Observation DateTime of the parent Content Item).

Type: Extensible
Order: Significant
Root: No

Table TID 3010. Paradigm Log Entry Qualifiers

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			INCLUDE	DTID 1000 "Quotation"	1	U		
2		HAS PROPERTIES	TEXT	EV (121106, DCM, "Comment")	1	U		

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
3		HAS OBS CONTEXT	TEXT	EV (121124, DCM, "Procedure Action ID")	1-n	U		
4		HAS OBS CONTEXT	TEXT	EV (121151, DCM, "Lesion Identifier")	1-n	U		Up to 3 numeric characters
5		HAS OBS CONTEXT	DATETIME	EV (121125, DCM, "DateTime of Recording of Log Entry")	1	U		
6		INFERRED FROM	IMAGE		1-n	U		
7		INFERRED FROM	WAVEFORM		1-n	U		
8		INFERRED FROM	COMPOSITE		1-n	U		
9		HAS OBS CONTEXT	CODE	EV (121135, DCM, "Observation DateTime Qualifier")	1	U		DCID 3430 “DateTime Qualifiers”

Content Item Descriptions

Row 3	Procedure Action ID allows linking recorded events to a particular action, step, or phase of a procedure. See description for TID 3100 “Procedure Action”.
Row 4	Lesion Identifier is specified as a numeric text string, and allows linking recorded events to the diagnosis or therapy of particular lesion. See description for TID 3105 “Lesion Identification and Properties”.

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Item: Add in Section B DCMR Context Groups (Normative)

DICOM PS 3.17: Explanatory Information

Item: Add the following Section

Functional Study contains several steps and objects.

Some concepts used in this context.

Paradigm definition

- A description of the idealized paradigm (narrative, for human consumption)
- Paradigm instructions (to be provided to the patient)
- References, Institutional Source, revision number and other provenance
- A collection of events representing the idealized timing pattern and stimuli
    - Timing may be specific or statistical
    - Stimulus may be specific (by UID) or categorical (specific stimulus to be selected from category during execution)
    - Stimulus files might be text (to be rendered on a screen), images, WAV/MP3 files, MP4 video, etc.

Paradigm executed record – description of the paradigm (a collection of stimulus events)

- The paradigm definition (above) UID
- A collection of stimulus events from the execution
    - A stimulus presentation event is stored for each stimulus shown
        - A timestamp
        - A stimulus descriptor identifying the stimulus file (e.g. UID)
        - Descriptors (those concept words I've been looking up).

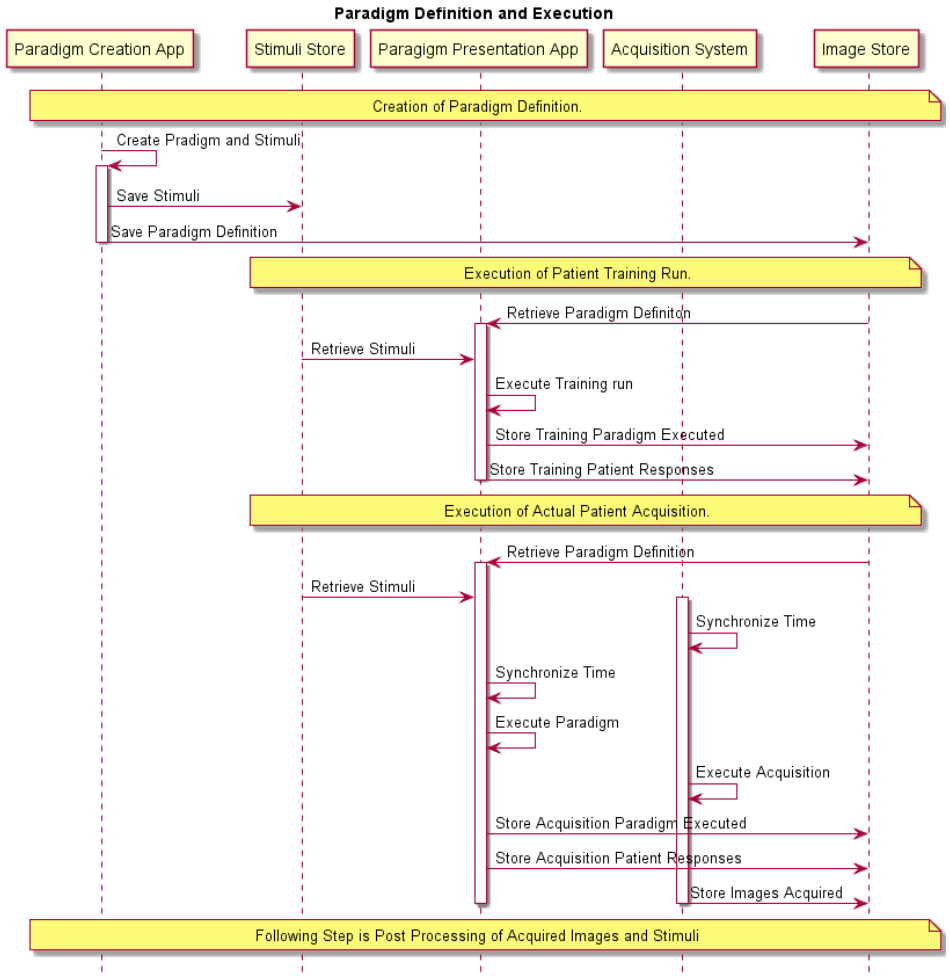
Paradigm Performance record –

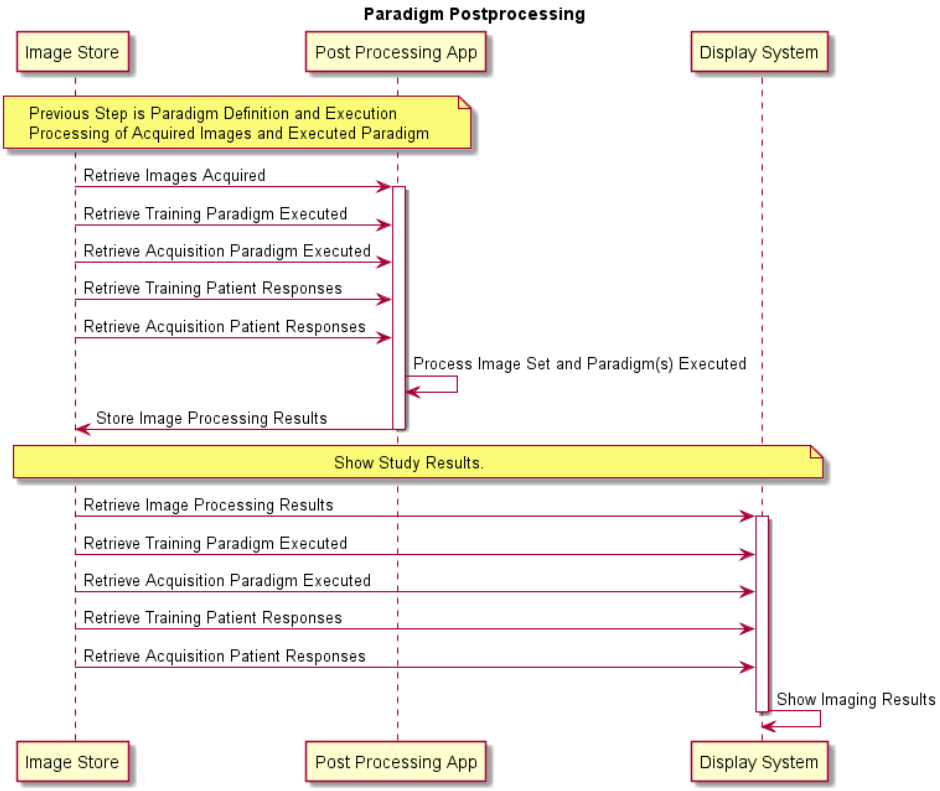
- Patient compliance
- Rationale for differences between Definition and Execution
- How well do you think you did
- How well does the tech think you did
- a collection of response events
    - A response event is stored for each patient interaction
        - a timestamp
        - a response code (e.g. key code).

Image Processing Results

- Activation maps
- Activation time series (4D) data
- Motion correction results – graphs, metrics, warnings, etc.
- Sample EPI volumes (typically an early volume from the series, or a middle volume, or an average …

315 Typical steps in a Functional Study.





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Create example, not to complex but giving different ideas.