

MINUTES

MEETING NAME 09-WG33: WG-33 Data Archive and Management

MEETING PLACE/DIAL IN

DATE & TIME Wednesday, October 14, 2020 | 11:00 am – 12:30 pm US ET

PRESIDING OFFICERS Matthew Bishop, UnityPoint Health
Keith Eklund, Healthcare Tech Solutions

VOTING MEMBERS PRESENT

AAPM	Bevins, Nicholas
Ambra Health	Ostrow, Daniel
Canon/Vital Images	Dawson, Tim
DesAcc EMEA	King, Graham
GE Healthcare	Nichols, Steven
Grafimedia	Georgiadis, Pantelis
Healthcare Tech Solutions	Eklund, Keith
Laitek, Inc.	Brown, Barry
Laitek, Inc.	Costea-Barluti, Razvan
Laitek, Inc.	Solomon, Harry
Mayo Clinic Rochester	Persons, Kenneth
Society for Imaging Informatics In Medicine	Bishop, Matthew
Society for Imaging Informatics In Medicine	Carey, Cheryl

OTHERS

DeJarnette Research Systems	Wineke, Steve
Ministry of Health	Eid, Monief
	Stefan, Ryan
	Maldonado, Josh

<u>VOTING</u>	Argentix Informatix	Silver, Elliot
<u>MEMBERS</u>	Canon Medical Research USA	O'Donnell, Kevin
<u>ABSENT</u>	Canon/Vital Images	Whitby, Jonathan
	Change Healthcare	Ho, Kinson
	European Society of Radiology	Mildenberger, Peter
	GE Healthcare	Numan, Jouke
	Laitek, Inc.	Sluis, Douglas
	Mach7 Technologies	Ulanov, Alexey
	PixelMed Publishing	Clunie, David
	Society for Imaging Informatics In Medicine	Henson, Kyle
	Varian Medical Systems, Inc.	Schwere, Thomas

DICOM Anna Zawacki, SIIM
SECRETARIAT

1 CALL TO ORDER AND REVIEW OF ANTI-TRUST RULES AND DICOM PATENT POLICY (Co-Chairs, Secretariat)

The meeting was called to order. Guidelines for Conducting NEMA Meetings were read and attendance was recorded.

2 REVIEW AND APPROVE AGENDA (Co-Chairs)

The agenda was reviewed and approved.

3 REVIEW MINUTES (Co-Chairs)

The minutes of the previous meeting were reviewed and approved.

4 TOPIC ITEMS TO BE DISCUSSED (All)

- Discuss Timestamps

<ftp://d9-workgrps@medical.nema.org/MEDICAL/Private/Dicom/WORKGRPS/WG33/2020/2020-10-14/Timestamp%20discussion.pptx>

Discussion: Inventory & Study Timestamps

Want to be able to get catchup inventory. To do that you have to know when the last inventory was and when the study was updated, but we have problems with both of those.

Issue – implementation of desired feature

- WG-33 Consensus - Inventory may be requested/produced for subset of studies, especially:
All studies updated (new, or changed metadata) after last inventory
- Requires knowledge of last Inventory datetime and Study Update datetime
- Both are problematic
 - Inventory production may be a lengthy process and cannot be assigned an instant timepoint
 - PACS generally do not record study update times (except perhaps in audit trails)

Inventory timestamp

- Inventory will record its production start time
 - Content Date / Time – will be defined as timepoint at which the inventory was begun. All Studies received before this timepoint are included in the inventory, and all patient updates through this timepoint have been applied to inventoried Studies
 - Studies received/updated after Content Date / Time, but during time of inventory production, are undefined as to whether they are wholly, partially, or not included in the inventory
 - Content Date / Time shall be consistent across all objects produced for a single inventory initiation
- End timepoint of inventory production is not mandated to be recorded
 - Nominally Instance Creation Date / Time, but pragmatic issues with updating large object under serial creation to include a final time

Study Update timestamp

- Defined attribute - Instance Coercion DateTime (0008,0015)
 - Added to DICOM by CPI216 in 2012
 - While specified in SOP Common (at Instance IE level), coercion is actually a Patient/Study level operation
- Not broadly implemented as a database key among PACS
 - Until now there was perhaps no compelling use case
 - Even if implemented, may have no assigned value for historical studies
- Include Instance Coercion DateTime as Type 2 Study level attribute in inventory object and as search key
 - Eventually leverage IHE or other profiling mechanism to encourage its implementation going forward

Instance Coercion DateTime as Inventory match key

- If Instance Coercion DateTime not supported in PACS, or has no assigned value, use Study Date / Time as default value for inventory key matching
 - E.g., Instance Coercion DateTime > prior Inventory Content Date / Time interpreted as Study Date / Time > prior Inventory Content Date / Time
- May miss studies with datetime prior to specified datetime but which were archived after inventory start
 - Recent studies that were delayed en route to PACS
 - Older studies transferred from another repository / institution
- Will miss demographic updates to studies after specified datetime

Implications for migration client

- Uncertainty of inventory end timepoint means some studies may be included in both prior and next inventory – must reconcile duplicates
- Use of Study Date / Time as default for Coercion DateTime means lag in study archiving must be mitigated, e.g., by pushing back key match datetime by n hours
 - Actual time needed dependent on delays characteristic of workflow at site
 - E.g., cardiology studies sent to PACS after reading in department (1-2 days)
- Miss of demographic updates after prior inventory can be mitigated by processing of update audit trail (e.g., HL7 ADT message archive)
 - Beyond scope of DICOM
- In general, inventory is a first order approximation, and migration clients will need to take additional (undefined) measures

Other options considered

- Study updated flag – same issues as Coercion DateTime, and no additional benefit
 - Study inventoried datetime – might assist in inventory timestamp issue (but requires solution on a study-by-study basis), but does not address other issues
- Continue going through the Draft Supplement

ftp://d9-workgrps@medical.nema.org/MEDICAL/Private/Dicom/WORKGRPS/WG33/2020/2020-10-14/SupXXX_03_ArchiveInventoryIODandServices.docx

Inventory Module Attributes – Content Date & Time – when the inventory begins

Under Study we have Inventory Date & Time – that’s when the study was actually captured.

C.YY.1.1 Inventory Module Attributes

C.YY.1.1.1 Content Date and Content Time

Content Date (0008,0023) and Content Time (0008,0033) establish the time point at which the inventory was begun. Conceptually, all Studies received by the storage system before this timepoint, and which match the specified Scope of Inventory key attributes, are included in the inventory, and all patient and study updates through this timepoint have been applied to inventoried Studies.

When multiple Inventory SOP Instances are created for a single inventory initiation, they shall have the same Content Date and Content Time.

Production of the inventory may take considerable time, during which period the storage system may be actively receiving new studies and updates. The status of such new studies and updates, e.g., whether they are wholly, partially, or not included in the inventory, is implementation specific.

Note

The using application may need to obtain a second inventory with changes since the Content Date and Time for reconciliation.

C.YY.1.1.4 Referenced Study Sequence

Within the set of Inventory SOP Instances with the same Inventory Group UID (0008,0Fx2) value, a given study shall appear only once among all the Referenced Study Sequence Items. Thus, each Study shall be described in only one Item in one Inventory SOP Instance, and it shall be completely described in that one Item.

Note

If the content of a Study changes during the production of the inventory, the producing application shall ensure that only one reference to that Study appears among the Inventory SOP Instances. As described in Section C.YY.1.1.1, the content of that reference need only reflect the known content of the Study at the time of initiation of the inventory.

2 meetings ago the issue came up of how are we going to specify the reference to stored instances? Thus, drafted Annex for part 3. Describes the use of URIs in the inventory IOD.

Annex P Stored File Formats (Normative)

The Inventory IOD (see section A.XX) includes optional attributes providing the URI link to stored SOP Instances in the DICOM File Format accessible through a non-DICOM file access protocol. This Annex specifies constraints on those URI links and their target resources (files).

P.1 FILES AND FILE SETS

P.1.1 DICOM File Format

Each stored SOP Instance that is a target of an Inventory URI link shall be encoded in accordance with the DICOM File Format (see [Section 7 "DICOM File Format" in PS3.10](#)).

550 Note

Depending on the storage mechanism, this target resource may be denoted a "file" or an "object".

While the stored SOP Instance shall be fully conformant to the DICOM File Format, some attributes may not have current values (e.g., Patient Name may have been corrected or changed). The current values are encoded in the Inventory SOP Instance.

P.1.2 Container Formats

SOP Instances in the DICOM File Format may be further aggregated into container data structures in accordance with the mechanisms specified in this Section.

P.1.2.1 ZIP

SOP Instance files may be included in a ZIP container file in accordance with [ISO/IEC 21320-1].

560 Note

[ISO/IEC 21320-1] is a constraint on the [ZIP] specification, and in particular supports only uncompressed or DEFLATE [RFC1951] compressed files.

P.1.2.2 TAR and TAR+GZIP

565 SOP Instance files may be included in a *ustar Interchange Format* container file (commonly denoted "TAR") in accordance with [POSIX].

Note

"ustar" is the formal name, derived from "Unix Standard Tape Archive". The specification for *ustar Interchange Format* is in the [POSIX] section "pax - portable archive interchange".

The TAR file may further be compressed in accordance with the [RFC1952] GZIP specification.

570 P.1.3 File Sets, Folders, and Directories

The file or object storage mechanism may support data structures that manage references to sets of files, commonly denoted "folders", "directories", or "buckets"

Note

The term "folder" is used in this specification due to potential ambiguities with the term "directory".

575 The storage of multiple SOP Instance files may be managed such that all SOP Instances in a Study or in a Series are contained within a single folder. Within that folder, the files may be included in a ZIP, TAR, or TAR+GZIP container file.

P.2 ACCESS PROTOCOLS

580 The non-DICOM file access protocol used in the Inventory URI link is not constrained by this Standard. The Conformance Statement for the implementation shall specify the protocol(s) in its description of conformance to the Inventory SOP Class.

Note

Specification may be facilitated by reference to IANA-registered schemes <https://www.iana.org/assignments/uri-schemes/>

585 Common protocols are listed in Table P.2-1.

Table P.2-1. Common Non-DICOM File Access Protocols (Informative)

Protocol	IANA-registered Scheme	Further Specification)
NFS	nfs	RFC7530
SMB	smb	https://docs.microsoft.com/en-us/openspecs/windows_protocols/ms-smb2
S3	https	
CloudStack	https	

One thing to revisit from last meeting – body part examined and anatomic region.

How much do we want to require matching on the anatomic regions body parts?

How broadly implemented is that among PACSs that we want it to be supported?

Not much value – especially looking at it from the migration use case. Research use case – it would be very useful.

>Anatomic Regions in Study Code Sequence	(0008,0063)	2	Matching key values for Anatomic Region and Body Part Examined. Zero or more Items shall be present. See C.YY.2.1.3
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Consensus to pull it out of here. Won't do it as a match key.

Our next meeting is in 2 weeks – 10/28. The following meeting after that is the meeting of DICOM WG-06 – this will get the first read by WG-06 then.

Conformance – we have to think about whether there is anything special in conformance. Because we have structured this in the context of parts 3 and 4, I think sufficient.

For part 3 – adding in some references, models of the real-world, info model for inventory is a study root model – patient hangs off of study, imaging service request hangs off of study.

In SOP common – breaking out the original attributes sequence into a separate macro so we can use that in the inventory module.

Add in reference to non DICOM process – info about reconciliation.

Inventory Module – includes Content Date & Time + description, Scope of the Inventory Macro, requesting AE – just recording who initiated the inventory creation, we talked about the Group UID and the In-group number.

Inventory Content level – can get inventory that is only study records; study and series records; study, series and instance records.

Study Series Sequence – reference study appearing only once in the inventory group. Not going to allow subsequent updates to studies that happened during

the inventory period to make the study show up twice. Would complicate things if we allow for it.

Discussion & Consensus to not use wording for metadata match flag.

Anatomic Region – optional

Original Attributes Macro – records prior values that have been updated, optional

Retrieve AETitle for DIMSE retrieves, retrieve URL for DICOMweb retrieves

Need to either have an AE title or a DICOMweb origin server

Body part examined – type 3, but it may not be possible since it may not be transcodable

Talked about FilePath expiration DateTime – if it's expected that the storage location is going to change, TTL for the path makes a lot of sense

Scope of Inventory Macro – our search parameters, single item in a sequence that gives you a match parameter, we have a Start and End time points, specifying datetime range

For simplicity – need only one, either coercion or study datetime.

Study Description as a matching key

Modalities in Study – allow multiple values

Study Instance UID List – give a list of study instances to be inventoried – rather than doing a multiple value for UI I did this as UC value representation; same with Patient ID List, doing UC to allow multiple patient IDs

Need to revisit Inventory Storage SOP Class and make sure the wording on it is correct.

Inventory Query Retrieve – this is to pick up the inventory – not gone through this since the beginning so need to revisit. Through DIMSE services you can FIND, MOVE or GET the inventory object.

Annex on the Inventory Initiation still needs work

Also need to revisit Scope of Inventory Sequence and specify the rules on how the key matching works.

Need something about Security of Data at Rest and How you do study matching for research, and how to do a join across databases.

Next mtng:

- Next version of the Supplement will be posted by 10/19

- That gives folks over 1 week to look at it, raise additional questions, suggested revisions to the text, open issues
- At next mtng we'll go through everything and clean it up for presentation to WG-06
- Daniel to present something about authentication/authorization

5 OLD BUSINESS

6 NEW BUSINESS

7 DATE AND TIME OF NEXT MEETINGS (Secretariat)

- Continue T-con meetings bi-weekly for the time being
- Next call is October 28, 2020 between 11:00 am and 12:30 pm ET

Reviewed by Counsel Peter Tolsdorf on 11/23/2020

<u>NEMALINK CODE</u>	09-WG33
<u>SUBMITTED BY</u>	Hull, Carolyn
<u>SUBMITTED ON</u>	11/16/2020
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