Integrating the Healthcare Enterprise

IHE Radiology
Technical Framework Supplement

Post-Acquisition Workflow (PAWF)

Trial Implementation

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Foreword

This is a supplement to the IHE Radiology Technical Framework V11.0. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

This supplement is published for Trial Implementation on June 15, 2012 and may be available for testing at subsequent IHE Connectathons. The supplement may be amended based on the results of testing. Following successful testing it will be incorporated into the Radiology Technical Framework. Comments are invited and may be submitted at http://www.ihe.net/radiology/radiologycomments.cfm.

This supplement describes changes to the existing technical framework documents and where indicated amends text by addition (**bold underline**) or removal (~~**bold strikethrough**~~), as well as addition of new sections introduced by editor's instructions to "add new text" or similar, which for readability are not bolded or underlined.

"Boxed" instructions like the sample below indicate to the Volume Editor how to integrate the relevant section(s) into the relevant Technical Framework volume:

Replace Section X.X by the following:

General information about IHE can be found at: www.ihe.net

Information about the IHE Radiology domain can be found at: http://www.ihe.net/Domains/index.cfm

Information about the structure of IHE Technical Frameworks and Supplements can be found at: http://www.ihe.net/About/process.cfm and http://www.ihe.net/profiles/index.cfm

The current version of the IHE Technical Framework can be found at: http://www.ihe.net/Technical_Framework/index.cfm

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Introduction to this Supplement

This Profile replaces the Post-Processing Workflow Profile (PPWF). The use cases addressed are largely the same, but the underlying mechanisms are improved.

The Post-Acquisition Workflow Profile addresses the need to schedule, distribute and track the status of typical post-acquisition workflow steps, such as Computer-Aided Detection or Image Processing. Worklists for these tasks are generated and can be queried, workitems can be selected and the resulting status reported from the system performing the work to the system managing the work. The Profile also addresses hosts performing workitems by launching and communicating with hosted applications.

Closed Issues

1	How should the Profile be Packaged/Drafted? - Define a new Profile; Retire PPWF Profile - Maintain most actors - Retire the old transactions - Clone the old transactions and redefine the contents to the new mechanisms - Add transaction for Push Workitem; actor for Push Performer
2	How should the Profile be Named? *A. Post-Acquisition Workflow (PAWF)* It will be presented as a "modernized" version of PPWF with new capabilities for hosted applications, push workflow, and subscription-based monitoring.
3	How should Host & Hosted App be added? A: Define a Host Actor and mandate it be grouped with Evidence Creator or Performer. Define a Hosted App Actor that is not required to be Grouped. Define transactions between Host and App because it is useful to profile the communication between them since they might come from different vendors. Ignore the fact that generally they will be running on the same device. The key point is that we ARE mandating a standards based communication between them.
4	What do we do about Reporting Workflow Profile? A: Set aside this year.

	There's no rush to implement it so we probably don't need to "suspend" it. Since it uses the "old" transactions, don't retire those in this supplement. Revisit RWF next year. If UPS is working out, consider a supplement to do the same overhaul for RWF and consider addressing Departmental Workflow as well.
5	How should Processing be added to the worklist, e.g., by Order Filler? A: Add Create Workitem transaction from Workitem Creator. Order Filler (or other systems) can group with Workitem Creator if desired, and/or WI Mgr can create internally. Add the Procedure Scheduled (and Update) from the Order Filler to the WI Mgr so it is well informed of Dept. Activities. The original profiles left it up to the Post-proc Manager and the Reporting Manager to populate their lists. Possible triggers included querying Modality Worklist, listening to Procedure Scheduled/Updated, listening to Modality PPS Complete, listening to Instance Availability Notification, Instance Availability Query, by proprietary channels, or by being grouped with an Order Filler or an Image Manager/Archive. As an exercise, make a table of the key contents of the UPS and map where you could populate it from (e.g., instances from MPPS, or from Query, or from IAN, or just point at Study UID, etc.)
6	Add transaction to Request Cancellation of Workitem? A: Agreed.
7	What workflow variants do we want to profile/require? A: Basic centrally managed pull is the starting point. Push from central manager to leaf nodes is also useful to profile. Could have informative text about subcontracting by grouping a WI Mgr with a Worker. Additional patterns can be considered in the context of use cases, but should probably start with the two above and leave others (such as Event-driven or Daisy Chain) for possible future named options if warranted. - Event-driven – watch for predecessor tasks and necessary inputs and self schedule - Daisy Chain – push successor tasks to downstream system
8	How should we distribute workflow variant requirements? Manager will likely be required to support all capabilities. Clients/workers support what is appropriate for them. Pull client actor has to handle pull and push client actor has to support push. Don't go the option route.
9	To what extent should we profile referencing XDS-based inputs/outputs?

	A: Silent for now. Might add a named option later.
10	How should hosted applications be identified/addressed? A: Use the AE Title of the Host. The Host will instantiate hosted applications as appropriate based on the nature of the task. Essentially mapping a procedure code to a particular application could be the "business logic" of the host (possibly along with the details of the data and processing parameters) Consider a content item in the Processing Parameters list that holds a triplet for the application or class of application you wanted to do the work. Alternatively, the Scheduled Station details in the UPS instead identify the actual application that you want to perform the work. Could use a URI to point to the application? Considered but rejected having additional AE Titles for each hosted applications sharing the same IP (but different ports?) on the host.
11	Are the parameters in UPS sufficient for what we think Hosted Applications will need? A: Yes. Hosted Applications now have access to the entire UPS contents. If the flat list in the Scheduled Processing Parameters Sequence is good enough for Workitem Performers, it ought to be good enough for Hosted Applications. The alternative of copying the parameters into a companion DICOM SR file and passing that to the App didn't seem to have any advantages. Applications are still free to design SR templates for the Scheduled Processing Parameters Sequence (like being done in DICOM Sup124) or even entire input parameter objects that could be referenced as inputs. The rationale for giving the app access to the whole UPS is that it might also like to know a variety of the attributes in a UPS Workitem (e.g., the Admitting Diagnosis, etc.), so it would be simplest to give the App access to the (normalized) UPS instance and let it find/use what it wants. To avoid having multiple passing methods, when the Host is using an Application on its own (i.e., independent of post-processing workflow) it will internally create a UPS instance to carry the task definition, parameters, etc. to the Application.

12	Who "owns" the UPS Workitem (Host or Hosted App)? A: The Host. The Host accepts the workitem and abstracts/extracts the contents of the workitem and passes it on to the application. Since the Host does the job of doing DICOM on behalf of the hosted apps, this is not really different (e.g., the host does proxy status updates from the hosted app). We may need to write requirements on the hosted application to provide the necessary information and events for the Host to properly populate and interact with the outside world through the workitem (e.g., hosted application must send signal allowing the Host to mark the workitem complete, etc.). Could go so far as to have the Host fully abstract the workitem and make it "fully" available to the application (although certain bookkeeping would be left to the host).
13	Should a workitem specify a class of applications instead of a specific application? A. A workitem can specify a workitem code, a station class or parameters. The Host has the burden of configuring mappings so the Workitem Creator can do what it likes. The Workitem Code and a class of applications overlap since the class is probably the group of applications that can carry out a particular Workitem Code.
14	Does the Host need to tell the WI Mgr which applications/classes it has access to? A: No. For now assume this is configured on the WI Mgr (or the WI Creator if it creates such workitems). Discovery is a pain. Also, the Host could simply send back an error to the WI Mgr if it cannot accomplish the workitem due to lack of application/class.
15	Should there be a download service (Host can find/get a requested application)? A: No. Out of scope – that's a configuration/product feature.
16	Add Order Placer to profile? (e.g., to ordering specific post-processing like 3D analysis) A: Yes, Probably
17	Add named option for WI Mgr to support/interface with XDW? A: No/Not yet. XDW would probably prefer to talk to a "Department Workflow Manager" which means waiting until we finish the Reporting Workflow update and map the departmental layer

	that combines the acq, pproc and reporting. It would also involve drafting/addressing cross-enterprise use cases.
18	Should we add a Push/Assign UPS Workitem transaction? A: No. A Push UPS Workitem transaction would distribute UPS instances over many processing systems which would make it tedious for watchers to monitor activities in the department. A separate Assign UPS Workitem transaction is unnecessary. The workitem is assigned by setting the Scheduled Station Name Code Sequence in the UPS instance. This can already be done within the Create UPS Workitem transaction or by the Workitem Manager. Workitem Performers are already required to accept Send UPS Notification, so it will be notified of the workitem creation/update with its name on it.
19	Do we need to allow a UPS to be claimed but not yet in progress? A. Yes. It's a reasonable state. The main thing watchers would want to know is if the Performer that is holding a workitem hasn't actually gotten around to doing anything yet. They might also like to be able to Get an attribute that tells them who is working on it. Don't really want to add a new workitem state (CLAIMED) to UPS. Keep the existing text that goes to INPROGRESS when claimed. Require Performers to update the Performed Procedure Start DateTime and the Performed Station Name Sequence when they really start work. Note that if useful they can also set/update the Progress percentage and/or Progress Comment.
20	Does this support workitems sent across organizational boundaries? A: Out of Scope. In theory it is possible, but the mechanics are not directly addressed beyond requiring Issuers for IDs and Accessions.
21	How do you know who claimed a Workitem? A: Should be in the Performed Station Name Sequence.
22	Allow creation of workitems even when inputs not available? A: No. Require both a complete list and instances available The alternative of allowing it would mean the availability of inputs must be tracked and the Input Readiness State flag updated accordingly by someone.

	The Workitem Manager would have to do this anyway for internally created workitems, and we'd probably like the Workitem Creator to be lightweight so don't want to mandate that the WI Creator do it. This would boil down to requiring : A) If the Input Readiness State is created UNAVAILABLE, the WI Mgr shall do an Instances Availability Query to the retrieval source specified in the Input Information Sequence. If all are there, set READY. If some or all are not there, then periodically poll by repeating the IAQ. Note that currently the Instances Availability Notification is semantically broken since the referenced instance set can contain instances that will never be stored: (Peek at IOCM) "The Image Manager/Image Archive, **after having received the last instance of the instance set referenced in the MPPS**, shall send an Instance Availability Notification to the DSS/Order Filler that has also received the related MPPS. It may also decide to send the Instance Availability Notification to other instance managing actors in the workflow to inform them that all instances referenced in the related MPPS are available. One Instance Availability Notification shall be sent for each MPPS that contains references to instances." which would depend on each potential image source being configured to notify the WI Mgr, and more importantly runs into the MPPS Instance List Semantics problem. B) All potential sources of input images are required to be grouped with a Watcher. When a workitem in the Scheduled state is created or modified, the image source checks if it is identified in the Input Information Sequence and if so, checks if the instances in the UPS are available and sends an IAQ to the WI Mgr once they are.
23	Address Storage Commitment for output stored to XDS or media? A: Not now since those two formats are out of scope in this supplement. If XDS or Media Storage is addressed later, should revisit this issue.
24	Should we mandate the Order Placer support specific processing codes? A: No. We don't have enough of a handle on the code sets to mandate. First let's see if the Order Fillers get into scheduling processing (i.e., by grouping with a Workitem Creator and perhaps a Watcher) before we get into OP ordering processing. Note the processing code list in the HL7 ordering transaction?
25	How would we make an "I think I'm done" message? A. Could have a workitem with a standard code for "Declare no further intended contributions to this study", however this will not be addressed now. Needs more thought and could easily be added later if useful.

	A system could schedule such a workitem for each relevant Performer as a way to request "ready to read" input. Alternatively a performer could self schedule such a workitem to provide unsolicited input.
26	Should the PPS Manager be added to the Profile? A. Don't add a new actor but describe grouping with an MPPS Manager in X.7. MPPS could be mirrored in UPS if the MPPS Manager were grouped with a Workitem Manager, or with a Workitem Performer that "self-schedules". Watchers would then be able to monitor acquisitions as well as post-acquisition tasks. (Subscription based notifications are nicer than the MPPS model of dual-implementation and grouping on the RIS and PACS with dual-forwarding, mutually-excluding configuration and no one else can track.) There would be some work to map between the two and reconcile some of the semantics.
27	Do we want to mandate that a Performer not COMPLETE a workitem until the instances listed in the Output Information Sequence have been stored and committed to the identified source? A: No. Timely notification of completion is useful and listing in the sequence is not a guarantee of current availability. Although this means it's possible that in rare cases storage/commitment fails and thus the AE_TITLE in the Output Information Sequence is not accurate, it is presumed that consumers will be robust enough to locate the listed instances. This is analogous to what already happens with acquisition data.
28	Should we put the key details (study UID and work item code) into the progress information module? A: No. Probably not worth it. It would mean they go into the notification message so they could be easily ingested (and proxied into an HL7 message?) A system that wants to be helpful could simply implement a Watcher which can receive Notifies and do Gets for any useful details. It could generate any appropriate HL7 messages on its own.
29	Is the Host permitted to subdivide a workitem and spread it across several apps, or must it maintain a 1:1 mapping.

	A: Can subdivide if it wants. The App should be Workitem unaware. The Host decides how to translate and decides when the work is done (based on info from App) and Host does all interactions with WI Mgr. Apps are workitem-blind. Note that in DICOM Apps are parameter-blind (although WG23 was thinking about the idea of passing a Content Item sequence which would work well since the Workitem parameters are also a Content Item sequence). Some hosts might be App-blind. So profile that the Host must have a configurable mapping for Workitem Code to an app, and it sends the list of inputs from the workitem to the app. App can (in DICOM) and shall (in IHE) send back status including if the work is canceled/aborted. Definitely sounds like we will be profiling the behavior of both the Host and App (e.g., PAWF app must eventually send a Completed signal).
30	Should we allow the Hosting System to exist without grouping with Performer? A: In this profile, No. If it's in this profile, it needs to play in PPWF via grouping with Performer. In another profile it might be reasonable to have a Host that doesn't do PPWF. i.e., is there useful profiling for the Host and App independent of worklists and reporting on work?
31	Is there a baseline codeset for Scheduled Workitem Code that it would be useful to mandate? A. Not here, but it would be good to work with DICOM and RadLex. DICOM could pick a few really common specific ones (e.g. corresponding to existing CPT codes; a DICOM CP has been submitted.) and look to RadLex for a more complete list. RadLex would be a good place to select a good set (although they don't have one now), perhaps based on the list provided by Mayo. Might have to be done on a modality by modality basis.
32	Do we need to raise the bar on UPS attribute optionality? (in PS3.4 Table CC.2.5-3) A. Except for Issue #43, no.
33	Should Performers be required to update workitems for any specific conditions? A. Except for Issue 19, can inform but not required.

	DICOM requires that the workitem meet final state requirements (which may require updating attributes) prior to being move to COMPLETE or CANCELED, but does not require any other updates. Status update frequency will be somewhat implementation dependent. Might mention the idea of a configurable Performer setting for frequency of status update to reflect current. E.g. so if the customer sets it to 5 min, the status on the Manager is no more than 5 minutes old. This might also be useful as a heartbeat mechanism.
34	Is there any reason to prohibit Manager support of Gift Subscriptions? A. No. No need to prohibit. See PS3.17 GGG.3.3. One could imagine various scenarios where it would help make other systems (RIS, Reporting Mgr, Auditor, Patient Record System, DVD Burner, etc.) aware of workitems relevant to them. Some recipients of gift subscription might not know what to do with the notifications, but they can unsubscribe or just ignore them. If it's problematic, configure the gifter to stop gifting.
35	Should we mandate that Cancellation Requests include the Reason for Cancellation and/or Contact Information for the requestor? A. No. DICOM leaves these as Type 3 for the SCU. Since the Performer would likely ignore requests which lacked a compelling reason or contact info, it is in the interests of the SCU to send them, so there's no need to mandate. Such details would be useful for auditing and reporting and the Audit message should copy this information from the cancellation request, but getting the user to populate the field in the request is a site policy/enforcement issue, not an integration issue.
36	Do we need an "Understanding UPS if you did GP-WL" Informative Section? *A. No. Seems pretty self apparent since much was borrowed directly from GP-WL.*
37	Should the Output Information Sequence list instances that are not and will not be made available for retrieval? A: No.

	The purpose of the Output Information Sequence is to communicate what is available to others, not to record intermediate activity of the Performer. Besides which, if we did include such instances, what would the retrieval method be?
38	Does a use case for "unknown patient" exist? A: No. To have data to process for a John Doe patient, an acquisition or import has already been performed, so a Study and a temporary patient ID have already been created, so to the Post-Acquisition Workflow it looks like and is treated like a regular workitem. <Unless someone thinks up something about the later data reconciliation steps that PIR doesn't handle.>
39	Should we include details about the libraries the app needs from the host to run? A. No specific recommendation was provided. Leave for now. Although it was pointed out that John Moerke had a good start to an app self-description that could be provided to a host.
40	What should we tell Performers about honoring Scheduled Station Name assignments? A. Never take a workitem assigned to another station; leave it to the Manager to re-assign or unassign workitems that don't get picked up. Propose that DICOM include this in UPS. If we stay silent, it defaults to: Feel free to claim every workitem regardless of who it's assigned to, thus diverting work from its intended workstation. In some cases tasks really need to be handled by an assigned workstation. Considered an alternative logic of "If it's assigned to another workstation, wait some amount of time to allow the assigned station to claim it if it's active." but this approach raises additional questions. It seemed better to depend on the manager to be smart.
41	How to handle security for delegated tasks? A. Most will do this profile assuming it operates inside a "secure environment" (i.e., not address security explicitly) There is a mechanism for passing on a SAML assertion or having delegated certificates. A Multi-Site Clinical Trial would probably use multiple instances of the worklist rather than cross-enterprise worklists, so not clear we have a use case.
42	To participate in the Profile, Order Fillers must send Procedure Scheduled/Updated

	messages to an additional destination. Is that an unreasonable burden? *A. No.*
43	Should Workitem Code and Accession # be made mandatory in created Workitems? *A. Require a workitem code in Create UPS Workitem. Leave Accession Type 2.* They are currently Type 2 in DICOM.
44	Table W.1-1 specifies copying Study UID and Accession # from input data for Ad Hoc work. Is that reasonable? A. That's a reasonable starting point, but point out there will be odd cases the Performer needs to handle (either by talking to the operator, or using internal logic such as creating a new study, or putting it in the newest input, or just halting with an exception). In many cases it makes sense and is simple to copy from the input data. In the group case or when the task combines inputs from multiple studies, the Performer has to figure out which one of several values to copy. There may be cases where it doesn't make sense (e.g., prior exam is Accession 1, current exam is Accession 2, and this ad hoc processing should go into Accession 3 Ultimately, the Performer only has to deal with this for unscheduled work. If you want well linked/coordinated behavior, schedule the workitems. Note that creating a new study w blank accession would create a lot of orphans. The copy from input would work most of the times.
45	Are Study ID and Scheduled Procedure Step ID needed? *A. No.* When describing the requirements for aligning attributes between UPS Workitems and created Images, these two were left out. Study ID seems redundant/useless (the only guidance seems to be to copy Requested Procedure ID into it). Schedule Procedure Step ID seems to have had a use when cross-indexing several SPSs against several PPSs. In UPS there is a one to one mapping so it seems irrelevant/not applicable.
46	Are the mandated Matching and Filtering Keys sufficient? A. Apparently. No suggestions to expand. A number of possibilities for Additional Filtering were listed in 4.81.4.1.2.1. which are

	not mandated on the SCU. Proposals were solicited but none received to mandate any additional attributes as either Matching Keys (server side filtering) or Return Keys (client side filtering/sorting). For GPWL DICOM/IHE mandated that the SCU Return: • Input Readiness State • Scheduled Procedure Step Priority • Input Information Sequence • Study Instance UID • Referenced Study Sequence • Patients Birthdate • Patients Sex
47	Is there a need to specify an Audit Message for accessing the worklist item? A. No. Followed the precedent of PPWF of tracking the initial query that returned information on various workitems, but did not set an audit event for each access of the contents of each workitem individually. Can upgrade this with a CP if necessary.
48	Do we need to audit Task Start and if so with what message? A. Skip it for now. There is no "Task Start" audit message defined in ITI and Rob and John do not see value in a creating one. If we manage to come up with a case for a security/privacy benefit to task level auditing (i.e. what would a security officer learn by looking at it?) we can use Application Start and structure the process ID to see the tasks as "subprocesses" of the Hosted Application (which in turn is a sub-process of the Hosting System Actor.
49	Should we add a column for Scheduled to Table W-1 and describe populating attributes from an associated HL7 Order? A. No. We decided to leave out discussion of Order Placer participation in terms of ordering post-processing. If it is helpful, we can add it later.

50	Is Application Hosting inherently tied to UPS-based Workflow Management? *A. No.* Application Hosting (and for that matter the transactions defined here) could be used independently of UPS or Post-Acquisition Workflow but this Profile/Supplement does not address that scenario.
	Rule of Thumb: If messages don't result in something happening elsewhere in the swimlane diagram (it's just between you and me) then it's messages in a transaction. If there IS something elsewhere, then it's a new transaction because otherwise you would have to show "flavours" of the transaction for the swimlane to make sense so have another transaction.
	Note for reviewers: *This profile is a test-run of a modification to the supplement template to assign Roles at the beginning of Transactions. This eliminates awkward wording, structures and maintenance when a transaction can be used by multiple actors and even multiple Profiles.* *Current concept is that Role names are locally unique in the Transaction, not globally unique. To that end, convention is currently to make them one word names, so they don't confuse/conflict with actor names in general. This is very much the same pattern as DICOM which always has the same two roles for all transactions: SCU and SCP.* *Consider making a list of typical Role pairs (Sender-Receiver, Requestor-Server, Performer-Manager, Subscriber-Manager, etc.) that would probably address 99% of our transaction cases.*

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Volume 1 – Profiles

30 Post-Acquisition Workflow (PAWF) Profile

The Post-Acquisition Workflow Profile addresses the need to schedule, coordinate and monitor the status of typical post-acquisition steps, such as performing QA, additional reconstructions, Computer Aided Detection, clinical analysis applications, image processing or visualizations such as preparing 3D surface views. Worklists containing workitems for such tasks are generated and can be queried, workitems can be selected and the resulting status returned from the system performing the work to the system managing the work and notifications provided to other interested systems.

Each workitem initially describes the task to be performed, and can describe the resources required or allocated, the expected schedule, processing parameters and specific references to input objects. As the work is performed, the contents of the workitem are updated to describe the work actually performed, the resources used and references to the output objects created.

The Post-Acquisition Workflow Integration Profile is modeled as a continuation of the Scheduled Workflow Integration Profile and shares the same model of studies, orders and procedures (RAD TF-1:3.4.1).

The Post-Acquisition Workflow Integration Profile also addresses the integration of processing applications that operate as hosted applications (e.g., a CAD application) on a hosting system (e.g., a PACS, a workstation or a clinical application server). The tasks described by the workitems may be performed by hosted applications.

30.1 PAWF Actors, Transactions, and Content Modules

Figure 30.1-1 shows the actors directly involved in the PAWF Profile and the relevant transactions between them. If needed for context, other actors that may be indirectly involved due to their participation in other related profiles are shown in dotted lines. Actors which have a mandatory grouping are shown in conjoined boxes.

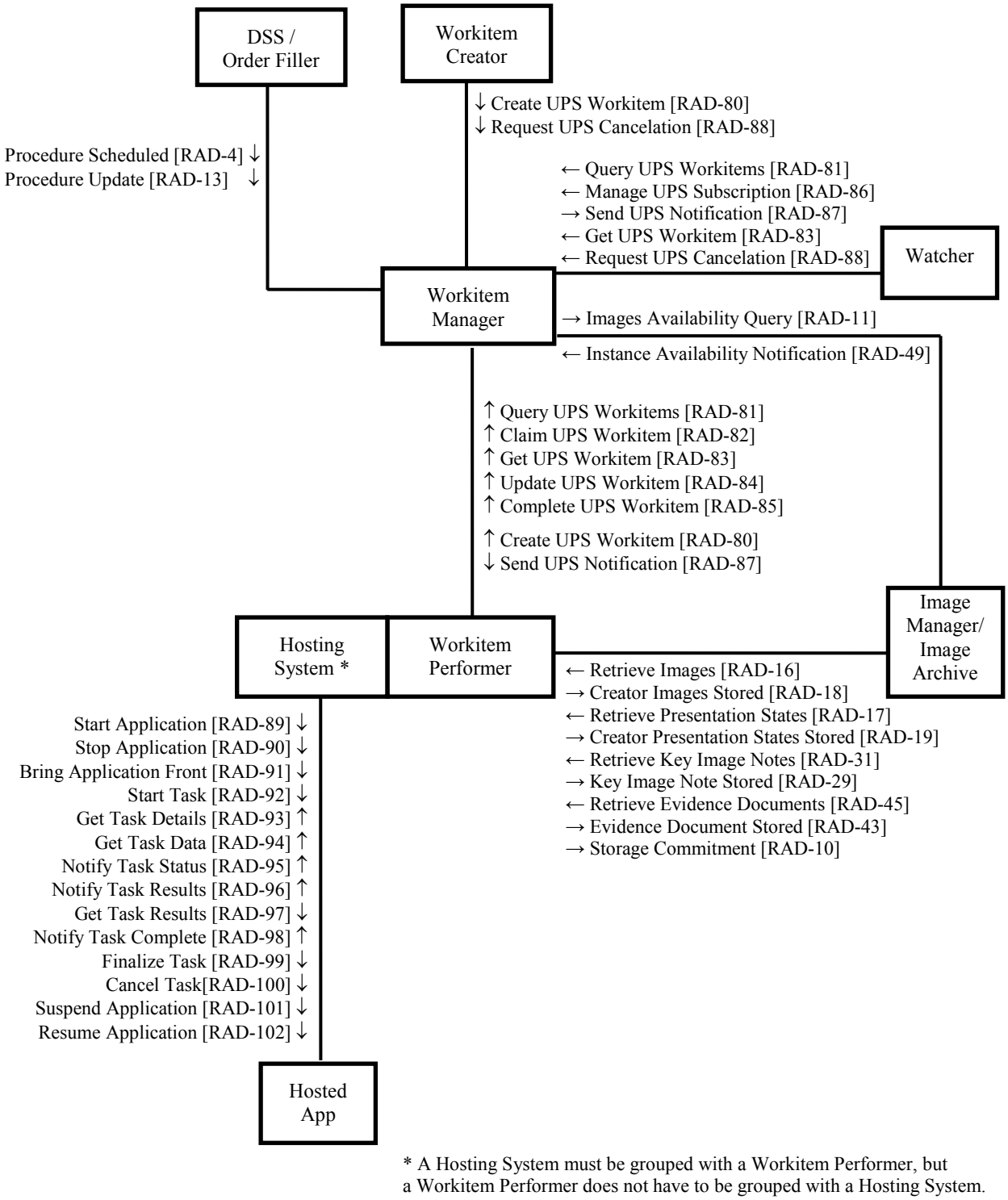

Figure 30.1-1: PAWF Actor Diagram

Table 30.1-1 lists the transactions for each actor directly involved in the PAWF Profile. In order
265 to claim support of this Profile, an implementation of an actor must perform the required transactions (labeled "R") and may support the optional transactions (labeled "O"). Actor groupings are further described in Section 30.3.

Table 30.1-1: PAWF Profile - Actors and Transactions

Actors	Transactions	Optionality	Section in Vol. 2/3
Workitem Creator	Create UPS Workitem	R	4.80
	Request UPS Cancelation	R	4.88
Workitem Manager	Create UPS Workitem	R	4.80
	Query UPS Workitems	R	4.81
	Claim UPS Workitem	R	4.82
	Get UPS Workitem	R	4.83
	Update UPS Workitem	R	4.84
	Complete UPS Workitem	R	4.85
	Manage UPS Subscription	R	4.86
	Request UPS Cancelation	R	4.88
	Send UPS Notification	R	4.87
	Images Availability Query	R	4.11
	Instance Availability Notification	R	4.49
	Procedure Scheduled	R	4.4
	Procedure Update	R	4.13
Image Manager/Image Archive	Images Availability Query	R	4.11
	Images Availability Notification	R	4.49
	Storage Commitment	R	4.10
	Retrieve Images	R	4.16
	Creator Images Stored	R	4.18
	Retrieve Presentation States	R	4.17
	Retrieve Key Image Note	R	4.31
	Key Image Note Stored	R	4.29
	Retrieve Evidence Documents	R	4.45
	Evidence Document Stored	R	4.43
DSS/Order Filler	Procedure Scheduled	R	4.4
	Procedure Update	R	4.13
Watcher	Query UPS Workitems	O	4.81
	Manage UPS Subscription	R	4.86
	Send UPS Notification	R	4.87
	Get UPS Workitem	O	4.83
	Request UPS Cancelation	O	4.88
Workitem Performer	Create UPS Workitem	R	4.80

Actors	Transactions	Optionality	Section in Vol. 2/3
	Query UPS Workitems	R	4.81
	Claim UPS Workitem	R	4.82
	Get UPS Workitem	R	4.83
	Update UPS Workitem	R	4.84
	Complete UPS Workitem	R	4.85
	Send UPS Notification	R	4.87
	Storage Commitment	R	4.10
	Retrieve Images	O (Note 1)	4.16
	Creator Images Stored	O (Note 1)	4.18
	Retrieve Presentation States	O (Note 1)	4.17
	Retrieve Key Image Note	O (Note 1)	4.31
	Key Image Note Stored	O (Note 1)	4.29
	Retrieve Evidence Documents	O (Note 1)	4.45
	Evidence Document Stored	O (Note 1)	4.43
Hosting System	Start Application	R	4.89
	Stop Application	R	4.90
	Bring Application Front	O	4.91
	Start Task	R	4.92
	Get Task Details	R	4.93
	Get Task Data	R	4.94
	Notify Task Status	R	4.95
	Notify Task Results	R	4.96
	Get Task Results	R	4.97
	Notify Task Complete	R	4.98
	Finalize Task	R	4.99
	Cancel Task	R	4.100
	Suspend Application	R	4.101
	Resume Application	R	4.102
Hosted Application	Start Application	R	4.89
	Stop Application	R	4.90
	Bring Application Front	O	4.91
	Start Task	R	4.92
	Get Task Details	O	4.93
	Get Task Data	O (Note 2)	4.94
	Notify Task Status	O	4.95
	Notify Task Results	O (Note 2)	4.96
	Get Task Results	O (Note 2)	4.97
	Notify Task Complete	R	4.98

Actors	Transactions	Optionality	Section in Vol. 2/3
	Finalize Task	R	4.99
	Cancel Task	R	4.100
	Suspend Application	O (Note 3)	4.101
	Resume Application	O (Note 3)	4.102

Notes: 1. The Workitem Performer is only required to support Retrieve and Store transactions for the types of objects that are created or consumed by the workitems it is capable of performing.

2. The Hosted Application is only required to support Get Task Data if it requires data to perform its task. The Hosted Application is only required to support Notify Task Results and Get Task Results if it produces data that needs to be persisted or communicated.

3. The application is required to implement the API, but is not required to act on requests to Suspend or Resume.

30.1.1 Actor Descriptions and Actor Profile Requirements

Normative requirements are typically documented in Volumes 2 & 3 (Transactions). Some Integration Profiles, however, contain requirements which link transactions, data, and/or behavior. Those Profile requirements are documented in this section as normative requirements ("SHALL").

Many transactions in this profile are based on the DICOM Unified Procedure Step SOP Classes. The Technical Framework specifies support of those SOP Classes and assumes that actors have implemented them as described in DICOM PS 3.3, PS 3.4 and PS 3.17. Requirements that IHE places above and beyond support of DICOM will be clearly identified.

For simple definitions of the actors in this profile, refer to the Actor Summary Definitions in the IHE Technical Framework General Introduction.

The following actors have additional specific details:

30.1.1.1 Workitem Manager Actor

Workitem Creation

The Workitem Manager is permitted to create workitems based on its internal logic (and in some installations that may be the primary source of new workitems).

The Workitem Manager is not expected to use the Create UPS Workitem transaction [RAD-80] when creating workitems internally; however, the workitem it creates shall comply with the message semantics of [RAD-80] and the Workitem Manager shall follow the expected actions and security considerations described.

Input Availability

Many post-acquisition steps operate on input instances (which may be images or other instances like SR documents, segmentations, etc.). UPS Workitems contain an Input Information Sequence (0040,4021) listing instances to be used as input for the workitem, and an Input

Readiness State (0040,4041) indicating whether the list is complete and whether the instances are available for retrieval.

The Create UPS Workitem transaction [RAD-80] requires that workitems only be created with an Input Readiness State of READY, indicating that the contents of the Input Information Sequence is complete and all listed instances are available.

For workitems that the Workitem Manager creates itself, based on internal business logic, it is responsible for determining the availability of the input instances. The methods the Workitem Manager uses will depend on the retrieval methods it supports listing in the Input Information Sequence.

For DICOM Retrieval support, the Workitem Manager shall support the Images Availability Query and Instance Availability Notification transactions to confirm availability of listed instances.

Note: A Workitem Manager that is grouped with the Image Manager/Archive referenced as the retrieval source for instances in the Input Information Sequence is permitted to use internal mechanisms to confirm availability of those instances, but is still required to support the availability transactions since other instances may be stored on other systems.

The use of XDS Retrieval and Media Retrieval in the UPS Input Information Sequence is not addressed in this profile. It is assumed that if such instances are needed, they have already been imported and made available locally for DICOM Retrieval.

It is permitted but not expected that the Workitem Manager will continue to monitor the availability of the inputs and change the Input Readiness State from READY back to UNAVAILABLE if some of the instances were to become unavailable.

Load Balancing

Describing the business logic of the Workitem Manager is beyond the scope of this Profile. In terms of the tools the Workitem Manager has available, setting the Scheduled Station Name Code Sequence (0040,4025) allows it to assign (or reassign) a scheduled Workitem to a particular system. Examining the Performed Station Name Code Sequence (0040,4028) of Workitems that have been claimed but not yet completed or canceled allows it to see different Workitem Performers current workload.

Since Workitem Performers are prohibited from claiming workitems specifically assigned to other systems, it is the responsibility of the Workitem Manager to handle (e.g. by re-assigning or canceling) workitems that have not been claimed by the assigned system for an unreasonable length of time.

Worklist Maintenance

Implementers of Workitem Managers are encouraged to read the DICOM UPS specifications carefully. Practical issues, such as the possibility of Workitem Performers that become disabled or Watchers that fail to release deletion locks, are acknowledged there and the Workitem Manager (SCP) is given permission to perform certain remediations.

30.1.1.2 Workitem Performer Actor

Performing System Identification

Prior to starting work on a claimed workitem, the Workitem Performer shall update the Performed Station Name Code Sequence as described in RAD TF-3: 4.84.4.1.2.1 to identify itself.

Output Information

The final state requirements specified in DICOM require that, prior to a workitem being moved to the COMPLETED or CANCELED state, the Workitem Performer update the Output Information Sequence (0040,4033) in the workitem to contain a list of all instances that the Workitem Performer intends to be available for retrieval.

In some scenarios, waiting until the Workitem Performer has finished actually storing the output instances to the retrieval source would unnecessarily reduce the timeliness of the workitem completion information and slow down the workflow. Note, therefore, that the Workitem Performer is permitted to list instances in the Output Information Sequence and move the workitem to the COMPLETED (or CANCELED) state even if it has not yet finished storing the instances. The Workitem Performer should, however, intend to make all the listed instances available for retrieval. This differs from the Referenced Image Sequence (0008,1140) and the Referenced Non-image Composite SOP Instance Sequence (0040,0220) in a DICOM Modality Performed Procedure Step, which contains all instances created, regardless of whether they are available for retrieval or not.

Resulting Instances

The values of certain attributes in the DICOM instances (images, etc.) created as a result of performing a workitem shall be consistent with the contents of the workitem. Specific requirements are described in RAD TF-3:Appendix W.

30.1.1.3 Hosting System Actor

Hosted Application Selection

It is expected that Hosting Systems will often host multiple Hosted Applications. The Hosting System will need to determine which, if any, of the applications it hosts are appropriate for a given workitem. This determination will help the Hosting System decide whether to claim any given workitem, and once claimed, decide which application to use to complete the workitem.

This often involves site-specific codes and patterns agreed upon between the Workitem Creators and the Hosting Systems grouped with Workitem Performers.

Typically, a site will either define or adopt a list of Workitem Codes used in the Scheduled Workitem Code Sequence (0040,4018). These may be unique to the point of specifying the application to be used for the workitem or may just define the general task to be performed.

A site may also define or adopt a list of Station Class Codes to be used in the Scheduled Station Class Code Sequence (0040,4026). These too may be unique to the point of specifying a station hosting a specific application, may be more general, or may be omitted entirely.

The contents of one or more parameters in the Scheduled Processing Parameters Sequence (0074,1210) may affect what Hosted Applications are appropriate for the workitem.

The Hosting System shall be configurable to create mappings to applications hosted by the Hosting System from any combination of Workitem Codes, Station Class Codes and simple pattern matching of one or more Processing Parameter values. The Hosting System shall support multiple such mappings.

30.2 PAWF Actor Options

Options that may be selected for this Profile are listed in Table 30.2-1 along with the Actors to which they apply. Dependencies between options when applicable are specified in notes.

Table 30.2-1: PAWF - Actors and Options

Actor	Options	Volume & Section
Workitem Creator	*No options defined*	- -
Workitem Manager	*No options defined*	- -
Image Manager/Image Archive	*No options defined*	- -
DSS/Order Filler	*No options defined*	- -
Watcher	*No options defined*	- -
Workitem Performer	*No options defined*	- -
Hosting System	*No options defined*	- -
Hosted Application	*No options defined*	- -

30.3 PAWF Actor Required Groupings

Actor(s) which are required to be grouped with another Actor(s) are listed in this section. The grouped Actor may be from this profile or a different domain/profile.

An Actor from this profile (Column 1) must implement all of the required transactions in this profile in addition to all the required transactions for the grouped profile/actor listed (Column 2).

Section 30.7 describes some optional groupings that may be of interest to implementers.

Table 30.3-1: PAWF - Actors Required Groups

PAWF Actor	Required Grouping Actor	Volume & Section	Note
Workitem Creator	Time Client (Consistent Time Profile)	ITI TF-1: 7	
Workitem Manager	Time Client (Consistent Time Profile)	ITI TF-1: 7	
Image Manager/Archive	Image Manager/Archive (Scheduled Workflow Profile)	RAD TF-1: 3	
DSS/Order Filler	DSS/Order Filler (Scheduled Workflow Profile)	RAD TF-1: 3	
Watcher	None		
Workitem Performer	Time Client (Consistent Time Profile)	ITI TF-1: 7	
Hosting System	Workitem Performer	RAD TF-1: 30	Note 1
Hosted Application	None		

Note 1: The grouping requirement is not reciprocal. The Hosting System is required to be grouped with a Workitem Performer Actor. This allows it to get workitems and to report completion on behalf of its hosted applications. The Workitem Performer is not required to be grouped with a Hosting System since some Workitem Performer Actors will perform the workitems themselves rather than use hosted applications. It is also possible that Workitem Performers or other systems might utilize DICOM Application Hosting in the performance of tasks that are not tracked by workitems. Such use is not in the scope covered by this profile.

Implementation Patterns – Workitem Management

This profile is designed with several expected patterns of implementation:

- The Workitem Manager is implemented by the RIS (i.e., it is grouped with a DSS/Order Filler) and a Watcher is implemented by the PACS (i.e., it is grouped with an Image Manager/Archive) to better monitor and facilitate the workflow (e.g., doing pre-fetches or pre-pushes of input data when a workitem is created, etc.)
- The Workitem Manager is implemented by the PACS (i.e., it is grouped with an Image Manager/Archive) and a Watcher is implemented by the RIS (i.e., it is grouped with a DSS/Order Filler) to monitor progress and output of post-acquisition steps and perhaps schedule or modify reporting tasks based on that information.
- The Workitem Manager is implemented by a separate post-processing coordination system. Either or both the RIS and the PACS implement a Watcher to monitor (and react to) workitem performance, and may implement a Workitem Creator to directly add or change workitems on the worklist.

The possibility exists that more than one Workitem Manager may be installed at a site (e.g., if both the PACS and RIS provide such function). This can be handled by configuring the Workitem Performers and Watchers to point at one or the other of the Workitem Managers. It is conceivable that a Workitem Manager could implement a Workitem Creator to delegate work to another Workitem Manager as needed. Alternatively, work could be divided between the Managers by configuring one to handle workitems for one set of procedure codes and configure the second to handle workitems for a complementary set of procedure codes. Making sure that the procedure code sets are non-overlapping and complementary is a configuration responsibility of the site. Such patterns are not further discussed in this Profile.

Implementation Patterns – Workitem Creation

This profile is designed with several (non-mutually exclusive) expected patterns of implementation, each of which might be automatic, or might involve a user deciding what workitems to create:

- Workitem creation is handled internally by the Workitem Manager, independent of a Workitem Creator.
- A Workitem Creator is implemented by the RIS (i.e., it is grouped with a DSS/Order Filler) that creates workitems based on departmental scheduling logic.
- A Workitem Creator is implemented by a Modality (i.e., it is grouped with an Acquisition Modality) that creates workitems based on the acquisitions it performs.
- A Workitem Creator is implemented by an Image Manager/Archive that creates workitems based on the data that it receives.

In some cases, the system implementing a Workitem Creator will also implement a Watcher to monitor progress and completion of the workitems.

30.4 PAWF Document Content Module

Not applicable.

30.5 PAWF Overview

30.5.1 Concepts

Post-Acquisition Workflow and its associated transactions are based in part on the DICOM Unified Procedure Step (UPS) Service and SOP Classes. Readers are encouraged to review DICOM PS 3.17 Annex GGG for related informative material on several of the topics below.

Post-Acquisition Workflow is also based on DICOM Application Hosting. Readers are encouraged to review DICOM PS 3.17 Annex XX and DICOM PS 3.19 for related informative material.

Pull Workflow and Push Workflow

There are a variety of patterns for assembling an effective workflow. Two key aspects of these patterns are where the workitem is managed and how the performer of the workitem becomes aware of relevant work to be done.

A "Pull Workflow" involves the performer querying a central system that manages workitems for a list of workitems matching some filter (e.g., Cardiac Vessel Analysis tasks that are scheduled for today). The performer reviews the list of workitems, "claims" any workitems it selects to work on, and gets the contents of the workitem to obtain the full details of the work. (The Scheduled Workflow Profile use of Modality Worklist is a type of Pull Workflow). The 3D

View use case is shown below as an example of Pull Workflow. This is not intended to imply that IHE mandates the use of Pull Workflow for 3D View Preparation.

A "Push Workflow" involves some system determining that a workitem will be assigned to a specific performer and informing the performer of that assignment. The CAD use case is shown in Section 30.5.6 as an example of Push Workflow.

DICOM UPS also permits workflows where, for example, each performer generates workitems internally for itself based on watching for notifications of tasks performed on other systems that produce outputs it can use. This allows for some interesting patterns, but by distributing the workitem instances and some of the business logic across many systems, it can be more difficult to configure and monitor departmental activities. For these reasons, this profile assumes a single (or a small number) of workitem managers that centralize the workitem instances and much of the business logic.

Subscription-based Notification

UPS allows interested systems to subscribe for notifications about workitem events such as creation, modification, completion or cancelation of a workitem. Such notifications would normally be interleaved with the related transactions in the workflow patterns shown in the use cases below. For simplicity and readability, however, the subscription mechanisms will be left out of most use cases and shown separately in the Subscription Use Case.

Cancelation of a Workitem

In addition to a Workitem Performer choosing to cancel a workitem itself, UPS allows other systems to request cancelation of a workitem. A notification of the cancelation request is passed to the performing system, which may or may not be able to comply with the request and may or may not choose to do so. If the workitem is canceled, subscribed systems will also receive a notification of that fact. An example of cancelation is shown as a separate use case, but could be combined with any of the use cases.

Hosted Applications

DICOM Part 19 introduced an interface that allows hosted applications to talk to a hosting system that retrieves and stores DICOM instances on behalf of the hosted applications. In the context of Post-Acquisition Workflow, this allows a Workitem Performer to carry out processing tasks by launching an appropriate hosted application rather than doing the processing itself. The Workitem Performer is still responsible for all the external workflow communications. This is expressed in the profile by the Workitem Performer actor being grouped with a Hosting System actor.

An example of application hosting is shown as a separate use case, but the use of hosted applications could apply to any of the use cases.

The following Use Cases show workitems that involve images as the primary inputs and outputs. The same patterns apply equally well for workitems that involve segmentation objects, key image notes, presentation states, structured reports and other documents as inputs or outputs.

30.5.2 3D View Use Case

30.5.2.1 3D View Use Case Description

A modality procedure (e.g., a standard CT cardiac exam) has been acquired and reconstructed. The reconstructed images are to be post-processed to perform segmentation, 3D surface generation and vessel analysis.

In this example, the Workitem Manager creates the Workitem based on internal business logic which was triggered by the Instance Availability Notification message from the Image Manager/ Archive (for example it might examine the data and schedule the post-processing based on the procedure code associated with the instances). The Workitem Manager sets the workitem code (identifying the task to be performed) and any processing parameters, lists the full set of reconstructed images in the Input Information Sequence of the Workitem, and sets the Input Readiness Status to READY.

In alternative examples (not shown), the PACS or RIS might implement a Workitem Creator and send the Create Workitem message instead based on MPPS message contents or other information.

A Workitem Performer, either automated or driven by a user, queries the worklist (i.e. pull workflow), claims a selected workitem, gets the contents of the workitem to obtain the relevant details (i.e., the input list, processing code, parameters, etc.), retrieves the needed instances, does the work, stores the outputs, and reports completion.

See the Notification Use Case (Section 30.5.3) for details on how systems interested in the status and/or output of this workitem (e.g., a reporting workflow manager or a billing system) might monitor the progress and output of the Workitem.

30.5.2.2 3D View Process Flow

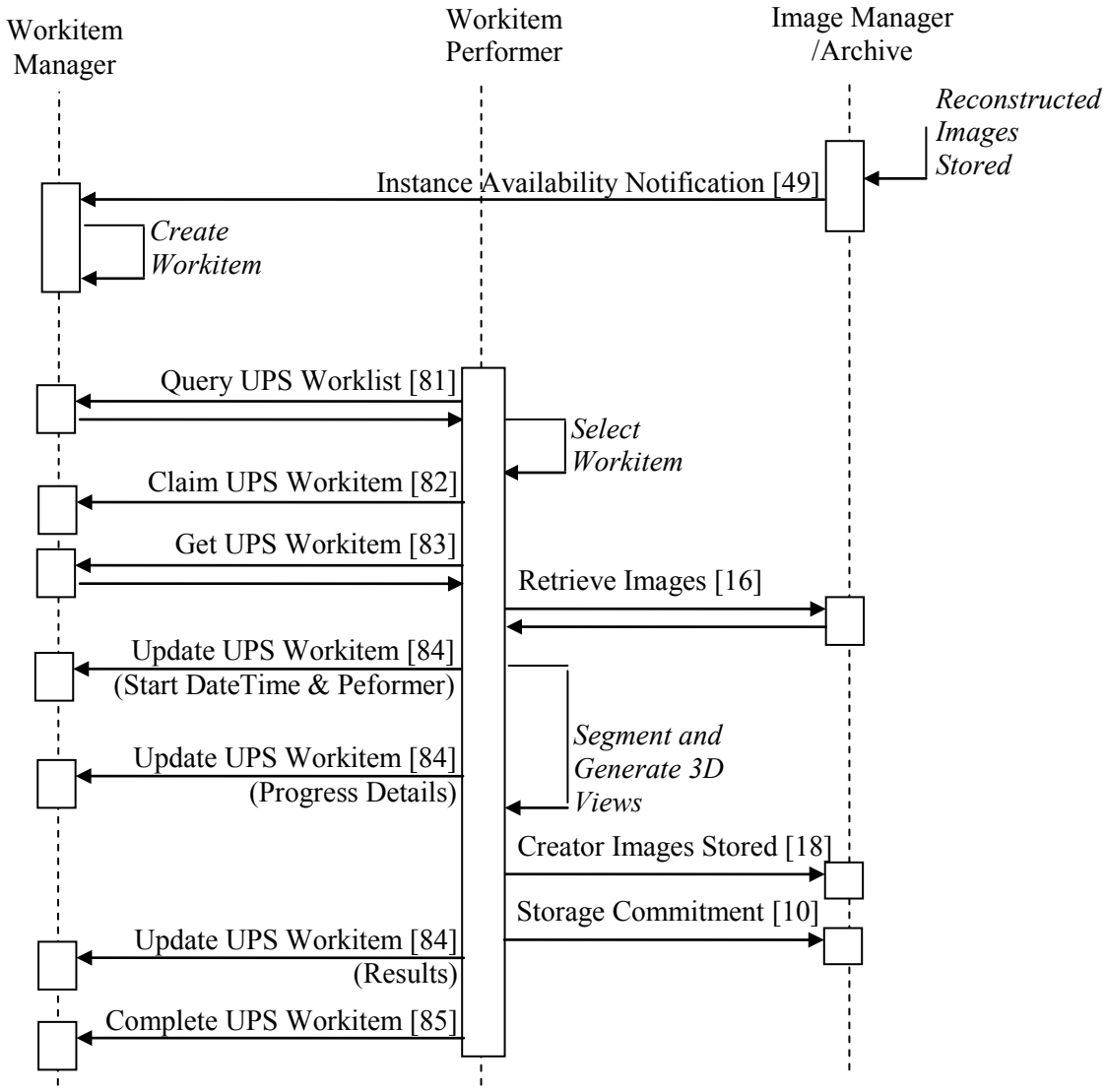

Figure 30.5.2.2-1: 3D View Process Flow in PAWF Profile

30.5.3 Notification Use Case

30.5.3.1 Notification Use Case Description

A Workitem has been scheduled and is eventually performed. A Watcher wishes to monitor the progress and completion of the workitem and perhaps make use of the outputs. This could be the system that initially requested creation of the workitem, or it might be a dashboard, or a system that is expected to take action upon completion, such as a reporting workflow manager that would like to incorporate the 3D views into the list of instances being marshaled for a reading task.

In this example, the Watcher uses a global subscription which requests notifications for all instances managed by the Workitem Manager. It is also possible to subscribe (and unsubscribe) notifications for specific instances. Although it is not required, the Watcher is shown here getting the details of the workitem following notification of the initial creation. At that point a Watcher might evaluate whether the workitem is of interest and if not, unsubscribe from that specific workitem so it will not receive further notifications about it. In the flow below, the Watcher chooses to remain subscribed.

This example also shows the Watcher making use of the Deletion Lock, which requests that the Workitem Manager not delete the Workitem until the Watcher has unsubscribed. This gives the Watcher a window of time after the Workitem has been completed to retrieve details of interest such as the list of instances created by the Workitem Performer, or the codes describing the work actually performed (which could differ from that requested in some scenarios).

A different Watcher might choose to subscribe globally without the Deletion Lock. In that case, the Watcher could decide on a case-by-case basis to place a deletion lock on specific Workitems of interest.

This example assumes that no one except the Watcher shown has a Deletion Lock on the Workitem being performed, which means the Workitem Manager is free to delete the Workitem once the Watcher unsubscribes from that Workitem, thus releasing the lock. If other Watchers also had Deletion Locks, the Workitem Manager would have to wait until they, too, unsubscribed from the workitem.

The storage of the result objects prior to completion is not shown here. Refer to the 3D View Use Case for details. The Watcher has access to the details about the result objects created and where to obtain them when it does its final Get UPS Workitem; however, this example assumes that the watcher is simply passing that information on (e.g., to a reporting task) and does not need to actually retrieve the objects itself, although that is not precluded by the profile.

The Notification messages include the basic workitem status details from the Progress Information module. If it was useful to the Watcher, additional details/contents could be obtained using the Get UPS Workitem transaction at any time.

In the diagram below the workitem performance transactions (from the 3D View Use Case) show context and sequencing, but are drawn in grey to make the workitem notification transactions more visible.

30.5.3.2 Notification Process Flow

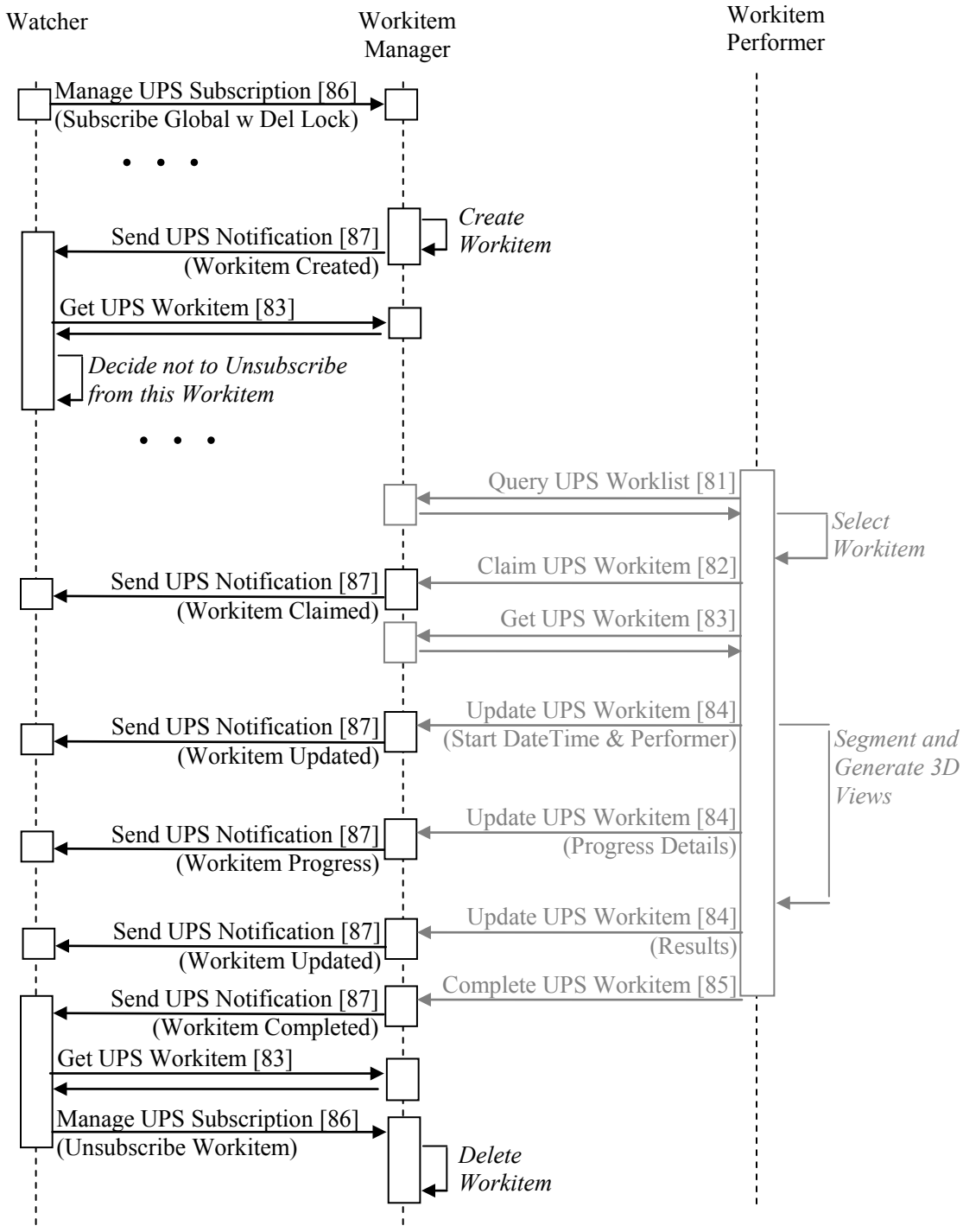

Figure 30.5.3.2-1: Notification Process Flow in PAWF Profile

30.5.4 Cancelation Use Case

30.5.4.1 Cancelation Use Case Description

A Workitem has been scheduled; however, a Watcher would like to request that it be canceled. This could be the system that initially requested creation of the workitem and it would like to withdraw the request (perhaps to schedule a different workitem for the same study), or it might be some other system with information about the patient or the case.

This example presumes that the Watcher is already aware of the Workitem, perhaps because it created the Workitem, or perhaps it has a subscription, or perhaps it performed a query.

In this example, a Workitem Performer has already claimed the Workitem. If the Workitem had not yet been claimed, the Workitem Manager would process the cancelation request itself. Since the Workitem here has been claimed, the Workitem Manager can only notify and leave the decision to the Workitem Performer. Since the Workitem Performer might not be able to stop the task in the middle, cancelation is completely at the discretion of the Workitem Performer. It should be pointed out that the cancelation request message can include the reason and contact information for the person requesting cancelation. The Workitem Performer may or may not choose to make use of those details.

The Workitem Performer might evaluate the cancelation request by displaying a popup message to the human operator showing who requested the cancelation request, why and how to reach them, and ask for a decision, or the Workitem Performer might be automated and decide based on internal logic.

Depending on the nature of the task and the progress made by the Workitem Performer, it might record partial results in the workitem. See DICOM PS 3.17 GGG.3.1 for further discussion.

In this example, the Watcher has no interest in the details of how the Workitem Performer finalized the workitem before cancelation. If the Watcher was interested, it could use Get UPS Workitem.

30.5.4.2 Cancelation Process Flow

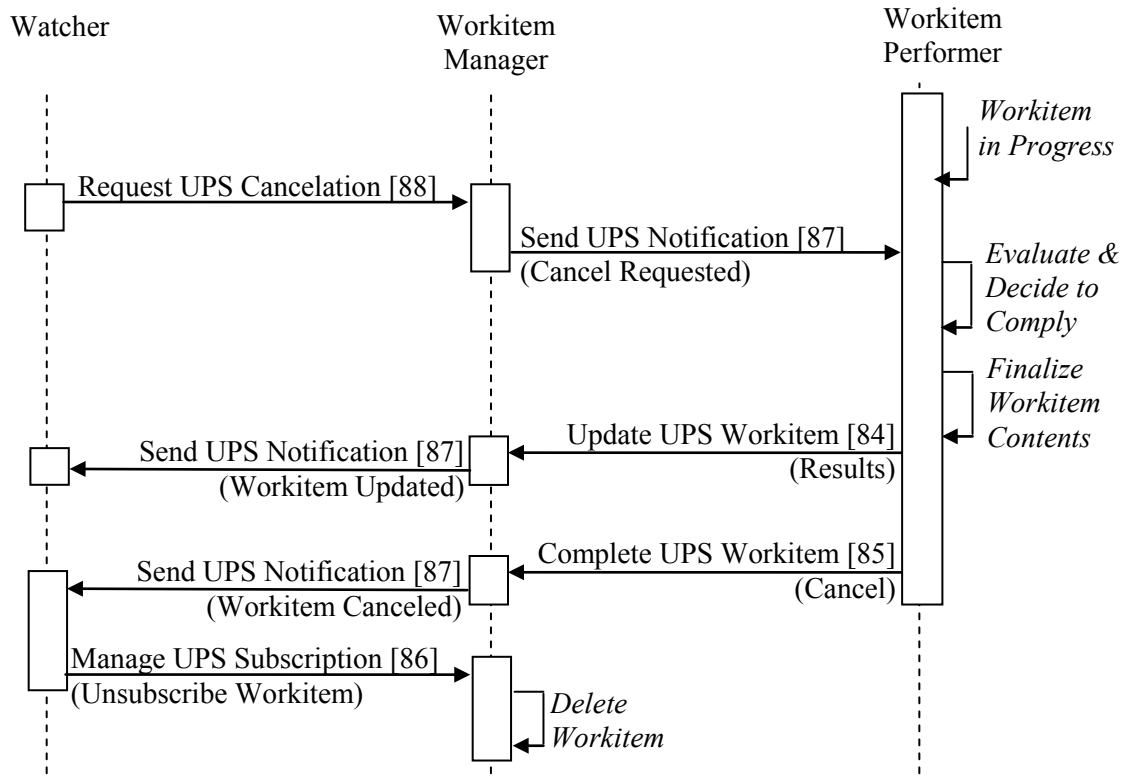

Figure 30.5.4.2-1: Cancelation Process Flow in PAWF Profile

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30.5.5 Unscheduled Use Case

30.5.5.1 Unscheduled Use Case Description

A Workitem Performer wishes to perform work that is not currently on the worklist as a scheduled Workitem. After the Workitem Performer creates the workitem, the rest of the
605 workflow performance and notifications (drawn in grey in the diagram below) are the same as for the scheduled example shown in the Notification Use Case.

It is assumed in this use case that the Watcher (e.g., the RIS) has subscribed globally to the Workitem Manager to be kept apprised of additional work performed.

30.5.5.2 Unscheduled Process Flow

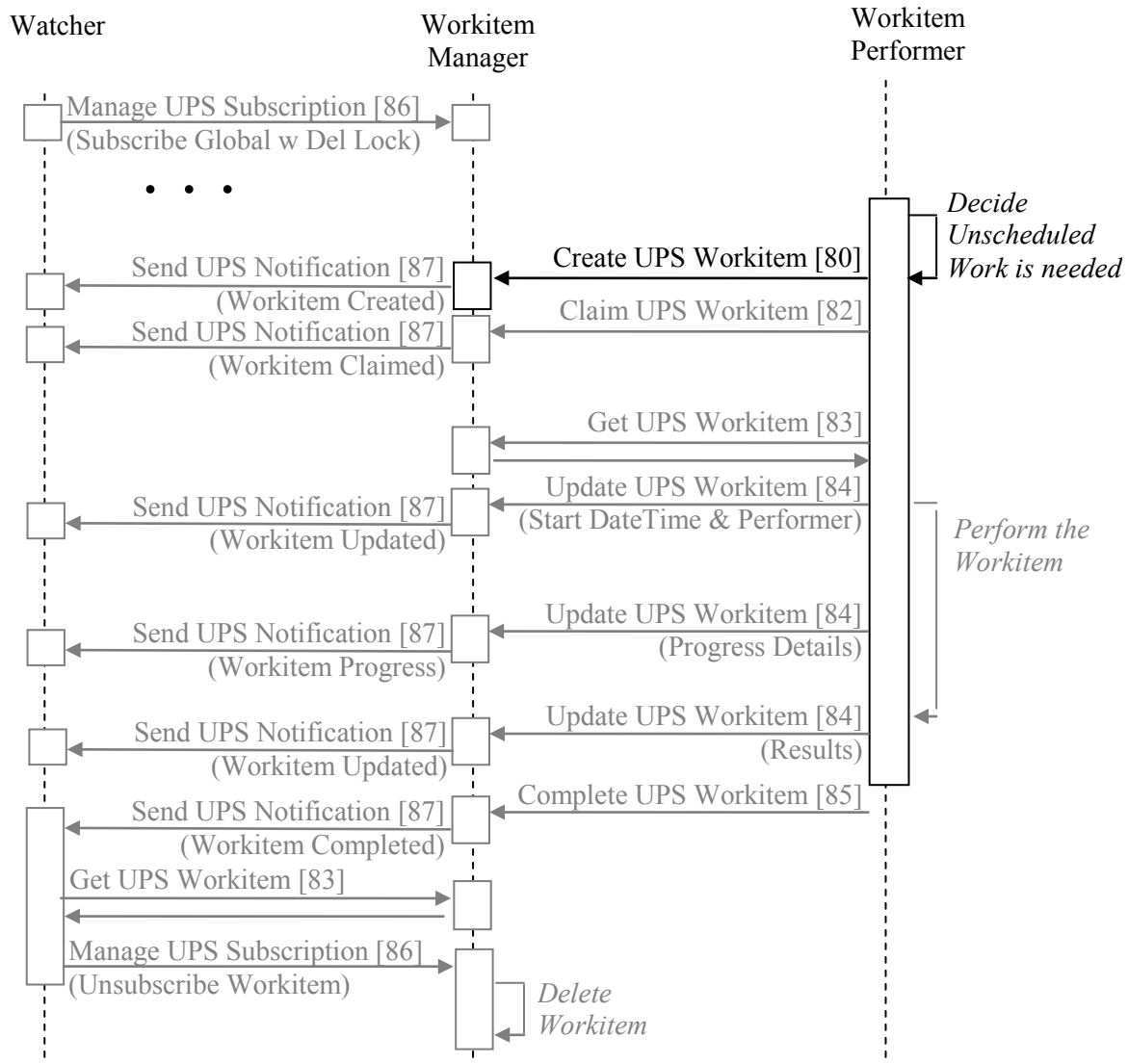

Figure 30.5.5.2-1: Unscheduled Process Flow in PAWF Profile

Two variants of this use case differ only in how the Workitem Performer populates the details of the UPS Relationship Module. See RAD TF-3: Appendix V for details on the required correspondence between attribute values in UPS instances and associated DICOM objects.

Briefly, the two variants of Unscheduled are:

- Append – the Workitem Performer wishes to associate the new workitem with an existing performed workitem.
- Ad Hoc – the Workitem Performer wishes to associate the new workitem with an existing study, but not with an existing performed workitem.

A Workitem Performer can become aware of associated workitems due to performing them, due to querying for them, or due to receiving notifications about them; however, dictating how the Workitem Performer becomes aware of associated workitems, studies or patients is out of scope of this Profile.

30.5.6 Computer Aided Detection Use Case

30.5.6.1 CAD Use Case Description

A modality procedure (e.g., a chest CT) has been acquired and CAD processing is to be performed on the images (e.g., to highlight possible lung nodules). The images and CAD processing results will be interpreted together by the reading physician on a review workstation.

In this example, the Workitem Creator is grouped with the Acquisition Modality that acquired the input image data. The modality may create the CAD workitem and set the workitem code based on the procedure code or other details in the acquisition worklist, or based on operator interaction. Note that the list of image instances in the Input Information Sequence of the workitem may be a subset of the list in the MPPS generated by the modality as a result of the acquisition.

In this example, the modality identifies the AE Title of a specific CAD system in the Scheduled Station Name Code Sequence, triggering the Workitem Manager to send a notification to the requested system, making it aware that a workitem has been assigned to it (i.e. push workflow).

In this example, the modality stores copies of the images directly to a specific CAD system and includes the AE Title of the CAD system as the Retrieve AE Title for those instances in the Input Information Sequence. Alternatively, the images could have been stored to the PACS or a local cache and listed as such in the Input Information Sequence.

In the diagram below the workitem performance transactions that are essentially the same as the preceding Use Cases are drawn in grey to highlight (in black) the aspects of this Use Case that are different.

30.5.6.2 CAD Process Flow

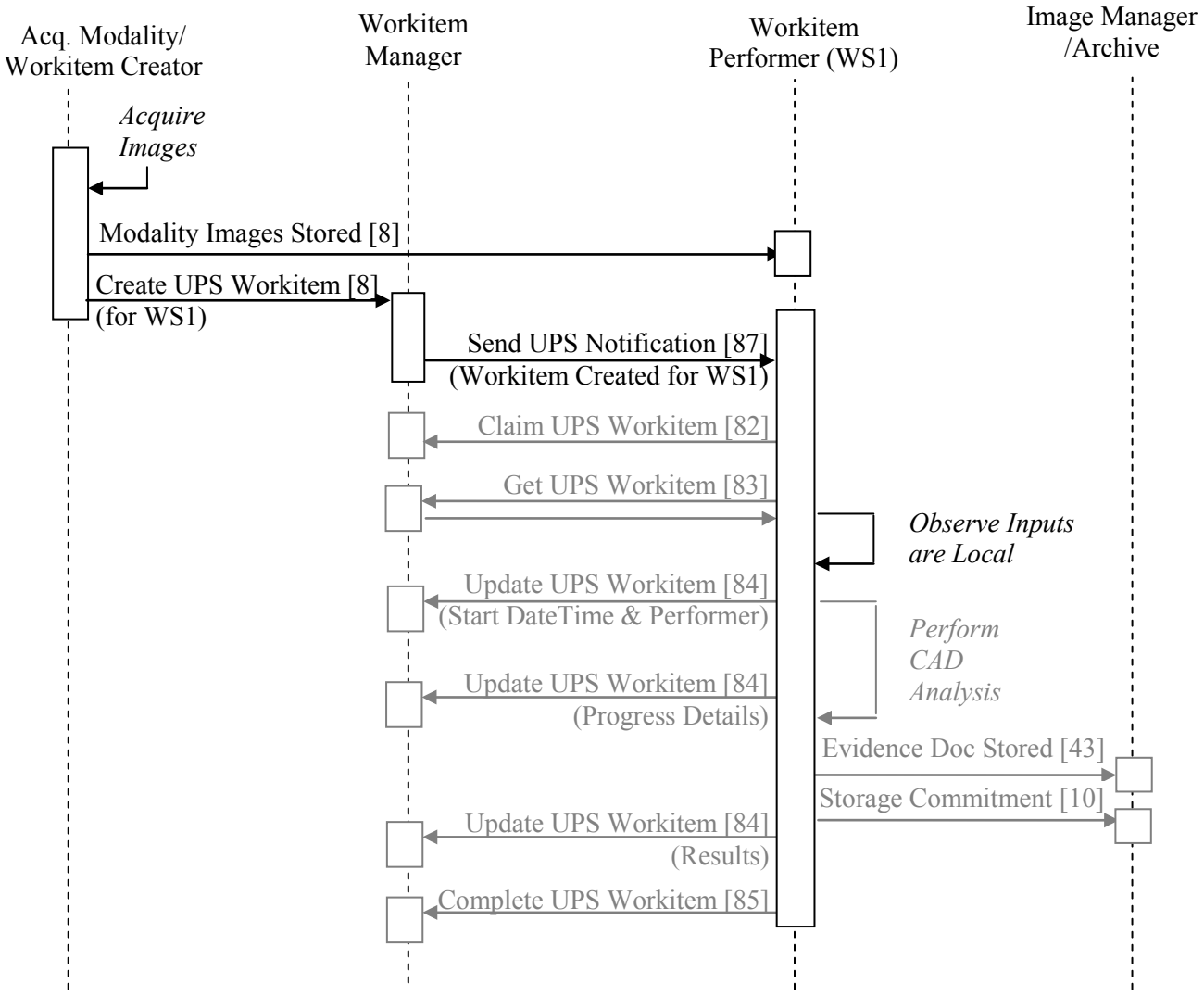

Figure 30.5.6.2-1: CAD Process Flow in PAWF Profile

Although the UPS Workitem is a transient object, details about the processing performed and the success or failure are often also recorded in the persistent output objects, such as the Evidence Documents, created while performing the workitem.

30.5.7 Application Hosting Use Case

30.5.7.1 Application Hosting Use Case Description

A system performs a workitem by invoking a hosted application to do some or all of the work.

For brevity, the grouped Workitem Performer/Hosting System will be referred to as the Workitem Performer in this use case.

The workitem may specifically identify or imply a particular Hosted Application, or class of Hosted Applications to be used (e.g., in the Scheduled Workitem Code Sequence (0040,4018), the Scheduled Processing Parameters Sequence (0074,1210), or the Scheduled Station Class Code Sequence (0040,4026)). By claiming such a workitem, the Workitem Performer agrees to use the requested Hosted Application or a Hosted Application of the requested class.

Even if the workitem did not specify the use of a Hosted Application, the Workitem Performer may choose to use one or more Hosted Applications to perform the work.

In this example, the Workitem Performer is assumed to be aware of the workitem (e.g., by previously performing a query, receiving a notification, or creating the workitem itself).

In this example, it is assumed that an instance of the necessary Hosted Application is already running and in the IDLE state, and it will be left running after the current task is completed. If that were not the case, the Workitem Performer would use the Start Application [RAD-89] and Stop Application [RAD-90] transactions as appropriate.

In this example, the Workitem Performer retrieves the input instances “on-demand” as they are requested by the Hosted Application. Alternatively, the Workitem Performer could retrieve all the inputs to local storage prior to requests from the Hosted Application, or even prior to initiating the Start Task [RAD-92].

In this example, the Hosted Application requests all the inputs at once. Alternatively, it could periodically request inputs as it needs them (for example to conserve operating memory).

In this example, the inputs and outputs are all images. Alternatively, the task could involve consuming or producing reports, presentation states, key image notes, etc.

In this example, the Hosted Application reports all the results at once. Alternatively, it could report them individually as each is generated.

In this example, the Workitem Performer gets and stores the results as soon as it is notified of their availability. Alternatively it could wait until the task is complete, or it might get them and wait until the task is successful before storing them, etc.

In this example, the Workitem Performer waits until after the Hosted Application is IDLE before completing the workitem. Alternatively it could complete the workitem right after the Complete Task since no further work will be done by the Hosted Application.

In the diagram below, which shows the intended relationship and sequencing of the transactions, the Application Hosting transactions are shown in black, and the UPS Workflow and DICOM Store/Retrieve transactions are shown in grey.

30.5.7.2 Application Hosting Process Flow

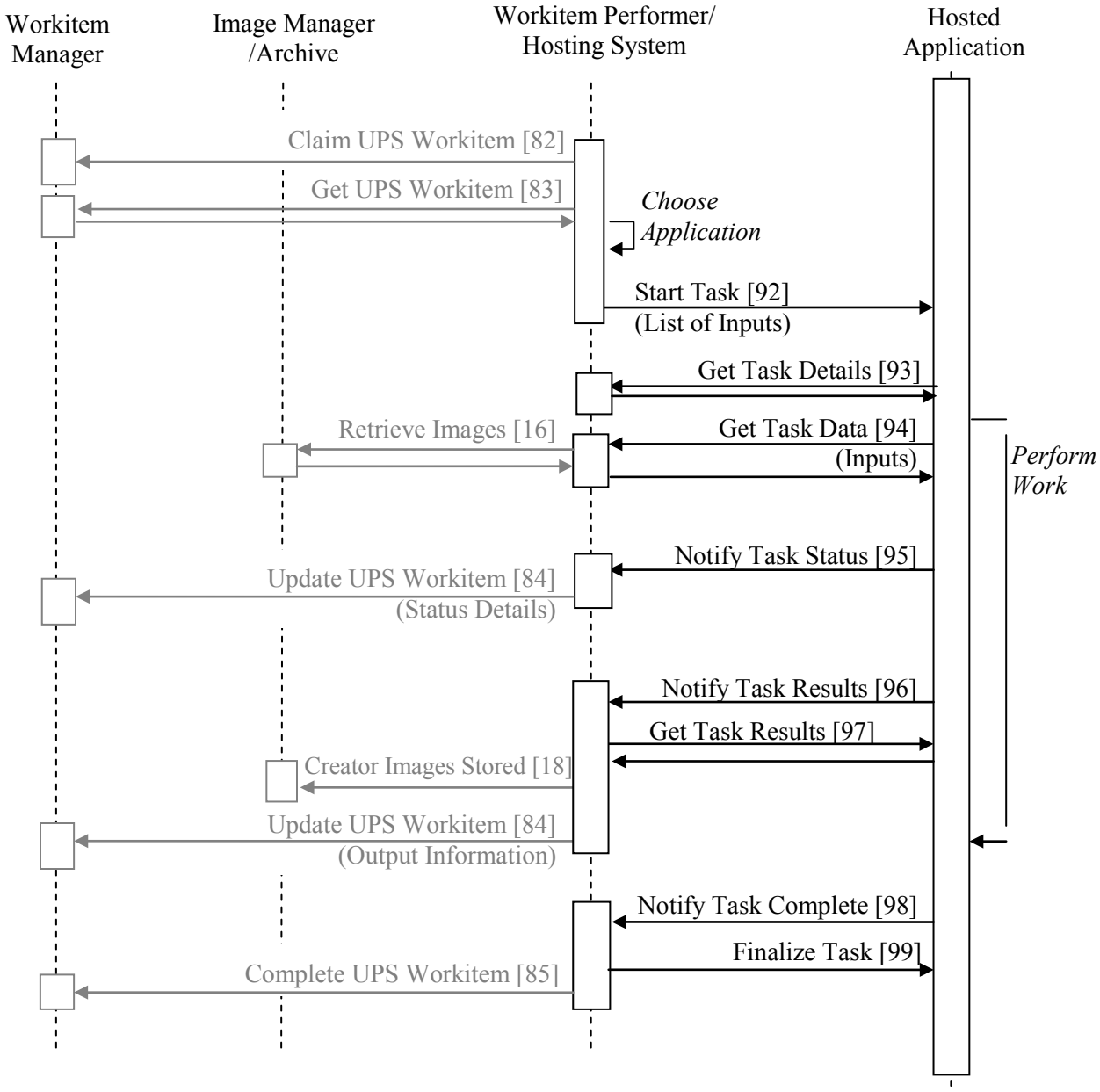

Figure 30.5.7.2-1: Application Hosting Process Flow in PAWF Profile

30.6 PAWF Security Considerations

The security considerations for Post-Acquisition Workflow are essentially the same as those for Scheduled Workflow (which is focused on image acquisition) with the exception that the patient

is generally no longer in contact with the equipment for the duration of the Post-Acquisition Workflow.

Post-Acquisition Workflow worklists and data objects contain almost exactly the same type of patient information as those used in Scheduled Workflow which will generally also be operating on the same local network. So as not to burden Post-Acquisition Workflow actors more than the equivalent Scheduled Workflow actors, support of ATNA was not included as a required grouping, but was recommended as a useful feature to consider in section 30.7.

Cross-enterprise usage was not specifically addressed by this Profile. It is assumed that the actors in the Profile share a secure network.

30.7 PAWF Cross Profile Considerations

There are a variety of ways that the PAWF Profile can be effectively combined with other IHE Profiles.

SWF - Scheduled Workflow

A DSS/Order Filler in Scheduled Workflow could be grouped with a Workitem Creator to schedule post-processing associated with acquisition orders.

An Acquisition Modality Actor in Scheduled Workflow might be grouped with a Workitem Creator in order to schedule follow-on steps appropriate for the acquisition it has just completed.

A DSS/Order Filler or an Image Manager/Archive in Scheduled Workflow could also be directly grouped with a Workitem Manager to manage the post-acquisition workitems.

For further a discussion of SWF groupings, refer to the Implementation Patterns in Section 30.3.

An MPPS Manager in Scheduled Workflow might be grouped with a Workitem Manager or a Workitem Creator in order to make use of the acquisition workflow information to schedule post-acquisition workitems.

An MPPS Manager in Scheduled Workflow might also be grouped with a Workitem Manager or a Workitem Performer in order to create UPS instances that mirror the contents of MPPS instances. This would allow Watchers to easily monitor acquisition activities as well as post-acquisition activities (e.g., in a departmental dashboard or metrics data collection system). The mapping of MPPS Instance contents and semantics to UPS Instances is not addressed here.

XDS-I.b – Cross-Enterprise Document Sharing for Imaging

A Workitem Performer could be grouped with an Imaging Document Consumer in XDS-I.b which would allow it to retrieve images identified in the Input Information Sequence of a UPS Workitem as being available for XDS-based retrieval. It could also be grouped with or communicate with an Imaging Document Source which would allow it to store and register

objects using XDS-I.b and record them as such in the Output Information Sequence of the UPS Workitem.

PDI – Portable Data for Imaging

A Workitem Performer could be grouped with an Image Display or a Portable Media Importer in PDI which would allow it to retrieve images directly from media identified in the Input Information Sequence of a UPS Workitem as being available for media-based retrieval. It could also be grouped with a Portable Media Creator which would allow it to store output objects to media and record them as such in the Output Information Sequence of the UPS Workitem.

CHG - Charge Posting

A Watcher could be grouped with a DSS/Order Filler, or with the Charge Processor itself, in CHG to receive details about what post-acquisition activities were actually completed (and when) and thus are potentially eligible for billing.

ATNA – Audit Trail and Node Authentication (ITI Profile)

All actors in PAWF could be grouped with a Secure Node or Secure Application in ATNA to establish secure connections between PAWF actors and to contribute audit messages to a central audit repository for security and privacy purposes.

Appendices

Actor Summary Definitions

Add the following terms to the IHE TF General Introduction Namespace list of Actors:

Workitem Creator: requests that new workitems be created by systems that will either manage or perform the workitems.

Workitem Manager: provides management, query access and notifications for workitems in a worklist.

Watcher: subscribes and receives notifications of events associated with a workitem (such as modification, cancelation or completion).

Workitem Performer: queries, claims and performs workitems managed by a Workitem Manager.

Hosting System: a system that hosts applications, including providing an execution environment and mediating interactions with resources.

Hosted Application: an application (program) runs in an environment provided by a host.

Transaction Summary Definitions

Add the following terms to the IHE TF General Introduction Namespace list of Transactions:

Create UPS Workitem [RAD-80]: requests creation of a UPS Workitem.

Query UPS Workitems [RAD-81]: request a list of UPS Workitems matching a filter.

Claim UPS Workitem [RAD-82]: requests ownership of a UPS Workitem.

Get UPS Workitem [RAD-83]: requests contents of a UPS Workitem.

Update UPS Workitem [RAD-84]: requests modification of the contents of a UPS Workitem.

Complete UPS Workitem [RAD-85]: requests that a UPS Workitem be put into a completion state.

Manage UPS Subscription [RAD-86]: requests start or stop of notification events associated with UPS Workitem instances.

Send UPS Notification [RAD-87]: sends notifications of changes to a UPS Workitem, such as modification or completion.

Request UPS Cancelation [RAD-88]: requests that performance of a UPS Workitem be canceled.

Start Application [RAD-89]: requests that a hosted application start execution and prepare for instructions.

Stop Application [RAD-90]: requests that a hosted application shutdown.

Bring Application Front [RAD-91]: requests a hosted application to bring its window to the front.

Start Task [RAD-92]: requests a hosted application to start processing a task.

Get Task Details [RAD-93]: requests contents of a task workitem from a hosting system.

Get Task Data [RAD-94]: requests input data from a hosting system

Notify Task Status [RAD-95]: sends a notification of a change in task status.

Notify Task Results [RAD-96]: sends a notification of availability of task results.

Get Task Results [RAD-97]: requests task result objects.

Notify Task Complete [RAD-98]: sends a notification that a task has been completed.

Finalize Task [RAD-99]: requests a hosted application to release task details and become idle.

Cancel Task [RAD-100]: requests that a hosted application stop processing a task.

Suspend Application Task [RAD-101]: requests a hosted application to temporarily stop processing a task.

Resume Application Task [RAD-102]: requests a hosted application to resume processing of a suspended task.

Glossary

Add the following terms to the IHE Technical Frameworks General Introduction Glossary:

810

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(With the new Actor/Role structure, each of the following would just be:

"Add Workitem Performer to the list for Role X in section Y"

Add Workitem Performer to the Use Case Diagram in 4.10.2

Add the following to section 4.10.2 after Evidence Creator:

Actor: Workitem Performer

Role: Make requests for storage commitment to the Image Manager. (In the rest of this transaction, references to Evidence Creator apply equally to Workitem Performer.)

Add Workitem Performer to the Use Case Diagram in 4.16.2

Add the following to section 4.16.2 after Image Display:

Actor: Workitem Performer

Role: Receives requested images from the Image Archive Actor. (In the rest of this transaction, references to Image Display apply equally to Workitem Performer.)

Add Workitem Performer to the Use Case Diagram in 4.17.2

Add the following to section 4.17.2 after Image Display:

Actor: Workitem Performer

Role: Retrieve Grayscale Softcopy Presentation State objects together with the referenced image data and apply the transformations specified by the Presentation State. This device will implement the Query/Retrieve SOP Classes in the role of an SCU. (In the rest of this transaction, references to Image Display apply equally to Workitem Performer.)

Add Workitem Performer to the Use Case Diagram in 4.18.2

Add the following to section 4.18.2 after Evidence Creator:

Actor: Workitem Performer

Role: Transmit generated image data to Image Archive. (In the rest of this transaction, references to Evidence Creator apply equally to Workitem Performer.)

Add Workitem Performer to the Use Case Diagram in 4.29.2

Add the following to section 4.29.2 after Evidence Creator:

Actor: Workitem Performer

Role: Flag significant images by creating Key Image Notes and issuing Key Image Note Stored Transactions to the Image Archive. (In the rest of this transaction, references to Evidence Creator apply equally to Workitem Performer.)

Add Workitem Performer to the Use Case Diagram in 4.31.2

Add the following to section 4.31.2 after Image Display:

Actor: Workitem Performer

Role: Receives requested Key Image Notes from the Image Archive Actor. (In the rest of this transaction, references to Image Display apply equally to Workitem Performer.)

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Add Workitem Performer to the Use Case Diagram in 4.43.2

Add the following to section 4.43.2 after Evidence Creator:

Actor: Workitem Performer

Role: Records non-imaging evidence information in the Evidence Documents and stores them to the Image Archive. (In the rest of this transaction, references to Evidence Creator apply equally to Workitem Performer.)

Add Workitem Performer to the Use Case Diagram in 4.45.2

Add the following to section 4.45.2 after Image Display:

Actor: Workitem Performer

Role: Receives requested Evidence Documents from the Image Archive Actor. (In the rest of this transaction, references to Image Display apply equally to Workitem Performer.)

Add section 4.80 (Completely New Transaction)

4.80 Create UPS Workitem [RAD-80]

4.80.1 Scope

This transaction is used to create a new workitem.

The contents of the workitem describe both the task to be performed and associated information such as references to the input data, the order and accession number with which the task is associated, etc.

In a typical "pull workflow" this transaction allows a Workitem Creator (such as a RIS or Departmental Workflow Manager) to instruct a workitem manager (e.g., a Workitem Manager) to add a new workitem to a worklist. When a manager adds a new workitem to its worklist based on internal business logic, it would comply with the semantics of this transaction although it would not actually send itself a message.

In an unscheduled or append case, this transaction allows a Workitem Performer to instruct a manager to create a new workitem for unscheduled or appended work being performed by the Workitem Performer. This UPS N-CREATE is directly analogous (and similar in structure) to the MPPS N-CREATE used for unscheduled acquisition work.

4.80.2 Use Case Roles

The Roles in this transaction are defined in the following table and may be played by the actors shown here:

Role:	Requestor: Submits the relevant details and requests the creation of a new workitem.
Actor(s):	The following actors may play the role of Requestor: Workitem Creator: when requesting workitems Workitem Performer: when performing unscheduled workitems
Role:	Manager: Creates and manages a Unified Procedure Step instance for the requested workitem.
Actor(s):	The following actors may play the role of Manager: Workitem Manager: when receiving a new workitem for its worklist.

Transaction text specifies behavior for each Role. The behavior of specific Actors may also be specified when it goes beyond that of the general Role.

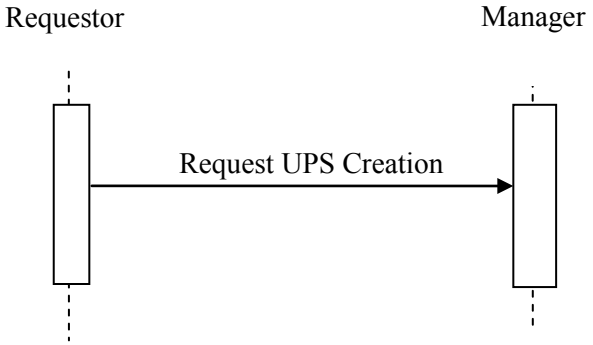
4.80.3 Referenced Standards

DICOM 2011 PS 3.4: Unified Procedure Step Service and SOP Classes

DICOM 2011 PS 3.3: Unified Procedure Step Information Object

DICOM 2011 PS 3.17: Unified Worklist and Procedure Step - UPS (Informative)

4.80.4 Interaction Diagram



4.80.4.1 Request UPS Creation Message

The Requestor sends a request to the Manager to create a new UPS instance representing the new workitem. The request contains the details for the requested workitem.

The Manager shall support handling such messages from more than one Requestor. The Requestor may choose to support making requests to more than one Manager.

4.80.4.1.1 Trigger Events

A user or an automated function on the Requestor determines that a new workitem is required.

The Requestor shall not request creation of a workitem unless the full list of input instances is known and those instances are available for retrieval.

4.80.4.1.2 Message Semantics

The message is an N-CREATE Request of the DICOM UPS Push SOP Class. The Requestor is the SCU, and the Manager is the SCP.

4.80.4.1.2.1 UPS Attribute Requirements

In addition to the UPS N-CREATE requirements described in DICOM PS 3.4, the Requestor shall comply with the following requirements.

The Scheduled Workitem Code Sequence (0040,4018) shall contain a single code that identifies the task to be performed. Requestors shall allow sites to configure the code to be used for the various tasks the Requestor can request.

Note: DICOM CID 9231 provides a handful of very generic codes.

Requestors may specify the intended performing system by populating the Scheduled Station Name Code Sequence (0040,4025). The Code Value (0008,0100) shall contain the AE-Title of the designated system. The Code Meaning (0008,0104) shall contain either the AE-Title of the designated system or a human-readable name for the designated system.

Note: The Coding Scheme Designator (0008,0102) will likely have a value of "L" or a value beginning with "99". See DICOM PS3.3 Section 8.2.

The Input Readiness State (0040,4041) shall have a value of READY, indicating that the list of instances in the Input Information Sequence (0040,4021) is complete, and the instances are all available for retrieval.

See Appendix W for details on the correspondence between attribute values in unscheduled UPS instances and associated DICOM objects.

4.80.4.1.2.2 Examples for the Use of Attributes

Requestors may provide a flat list of processing parameters in the Scheduled Processing Parameters Sequence (0074,1210); however, coordination of the parameters and their value

930 codings is outside the scope of this transaction. Creators of workitems should look to the documentation provided by the Workitem Performer for such details.

4.80.4.1.3 Expected Actions

The Manager shall attempt to create the requested UPS instance as described in DICOM PS 3.4 Annex CC and return appropriate success or failure codes to the Requestor.

935 Note: This includes the DICOM requirement to send out notifications of the UPS creation based on subscription settings.

4.80.5 Security Considerations

Local policy should consider what users and systems have permission to create a workitem and
940 configure appropriately.

4.80.5.1 Security Audit Considerations

This transaction is not associated with an ATNA Trigger Event.

Add section 4.81

945 4.81 Query UPS Workitems [RAD-81]

4.81.1 Scope

This transaction is used to find workitems of interest.

The contents of workitems describe both the task to be performed and related information such as references to the input data, the order and accession number with which the task is associated.

950 Typically the workitems have been scheduled by the Workitem Manager and the querying system intends to then select, claim and perform one or more of the workitems. Workitems on the worklist might include imaging tasks such as computer-aided diagnosis/detection, clinical image analysis/measurement or the generation of 3D views.

The querying system might also be a Watcher trying to select workitems of interest to which it
955 will then subscribe for notifications.

This transaction focuses on attributes relevant to filtering/selection. Matching key values are used to perform filtering on the manager; Return key values can be used to perform additional filtering and sorting on the requestor. Once a workitem of interest is selected, access to all the workitem details can be obtained using the Get UPS Workitem [RAD-83] transaction.

4.81.2 Use Case Roles

The Roles in this transaction are defined in the following table and may be played by the actors shown here:

Role:	Requestor: Query the Manager for Procedure Steps.
Actor(s):	The following actors may play the role of Requestor: Workitem Performer Watcher
Role:	Manager: Manage Unified Procedure Steps for workitems; accept query requests for Worklist items, return an appropriately filtered list of workitems.
Actor(s):	The following actors may play the role of Manager: Workitem Manager

Transaction text specifies behavior for each Role. The behavior of specific Actors are only specified when it goes beyond that of the general Role.

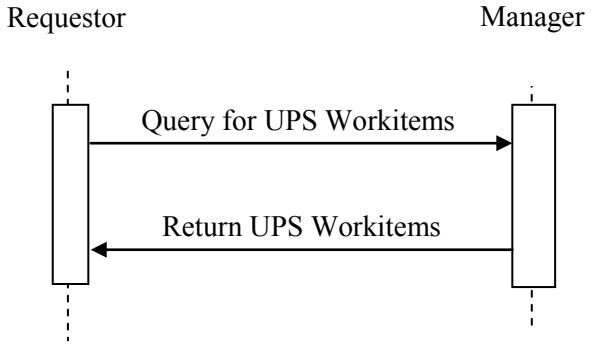
4.81.3 Referenced Standards

DICOM 2011 PS 3.4: Unified Procedure Step Service and SOP Classes

DICOM 2011 PS 3.3: Unified Procedure Step Information Object

DICOM 2011 PS 3.17: Unified Worklist and Procedure Step - UPS (Informative)

4.81.4 Interaction Diagram



4.81.4.1 Query for UPS Workitems Message

The Requestor queries the Manager for UPS instances representing workitems.

The Manager shall support handling such messages from more than one Requestor. The Requestor may choose to support querying more than one Manager.

4.81.4.1.1 Trigger Events

A user or an automated function on the Requestor wishes to identify workitems of interest and retrieve associated details of the workitems.

4.81.4.1.2 Message Semantics

The message is a C-FIND Request of the DICOM UPS Pull SOP Class. The Requestor is the SCU, and the Manager is the SCP.

See DICOM PS 3.4 Annex CC for further details.

4.81.4.1.2.1 Matching Keys and Return Keys

The Requestor shall be capable of performing each of the following query types.

Note: It is likely that various combinations of these queries will be useful to the user or the application. Implementers are advised to consider such combinations.

1. Patient-oriented Query: Query for workitems associated with a specific patient.

The Requestor shall support all of the matching key attributes listed in Table 4.81.4.1.2.1-1 in a query. Support for the keys individually or in combinations is at the discretion of the Requestor.

Table 4.81.4.1.2.1-1: UPS Keys for Patient-oriented Workitem Queries

Matching Key Attributes	Tag
Patient's Name	(0010,0010)
Patient ID	(0010,0020)
Issuer of Patient ID	(0010,0021)
Procedure Step State	(0074,1000)

Note: UPS instances are permitted to be created with the Issuer of Patient ID value left blank. A blank value can be presumed to match the local institution.

2. Procedure-oriented Query: Query for workitems associated with a specific procedure.

The Requestor shall support all of the matching key attributes listed in Table 4.81.4.1.2.1-2 in a query. Support for the keys individually or in combinations is at the discretion of the Requestor.

Sequence attributes denoted in the italics are not matching keys on their own but have to be included in a query to convey the value of the attributes contained within them.

Table 4.81.4.1.2.1-2: UPS Keys for Procedure-oriented Workitem Queries

Matching Key Attributes	Tag
Referenced Request Sequence	*(0040,A370)*
>Accession Number	(0008,0050)
>Issuer of Accession Number Sequence	*(0008,0051)*
>>Local Namespace Entity ID	(0040,0031)
>>Universal Entity ID	(0040,0032)
>>Universal Entity ID Type	(0040,0033)
>Requested Procedure ID	(0040,1001)
Scheduled Workitem Code Sequence	*(0040,4018)*
>Code Value	(0008,0100)
>Coding Scheme Designator	(0008,0102)
Procedure Step State	(0074,1000)

3. Station-oriented Query: Query for workitems associated with a particular workstation.

The Requestor shall support all of the matching key attributes listed in Table 4.81.4.1.2.1-3 in a query. Support for the keys individually or in combinations is at the discretion of the Requestor.

Sequence attributes denoted in the italics are not matching keys on their own but have to be included in a query to convey the value of the attributes contained within them.

The Code Value of the Scheduled Station Name Code Sequence, if valued, shall be set to the AE Title of the Requestor's UPS SCU.

Table 4.81.4.1.2.1-3: UPS Keys for Station-oriented Workitem Queries

Matching Key Attributes	Tag
Scheduled Station Name Code Sequence	*(0040,4025)*
>Code Value	(0008,0100)
>Coding Scheme Designator	(0008,0102)
Scheduled Procedure Step Start DateTime	(0040,4005)
Procedure Step State	(0074,1000)

4. Class-oriented Query: Query for workitems associated with a class of workstations.

The Requestor shall support all of the matching key attributes listed in Table 4.81.4.1.2.1-4 in a query. Support for the keys individually or in combinations is at the discretion of the Requestor.

Sequence attributes denoted in the italics are not matching keys on their own but have to be included in a query to convey the value of the attributes contained within them.

Table 4.81.4.1.2.1-4: UPS Keys for Class-oriented Workitem Queries

Matching Key Attributes	Tag
Scheduled Station Class Code Sequence	*(0040,4026)*
>Code Value	(0008,0100)
>Coding Scheme Designator	(0008,0102)
Scheduled Procedure Step Start DateTime	(0040,4005)
Procedure Step State	(0074,1000)

Additional Filtering

Although not mandated, implementers of Requestors are advised to review the full list of available Matching and Return Keys listed in DICOM PS3.4 Table CC.2.5-3 for attributes that would helpful in identifying workitems of interest.

Some possibilities include: Expected Completion DateTime (0040,4011), Expiration DateTime, Scheduled Procedure Step Priority (0074,1200), Procedure Step Label (0074,1204), Worklist Label (0074,1202), Scheduled Station Geographic Location Code Sequence (0040,4027), Scheduled Human Performers Sequence (0040,4034), Patients Birth Date (0010,0030), Patients Sex (0010,0040), Admission ID (0038,0010), Issuer of Admission ID Sequence (0038,0014), Requesting Service (0032,1033), Replaced Procedure Step Sequence (0074,1224).

4.81.4.1.2.2 Examples for the Use of Matching Key Attributes

- Scheduled Procedure Step Start DateTime supports a query for tasks scheduled to be performed today.
- Scheduled Workitem Code Sequence supports a query for specific types of computer-aided detection (CAD) tasks.
- Scheduled Station Name Code Sequence supports a query for tasks scheduled for this workstation.
- Scheduled Procedure Step Start DateTime, Scheduled Workitem Code and Scheduled Station Class Code together support a query for surface rendering tasks scheduled for today on 3D reconstruction workstations.

Note: Requestors are recommended to append a wildcard "*" at the end of each component of the structured Patient Name to facilitate matching with both structured and unstructured Patient Names.

4.81.4.1.3 Expected Actions

The Manager shall execute the query and send the matching UPS Workitems to the Requestor that originated the query as described in DICOM PS3.4.

4.81.4.2 Return UPS Workitems Message

The Manager returns workitems matching the query.

4.81.4.2.1 Trigger Events

The Manager receives a query for workitems.

4.81.4.2.2 Message Semantics

The message is a set of C-FIND Responses from the DICOM UPS Pull SOP Class. The Requestor is the SCU, and the Manager is the SCP.

The details available in the C-FIND Responses are intended to facilitate filtering and selection of a workitem for some purpose. The workitem itself contains many additional details that might affect actual performance of the workitem or that might be useful to an observing application. Such details can be obtained using the Get UPS Contents transaction.

4.81.4.2.3 Expected Actions

The Requestor typically provides the worklist to the user to select and start work based on the task details in the selected workitem, or does the selection and processing automatically. The Requestor is permitted to do additional "client-side" filtering prior to presenting the list to the user. Such filtering might be based on the values of Return Keys, access controls or other logic

4.81.5 Security Considerations

4.81.5.1 Security Audit Considerations

Managers that support the ATNA Profile shall audit this transaction.

This transaction corresponds to a Query Information ATNA Trigger Event.

Add section 4.82 (Modification of old Transaction)

4.82 Claim UPS Workitem [RAD-82]

4.82.1 Scope

This transaction is used to take "ownership" of a selected workitem by telling the managing system to change the state to IN PROGRESS. This permits other worklist users to detect that this workitem has been claimed and locks out others from claiming or modifying the workitem.

The workitem is still held by the Manager, but only the "owner" of the workitem is permitted to submit updates to the workitem. In some scenarios a single system might be both the Manager and the Performer of the workitem.

4.82.2 Use Case Roles

The Roles in this transaction are defined in the following table and may be played by the actors shown here:

Role:	Performer: Takes ownership of a workitem for the purpose of updating it.
Actor(s):	The following actors may play the role of Performer: Workitem Performer
Role:	Manager: Confirms/grants ownership of a workitem to the Performer.
Actor(s):	The following actors may play the role of Manager: Workitem Manager

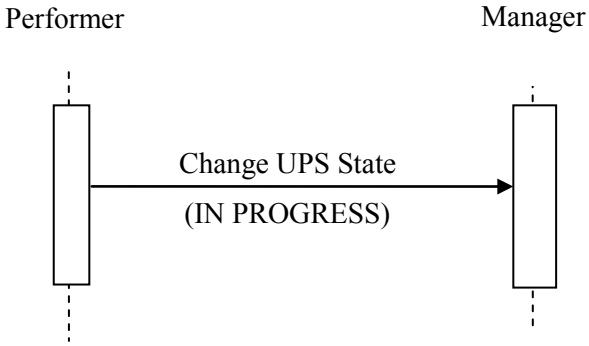
Transaction text specifies behavior for each Role. The behavior of specific Actors are only specified when it goes beyond that of the general Role.

4.82.3 Referenced Standards

DICOM 2011 PS 3.4: Unified Procedure Step Service and SOP Classes

DICOM 2011 PS 3.17: Unified Worklist and Procedure Step - UPS (Informative)

4.82.4 Interaction Diagram



4.82.4.1 Change UPS State Message

The Performer asks the Manager of a UPS instance to change the workitem state to IN PROGRESS.

The Manager shall support handling such messages from more than one Performer (although for an individual workitem this message will typically only be received from one Performer). The Performer may choose to support interacting with workitems on multiple Managers.

4.82.4.1.1 Trigger Events

A user or an automated function on the Performer wishes to take control of the workitem to begin work or otherwise modify it.

The Performer shall not claim a workitem if the contents of the Scheduled Station Name Code Sequence (0040,4025) indicate that the workitem was not intended for the Performer. See 4.80.4.1.2.1 for details on populating this sequence.

The Performer shall not claim a workitem for which Input Readiness State has a value of INCOMPLETE. Doing so would prevent the remaining references from being added to the Input Information Sequence.

Note: If it is useful for the Performer to start working on a workitem with an incomplete list in the Input Information Sequence, it may still use the Get UPS Workitem transaction (RAD-83) without claiming the workitem.

The Performer may claim a workitem for which Input Readiness State has a value of UNAVAILABLE; however, the Performer then has the responsibility for determining when the instances in the Input Information Sequence are available.

Once claimed, the Locking UID feature of UPS means that only the Performer that claimed it and the Manager have the key necessary to update the contents or modify the state of the UPS workitem, although other systems can still view the state and the contents.

4.82.4.1.2 Message Semantics

The message is a Change UPS State N-ACTION request of the DICOM UPS Pull SOP Class. The Performer is the SCU, and the Manager is the SCP.

The Performer shall generate a Locking UID and request that the UPS State be changed to IN PROGRESS as described in DICOM PS 3.4 Annex CC. The Locking UID is conveyed in the Transaction UID (0008,1195) attribute.

The Performer shall retain the Locking UID for use in future transactions on this Workitem. Future modification requests for this Workitem will be denied by the Manager (See DICOM PS 3.4) if the correct Locking UID is not provided.

By claiming the workitem, the Performer shall take responsibility for the performance of the task defined by the code contained in the Scheduled Workitem Code Sequence (0040,4018) of the workitem. The Performer shall be configurable to allow sites to map codes to the various tasks the Performer can perform. Performer may perform the task directly or may coordinate performance of the task by another system (e.g., by "sub-contracting" all or part of it or by using a hosted application).

4.82.4.1.3 Expected Actions

The Manager shall handle the N-ACTION state change request as described in DICOM PS 3.4 Annex CC and return appropriate success or failure codes to the Requester. This includes the DICOM requirement to send out notifications of the UPS creation based on subscription settings if the Profile requires the Manager to support the Send UPS Notification transaction.

4.82.5 Security Considerations

Local policy should consider what users and systems have permission to claim a workitem and configure appropriately.

4.82.5.1 Security Audit Considerations

This transaction is not associated with an ATNA Trigger Event.

Add section 4.83 (Partly derived from Performed Work Status Update)

4.83 Get UPS Workitem Contents [RAD-83]

4.83.1 Scope

This transaction is used to retrieve the contents (i.e., values of a requested list of attributes) from a workitem.

4.83.2 Use Case Roles

The Roles in this transaction are defined in the following table and may be played by the actors shown here:

Role:	Requestor: Requests details for a workitem.
Actor(s):	The following actors may play the role of Requestor: Workitem Performer Watcher
Role:	Manager: Provides the requested details for the requested UPS instance that it manages.
Actor(s):	The following actors may play the role of Manager:

	Workitem Manager

Transaction text specifies behavior for each Role. The behavior of specific Actors are only specified when it goes beyond that of the general Role.

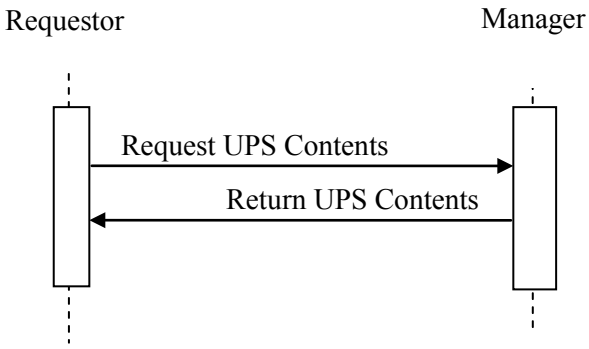
4.83.3 Referenced Standards

DICOM 2011 PS 3.4: Unified Procedure Step Service and SOP Classes

DICOM 2011 PS 3.3: Unified Procedure Step Information Object

DICOM 2011 PS 3.17: Unified Worklist and Procedure Step - UPS (Informative)

4.83.4 Interaction Diagram



4.83.4.1 Request UPS Contents Message

The Requestor sends a request for the Manager of a UPS instance to provide the values for a specific set of attributes for a specific UPS instance.

The Manager shall support handling such messages from more than one Requestor. The Requestor may choose to support making requests to more than one Manager.

4.83.4.1.1 Trigger Events

A user or an automated function on the Requestor wishes to obtain attribute values for a workitem.

Two typical usages are for:

- a Workitem Performer to get the full contents of a workitem prior to starting to perform it
- a Watcher to get specific details of interest upon notification that the contents of a workitem have changed.

4.83.4.1.2 Message Semantics

The message is an N-GET Request of the DICOM UPS Pull SOP Class (or the DICOM UPS Watch SOP Class). The Requestor is the SCU, and the Manager is the SCP.

Note: The N-GET Request in the two SOP Classes is equivalent. Pay particular attention to the discussion of SOP Class UIDs, Association Negotiation and DIMSE Implications for UPS in DICOM PS 3.4.

4.83.4.1.2.1 UPS Attribute Requirements

See RAD TF-3: Appendix V for details on the required correspondence between attribute values in UPS instances and associated DICOM objects.

The content and usage of the Scheduled Processing Parameter Sequence (0074,1210) is not constrained by IHE beyond what is specified in DICOM. If a Workitem Performer supports retrieving and using this sequence, the onus is on the Workitem Performer to provide documentation of the details so that creators of workitems can be configured to populate it appropriately.

4.83.4.1.3 Expected Actions

The Manager shall handle the request and respond with a Return UPS Contents message.

4.83.4.2 Return UPS Contents Message

The Manager returns the requested values from the specified UPS instance to the Requestor.

4.83.4.2.1 Trigger Events

The Manager receives a Request UPS Contents Message.

4.83.4.2.2 Message Semantics

The message is an N-GET Response Primitive of the DICOM UPS Pull SOP Class (which is equivalent to the N-GET Response Primitive of the DICOM UPS Watch SOP Class). The Requestor is the SCU, and the Manager is the SCP.

4.83.4.2.3 Expected Actions

The Manager shall provide the requested attributes to the best of its ability and return appropriate success or failure codes to the Requestor.

4.83.5 Security Considerations

Local policy should consider what users and systems have permission to retrieve workitem contents and configure appropriately.

4.83.5.1 Security Audit Considerations

This transaction is not associated with an ATNA Trigger Event.

Add section 4.84 (Modification of Old Transaction)

4.84 Update UPS Workitem [RAD-84]

4.84.1 Scope

This transaction is used by a workitem performer to request that the workitem manager modify the contents of a workitem it manages.

This is generally done to update details describing progress, or to finalize the attribute values prior to completing the workitem.

In the case where a system is also managing a UPS instance that it is performing, it will update the instance directly rather than use this transaction.

4.84.2 Use Case Roles

The Roles in this transaction are defined in the following table and may be played by the actors shown here:

Role:	Performer: Provides updated attribute values for a workitem it is performing.
Actor(s):	The following actors may play the role of Performer: Workitem Performer
Role:	Manager: Modifies the attribute values as instructed for a workitem it is managing.
Actor(s):	The following actors may play the role of Manager: Workitem Manager

Transaction text specifies behavior for each Role. The behavior of specific Actors are only specified when it goes beyond that of the general Role.

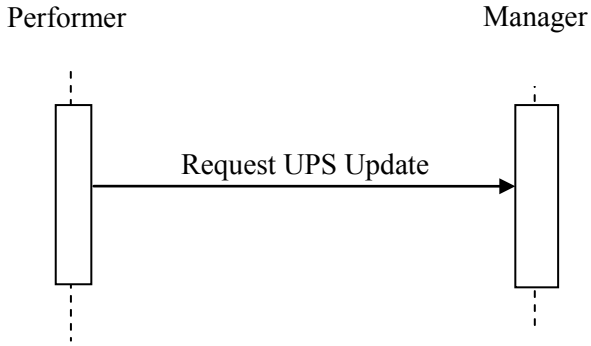
4.84.3 Referenced Standards

DICOM 2011 PS 3.4: Unified Procedure Step Service and SOP Classes

DICOM 2011 PS 3.3: Unified Procedure Step Information Object

DICOM 2011 PS 3.17: Unified Worklist and Procedure Step - UPS (Informative)

4.84.4 Interaction Diagram



1215

4.84.4.1 Request UPS Update Message

The Performer sends a request for the Manager of a UPS instance to update the attribute values.

The Manager shall support handling such messages from more than one Performer. The Performer may choose to support making requests to more than one Manager.

1220 **4.84.4.1.1 Trigger Events**

A user or an automated function on the Performer has updated attribute values for a workitem.

Upon starting actual work on a workitem, the Performer shall submit a Request UPS Update Message to update the Performed Procedure Step Start DateTime (0040,0244) and the contents of the Performed Station Name Code Sequence (0040,4028).

1225 In general, the frequency and "timeliness" of other updates is at the discretion of the Performer, unless otherwise specified in the Profile. Implementations might find it useful to provide a user configurable parameter for the frequency of updates (e.g. if set to 5 minutes, the information in the UPS instance is no more than 5 minutes old). This could serve as a useful "heartbeat" mechanism to determine that the Performer is still running.

1230 **4.84.4.1.2 Message Semantics**

The message is an N-SET Request of the DICOM UPS Pull SOP Class. The Performer is the SCU, and the Manager is the SCP.

As described in DICOM PS 3.4, the Performer needs to have the Locking UID for the UPS instance; otherwise the Manager will reject the N-SET Request. The Locking UID is conveyed
1235 in the Transaction UID (0008,1195) attribute. Generally the Performer will have generated the Locking UID when it claimed the workitem using RAD-82; however, it is possible it might have

the Locking UID due to being grouped with another actor, or may have been provided the Locking UID some other way.

4.84.4.1.2.1 UPS Attribute Requirements

In addition to the UPS N-SET requirements described in DICOM PS 3.4, the SCU shall comply with the requirements defined here.

The Actual Human Performers Sequence (0040,4035) shall be populated if a human has performed the workitem.

The Performed Station Name Code Sequence (0040,4028) shall be encoded as follows: The Code Value (0008,0100) shall contain the AE-Title of the designated system. The Code Meaning (0008,0104) shall contain either the AE-Title of the designated system or a human-readable name for the designated system. If the system has multiple AE-Titles, the value should reflect the AE-Title on which Send UPS Notification transactions could be received (e.g. notifying that a cancelation request has been submitted).

Note: The Coding Scheme Designator (0008,0102) will likely have a value of "L" or a value beginning with "99". See DICOM PS3.3 Section 8.2.

See RAD TF-3: Appendix V for details on the required correspondence between attribute values in UPS instances and associated DICOM objects.

4.84.4.1.2.2 Examples for the Use of Attributes

Guidance on the use of the Unified Procedure Step Progress Information Module may be found in DICOM PS3.3 C.30.1.

Informative material may be found in DICOM PS3.17 GGG.3.1 on updating workitem contents to reflect partial completion or performance of something that differs from what was requested.

4.84.4.1.3 Expected Actions

The Manager shall attempt to update the UPS instance as requested (and as described in DICOM PS 3.4) and return appropriate success or failure codes to the Performer.

4.84.5 Security Considerations

4.84.5.1 Security Audit Considerations

This transaction is not associated with an ATNA Trigger Event.

Add section 4.85 (Modification of old Transaction)

4.85 Complete UPS Workitem [RAD-85]

4.85.1 Scope

This transaction is used by a work performer to tell the managing system (e.g., a Post Processing Manager) that the contents of the selected workitem (e.g., references to result objects, etc.) have been finalized and the state should be changed to a Final State of either COMPLETED or CANCELED. Once in a Final State, further updates to the workitem are not permitted.

Subscribed actors will be notified of the state change and may choose to retrieve further details from the managing system.

4.85.2 Use Case Roles

The Roles in this transaction are defined in the following table and may be played by the actors shown here:

Role:	Performer: Finalizes and gives up ownership of a workitem.
Actor(s):	The following actors may play the role of Performer: Workitem Performer
Role:	Manager: Confirms/finalizes the workitem.
Actor(s):	The following actors may play the role of Manager: Workitem Manager

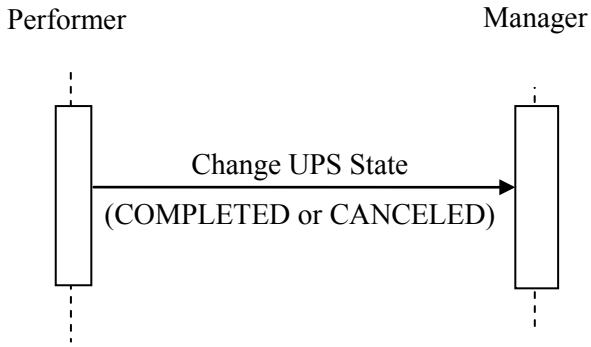
Transaction text specifies behavior for each Role. The behavior of specific Actors are only specified when it goes beyond that of the general Role.

4.85.3 Referenced Standards

DICOM 2011 PS 3.4: Unified Procedure Step Service and SOP Classes

DICOM 2011 PS 3.17: Unified Worklist and Procedure Step - UPS (Informative)

4.85.4 Interaction Diagram



4.85.4.1 Change UPS State Message

The Performer informs the Manager of a UPS instance that it has finished working on the workitem, has finished updating the UPS, and that the Manager should change the UPS state to COMPLETED or CANCELED (based on the value provided by the Performer for the Procedure Step State (0074,1000)).

The Manager shall support handling such messages from more than one Performer (although for an individual workitem this message will typically only be received from one Performer). The Performer may choose to support interacting with workitems on multiple Managers.

4.85.4.1.1 Trigger Events

A user or an automated function on the Performer determines that the task represented by the workitem is completed or canceled and the UPS instance has met the final state requirements described in DICOM PS 3.4 Table CC.2.5-3.

Since the UPS instance contains references to the generated output objects and where they are available from, and since the contents of a UPS instance cannot be updated after it is completed, it is recommended that the results have been successfully stored before this transaction is triggered.

4.85.4.1.2 Message Semantics

The message is a Change UPS State N-ACTION request of the DICOM UPS Pull SOP Class. The Performer is the SCU, and the Manager is the SCP.

The Performer shall not send the N-ACTION request unless it has already met the Final State requirements, including listing all Instances created, if any, in the Output Information Sequence (0040,4033).

4.85.4.1.3 Expected Actions

The Manager shall handle the N-ACTION state change request as described in DICOM PS 3.4 Annex CC and return appropriate success or failure codes to the Requestor. This includes the DICOM requirement to send out notifications of the UPS completion based on subscription settings.

If the Manager has internal logic to "override" remaining deletion locks and delete instances that have reached a Final State anyway based on internal logic, it shall be capable of waiting at least 24 hours before such deletions. This capability may be configurable.

4.85.5 Security Considerations

4.85.5.1 Security Audit Considerations

This transaction is not associated with an ATNA Trigger Event.

Add section 4.86 (New Transaction)

4.86 Manage UPS Subscription [RAD-86]

4.86.1 Scope

This transaction is used by an interested actor to subscribe (or unsubscribe) to notifications for one or more UPS workitems.

When an actor becomes subscribed to a workitem, it will be sent notifications (See RAD-87) of events such as changes in the state or contents of the UPS instance that represents the workitem.

In addition to subscribing to specific instances, an actor may subscribe to all instances ("global subscription") managed by another actor. An actor may also place a "deletion lock" on a subscription, which provides time for the subscribing actor to retrieve final details from a UPS instance after it has been moved to the COMPLETED or CANCELED state. See DICOM PS 3.4 and PS 3.17 for more details.

4.86.2 Use Case Roles

The Roles in this transaction are defined in the following table and may be played by the actors shown here:

Role:	Subscriber: Requests to change its subscription status to one or more UPS workitems.
Actor(s):	The following actors may play the role of Subscriber:

	Watcher
Role:	Manager: Modify subscription record as requested.
Actor(s):	The following actors may play the role of Manager: Workitem Manager

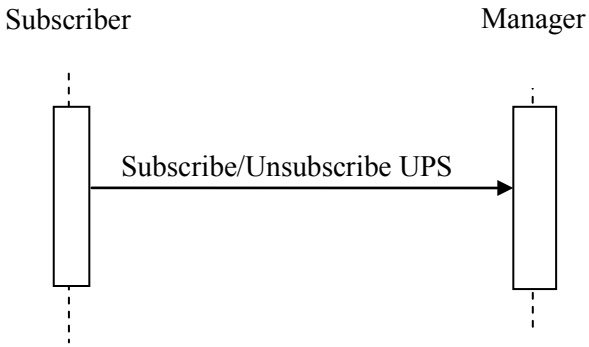
Transaction text specifies behavior for each Role. The behavior of specific Actors are only specified when it goes beyond that of the general Role.

4.86.3 Referenced Standards

DICOM 2011 PS 3.4: Unified Procedure Step Service and SOP Classes

DICOM 2011 PS 3.17: Unified Worklist and Procedure Step - UPS (Informative)

4.86.4 Interaction Diagram



4.86.4.1 Subscribe/Unsubscribe UPS Message

The Subscriber asks the Manager to change the state of the Subscriber's subscription. An active subscription means that the subscriber will receive notification events from the Manager with the associated workitem(s) change state or contents.

The Manager shall support handling such messages from more than one Subscriber. The Subscriber may choose to support interacting with workitems on multiple Managers.

As described in DICOM PS 3.4, Subscribers may choose to subscribe (or unsubscribe) from individual workitems or from all workitems managed by the Manager to which the request is sent (See Global Subscriptions in DICOM PS 3.4 and PS 3.17).

As described in DICOM PS 3.4, Subscribers may choose to place a Deletion Lock on workitem(s). Workitems are typically deleted by the Manager when the workitem is COMPLETED or CANCELED; however, the Manager will attempt to delay deletion of a workitem until Deletion Locks are removed, to allow Subscribers time to retrieve final state details for the workitem.

4.86.4.1.1 Trigger Events

A user or an automated function on the Subscriber determines that it would like to start receiving or stop receiving notifications associated with one or more workitems (UPS Instances).

Also, a user or an automated function on the Subscriber may determine that it would like to place a deletion lock on one or more workitems. For details on deletion locks, refer to DICOM PS 3.4.

4.86.4.1.2 Message Semantics

The message is a Subscribe/Unsubscribe to Receive UPS Event Reports N-ACTION request of the DICOM UPS Watch SOP Class. The Subscriber is the SCU, and the Manager is the SCP.

The semantics of Deletion Locks and Global Subscriptions are described in DICOM PS3.4 CC.2.3.

The Manager shall support the use of Deletion Locks and Global Subscriptions. Usage of Deletion Locks and Global Subscriptions by the Performer will depend on the nature of the application.

4.86.4.1.3 Expected Actions

The Manager shall respond to the N-ACTION request as described in DICOM PS 3.4 and return appropriate success or failure codes to the Subscriber.

4.86.5 Security Considerations

Local policy should consider what users and systems have permission to subscribe to workitem notifications and configure appropriately.

4.86.5.1 Security Audit Considerations

Managers that support the ATNA Profile shall audit this transaction.

This transaction corresponds to a Query Information ATNA Trigger Event.

Add section 4.87 (Modified and Extended the Performed Work Status Update Transaction)

4.87 Send UPS Notification [RAD-87]

4.87.1 Scope

This transaction is used to notify systems of the state or contents of a given UPS workitem.

4.87.2 Use Case Roles

The Roles in this transaction are defined in the following table and may be played by the actors shown here:

Role:	Subscriber: Accepts notifications.
Actor(s):	The following actors may play the role of Subscriber: Watcher Workitem Performer
Role:	Manager: Sends notifications about a workitem based on trigger events (such as changes in the state of the workitem).
Actor(s):	The following actors may play the role of Manager: Workitem Manager

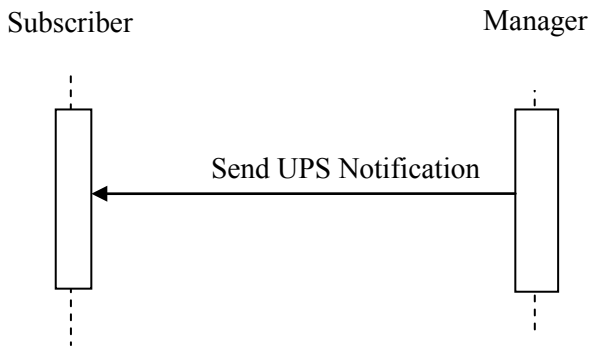
Transaction text specifies behavior for each Role. The behavior of specific Actors are only specified when it goes beyond that of the general Role.

4.87.3 Referenced Standards

DICOM 2011 PS 3.4: Unified Procedure Step Service and SOP Classes

DICOM 2011 PS 3.17: Unified Worklist and Procedure Step - UPS (Informative)

4.87.4 Interaction Diagram



4.87.4.1 Send UPS Notification Message

The Manager sends the Subscriber a notification that a given workitem has changed. The notification provides basic state/progress information. For more detail, the Subscriber must retrieve the contents of the UPS instance.

The Manager shall support sending such messages to more than one Subscriber for each workitem instance. The Subscriber shall support receiving such messages from each Manager it is configured to interact with.

As described in DICOM PS 3.4, if a Subscriber has a Global Subscription, it shall be prepared to receive notifications for workitems it has not individually subscribed to. The Subscriber may choose to unsubscribe from specific instances as it is notified of their creation.

Similarly, Workitem Performers shall be prepared to receive notifications for workitems not individually subscribed to when a new workitem is assigned to the Performer, or when there is a cancellation request for a workitem the Performer has claimed.

4.87.4.1.1 Trigger Events

Several events may trigger a Send UPS Notification Message

- The state or contents of a workitem is modified by the Manager. See DICOM PS 3.4 for a more complete description of the various modifications which require a notification.
- A Subscriber is newly subscribed to a workitem instance (See RAD TF3: 4.86). The Manager sends an initial notification, which provides the current state of the workitem to the Subscriber.
- A cancelation request is received for a workitem being performed (See RAD TF3: 4.88). The Manager notifies subscribers *and the performer of the workitem* of the cancelation request. This notification of the performer does not depend on the performer having previously subscribed to the workitem.
- A workitem has been assigned to a specific performer (by a workitem creator or the Manager setting the value of the Scheduled Station Name Code Sequence). The Manager

notifies the assigned performer. This notification of the performer does not depend on the performer having previously subscribed to the workitem. The notified performer may, but is not mandated to, claim the workitem.

4.87.4.1.2 Message Semantics

The message is a Report a Change in UPS Status N-EVENT-REPORT of the DICOM UPS Event SOP Class. The Subscriber is the SCU, and the Manager is the SCP.

4.87.4.1.3 Expected Actions

The Subscriber is not required to take any specific action upon receipt of a notification.

Specifically, in the case of notification of a cancelation request, the Performer of the Workitem is not required to honor the request. See DICOM PS 3.4 and PS 3.17 for further discussion of UPS cancelation.

The Subscriber may choose to perform a Get UPS Workitem Contents to obtain details beyond the brief set included in the notification event message.

4.87.5 Security Considerations

4.87.5.1 Security Audit Considerations

This transaction is not associated with an ATNA Trigger Event.

Add section 4.88 (New Transaction)

4.88 Request UPS Workitem Cancelation [RAD-88]

4.88.1 Scope

This transaction is used by an interested actor to request that a workitem be canceled.

There is no guarantee that the system performing the workitem will be successfully notified of the cancelation request, and there is no obligation for the system performing the workitem to honor the cancelation request.

It is recommended that a system requesting cancelation of a workitem provide as much detail as possible related to the cancelation request. The request itself is asynchronous, so the requesting system is advised to subscribe to the workitem in question if it wishes to know the outcome of the request.

This transaction would not be used by the system performing the workitem since it can simply use the Complete UPS Workitem transaction [RAD-85] to change the workitem to the Canceled state.

4.88.2 Use Case Roles

The Roles in this transaction are defined in the following table and may be played by the actors shown here:

Role:	Requestor: Requests cancelation of a UPS workitem.
Actor(s):	The following actors may play the role of Requestor: Workitem Creator Watcher
Role:	Manager: Responds to the request directly if the workitem is not being performed by another system, otherwise notifies the workitem performer of the cancelation request.
Actor(s):	The following actors may play the role of Manager: Workitem Manager

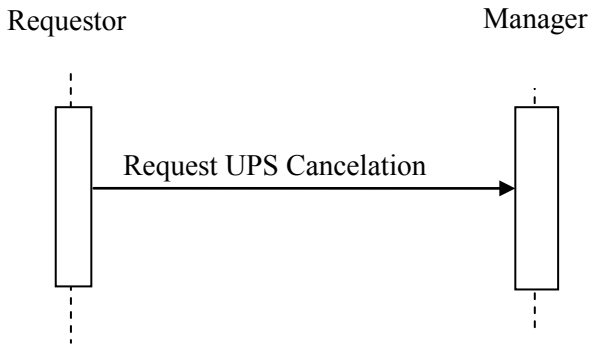
Transaction text specifies behavior for each Role. The behavior of specific Actors are only specified when it goes beyond that of the general Role.

4.88.3 Referenced Standards

DICOM 2011 PS 3.4: Unified Procedure Step Service and SOP Classes

DICOM 2011 PS 3.17: Unified Worklist and Procedure Step - UPS (Informative)

4.88.4 Interaction Diagram



4.88.4.1 Request UPS Cancelation Message

The Requestor sends a request to the Manager of a UPS instance that the workitem be canceled. The actions will depend on what system (if any) is performing the UPS in question.

For workitems still in the SCHEDULED state, the Manager will handle the cancelation request itself as described in DICOM PS 3.4 Annex CC (i.e., typically it will set the workitem state to IN PROGRESS then to CANCELED with appropriate attribute adjustments; however, it is permitted to ignore the request based on its internal logic).

For workitems that are IN PROGRESS, the Manager will attempt to notify the Performer of the cancelation request using a Send UPS Notification [RAD-87] message to the Performer of the workitem.

For workitems that are already in the CANCELED or COMPLETED state, the Request will fail.

The Requestor does not necessarily know which system is actually performing the workitem.

The Manager shall support handling such messages from more than one Requestor. The Requestor may choose to support interacting with workitems on multiple Managers.

4.88.4.1.1 Trigger Events

A user or an automated function on the Requestor determines that it would like a workitem to be canceled.

4.88.4.1.2 Message Semantics

The message is a Request UPS Cancel N-ACTION request of the DICOM UPS Push SOP Class. The Requestor is the SCU, and the Manager is the SCP.

The successful completion of the message means that the request was received, not that the workitem was necessarily canceled. The workitem might not be canceled, and even if it is canceled, it might take some time. If the workitem is canceled, the Requestor will receive a report of the cancelation in the form of a Send UPS Notification message (See RAD TF-3: 4.87) if the Requestor is subscribed to the workitem.

4.88.4.1.3 Expected Actions

The Manager shall respond to the N-ACTION request as described in DICOM PS 3.4 CC.2.2.3 and return appropriate success or failure codes to the Requestor.

The Manager shall notify the performer of the Workitem as described in 4.83.

4.88.5 Security Considerations

Local policy should consider what users and systems have permission to cancel a workitem and configure appropriately.

4.88.5.1 Security Audit Considerations

This transaction is not associated with an ATNA Trigger Event.

Add section 4.89

4.89 Start Application [RAD-89]

4.89.1 Scope

This transaction is used to launch a Hosted Application.

4.89.2 Use Case Roles

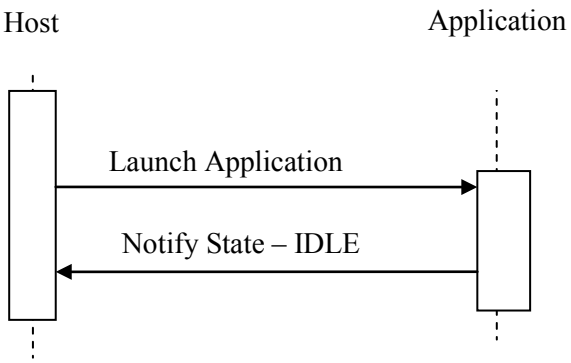
Role:	Host: Launches an Application.
Actor(s):	The following actors may play the role of Host: Hosting System
Role:	Application: Starts running.
Actor(s):	The following actors may play the role of Application: Hosted Application

4.89.3 Referenced Standards

DICOM 2011 PS 3.17: Annex XX Use Cases for Application Hosting

DICOM 2011 PS 3.19: Application Hosting

4.89.4 Interaction Diagram



4.89.4.1 Launch Application Message

This message initiates the launch of the Application.

The Host may choose to support launching multiple Applications (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.89.4.1.1 Trigger Events

A Host wishes an Application to start running, generally because the Host has processing tasks it wishes to assign to the Application. This could be in response to a user request, triggered by internal logic, or in order to carry out a workitem claimed by a Workitem Performer grouped with the Host.

4.89.4.1.2 Message Semantics

This message represents the Host following the Initialization method described in DICOM PS 3.19 for starting an Application's executable.

The Host may launch multiple instances of an Application to run multiple tasks in parallel; however, these tasks do not interact with each other.

The Host may provide a different HostURL (for example by embedding a unique "application ID" in the URL) to each application instance. This mechanism can allow the Host to easily distinguish later which instance is contacting it.

4.89.4.1.3 Expected Actions

The Application initializes and prepares for processing and enters the IDLE state.

4.89.4.2 Notify State – IDLE Message

The Application informs the Host it is ready to process.

The Host shall support receiving notifications from all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.89.4.2.1 Trigger Events

The Application completes initialization.

4.89.4.2.2 Message Semantics

The message is an invocation by the Application of the notifyStateChange() method of the Host Interface described in DICOM PS3.19.

The value of the State parameter shall be IDLE.

4.89.4.2.3 Expected Actions

None.

4.89.5 Security Considerations

No special security considerations are specified for this transaction beyond what is specified in DICOM PS 3.19, and the audit considerations listed in 4.89.5.1.

4.89.5.1 Security Audit Considerations

In general, the Application need not concern itself with audit messages, as that responsibility lies with the Host.

The Host shall be capable of generating an Actor Start audit message each time it performs this transaction.

Add section 4.90

4.90 Stop Application [RAD-90]

4.90.1 Scope

This transaction is used to shut down a Hosted Application.

4.90.2 Use Case Roles

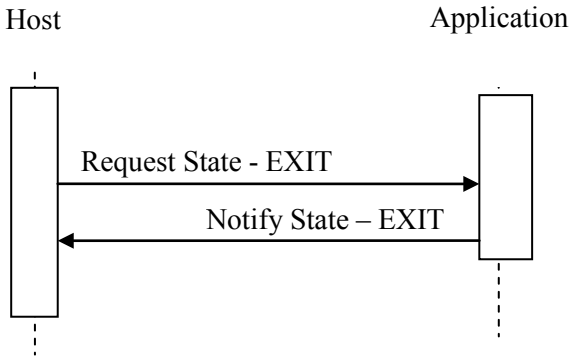
Role:	Host: Asks an Application to stop running.
Actor(s):	The following actors may play the role of Host: Hosting System
Role:	Application: Stops running.
Actor(s):	The following actors may play the role of Application: Hosted Application

4.90.3 Referenced Standards

DICOM 2011 PS 3.17: Annex XX Use Cases for Application Hosting

DICOM 2011 PS 3.19: Application Hosting

4.90.4 Interaction Diagram



4.90.4.1 Request State - EXIT Message

The Host requests that the Application stop running.

The Host shall support stopping all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.90.4.1.1 Trigger Events

A Host wishes an Application that is in the IDLE state to stop running, generally because the Host foresees no more processing tasks it wishes to assign to the Application.

4.90.4.1.2 Message Semantics

The message is an invocation by the Host of the setState() method of the Application Interface described in DICOM PS 3.19.

The value of the State parameter shall be EXIT.

4.90.4.1.3 Expected Actions

The Application completes any necessary shutdown preparation and goes to the EXIT state.

4.90.4.2 Notify State – EXIT Message

The Application informs the Host it is shutting down.

The Host shall support receiving notifications from all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.90.4.2.1 Trigger Events

The Application enters the EXIT state.

4.90.4.2.2 Message Semantics

The message is an invocation by the Application of the notifyStateChange() method of the Host Interface described in DICOM PS3.19.

The value of the State parameter shall be EXIT.

4.90.4.2.3 Expected Actions

The Application stops running.

4.90.5 Security Considerations

No special security considerations are specified for this transaction beyond what is specified in DICOM PS 3.19, and the audit considerations listed in 4.90.5.1.

4.90.5.1 Security Audit Considerations

In general, the Application need not concern itself with audit messages, as that responsibility lies with the Host.

The Host shall be capable of generating an Actor Stop audit message each time it performs this transaction.

Add section 4.91

4.91 Bring Application Front [RAD-91]

4.91.1 Scope

This transaction is used to ask the Hosted Application to bring its Graphical User Interface (GUI) window to the front (not be obscured by other windows in the workstation's GUI) and come into focus (take control of the user input devices) and resize the GUI if requested.

4.91.2 Use Case Roles

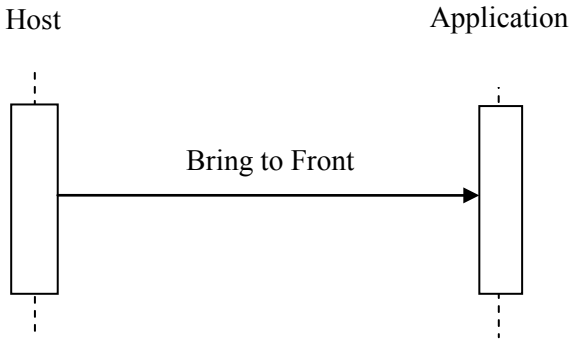
Role:	Host: Asks an Application to bring its GUI to the front and take the focus.
Actor(s):	The following actors may play the role of Host: Hosting System
Role:	Application: Brings its GUI to the front and takes focus.
Actor(s):	The following actors may play the role of Application: Hosted Application

4.91.3 Referenced Standards

DICOM 2011 PS 3.17: Annex XX Use Cases for Application Hosting

DICOM 2011 PS 3.19: Application Hosting

4.91.4 Interaction Diagram



4.91.4.1 Bring to Front Message

The Host requests that the Application resize its main GUI window, and come into focus, typically by becoming the front-most GUI window.

4.91.4.1.1 Trigger Events

The Host wishes to resize the Application's main GUI window, and bring it into focus.

4.91.4.1.2 Message Semantics

The message is an invocation by the Host of the bringToFront() methods of the Application interface described in DICOM PS 3.19.

4.91.4.1.3 Expected Actions

If the Application presents a GUI window, it shall resize that window, as requested in the bringToFront() call, and bring its window to the top of the window stacking order and give it GUI focus.

4.91.5 Security Considerations

No special security considerations are specified for this transaction beyond what is specified in DICOM PS 3.19, and the audit considerations listed in 4.91.5.1.

4.91.5.1 Security Audit Considerations

No audit messages are expected with this transaction.

Add section 4.92

4.92 Start Task [RAD-92]

4.92.1 Scope

This transaction is used to instruct a Hosted Application to start working on a task.

4.92.2 Use Case Roles

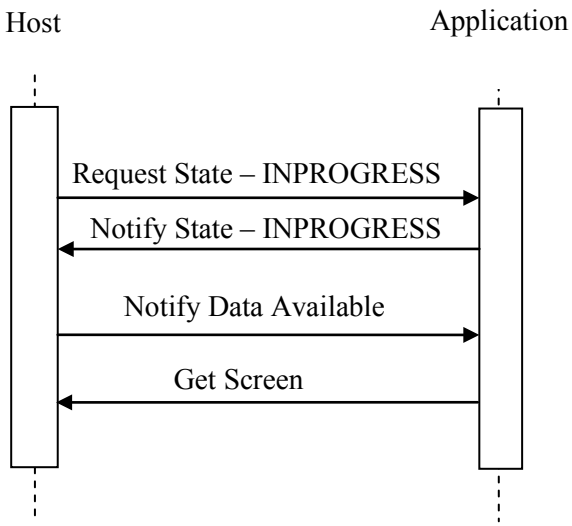
Role:	Host: Asks the Application to start working on a task.
Actor(s):	The following actors may play the role of Host: Hosting System
Role:	Application: Starts working on the assigned task.
Actor(s):	The following actors may play the role of Application: Hosted Application

4.92.3 Referenced Standards

DICOM 2011 PS 3.17: Annex XX Use Cases for Application Hosting

DICOM 2011 PS 3.19: Application Hosting

4.92.4 Interaction Diagram



4.92.4.1 Request State – INPROGRESS Message

The Host asks the Application to begin processing a task.

The Host shall support requests to all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

The Host may start multiple tasks in parallel, each task in its own Application; however, these tasks do not interact with each other.

4.92.4.1.1 Trigger Events

A Workitem Performer grouped with a Host has claimed a workitem, and the Host has selected an appropriate Application to perform a task needed to complete the workitem.

The Application selected by the Host typically depends on details provided by the Workitem Performer with which the Host is grouped. See RAD TF-1:30.1.1.3 for more details.

4.92.4.1.2 Message Semantics

The message is an invocation by the Host of the setState() method of the Application interface described in DICOM PS 3.19.

The value of the State parameter is INPROGRESS.

4.92.4.1.3 Expected Actions

Within the constraints described in DICOM PS3.19, the Application shall prepare to execute the task.

A given instance of an Application only executes a single task at a time.

4.92.4.2 Notify State – INPROGRESS Message

The Application informs the Host that processing has begun.

The Host shall support receiving notifications from all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.92.4.2.1 Trigger Events

The Application receives a request from the Host to change state to INPROGRESS.

4.92.4.2.2 Message Semantics

The message is an invocation by the Application of the notifyStateChange() method of the Host Interface described in DICOM PS3.19.

The value of the State parameter is INPROGRESS.

4.92.4.2.3 Expected Actions

The Host shall prepare an Available Data array to send to the Application, to inform the Application of any data that the Application may need to perform the task.

The Workitem Performer grouped with the Host shall update the workitem using the Update UPS Workitem [RAD-84] transaction. At a minimum, the Workitem Performer shall set the Performed Procedure Step Start DateTime (0040,0244) and the contents of the Performed Station Name Code Sequence (0040,4028).

4.92.4.3 Notify Data Available Message

The Host informs the Application of any data that the Host expects the Application might need to process the task.

4.92.4.3.1 Trigger Events

The Host receives notification that the Application is in the INPROGRESS state.

The Host may repeat this message as often as needed throughout the processing of the task to convey the list data to be processed to the Application.

4.92.4.3.2 Message Semantics

The message is an invocation by the Host of the notifyDataAvailable() method of the Data Exchange interface described in DICOM PS3.19.

The root level of the AvailableData array shall contain an ObjectDescriptor referring to the Unified Procedure Step SOP Instance that triggered this task. This descriptor shall have its MimeType set to "application/dicom" and its ClassUID set to "1.2.840.10008.5.1.4.34.6.1", i.e., the Unified Procedure Step - Push SOP Class UID.

Additional ObjectDescriptors shall reference all instances listed in the Input Information Sequence (0040,4021) of the UPS SOP Instance.

The message means that the Host is now prepared to respond to getData requests from the Application. It does not necessarily mean that the Host has already retrieved the data and has it locally available. The Host might wait until the Application requests the data and then the Host would retrieve the data to be able to provide it to the Application.

4.92.4.3.3 Expected Actions

The Application may access the referenced objects as necessary (e.g., to Get Task Details [RAD-93] or Get Task Data [RAD-94]).

4.92.4.4 Get Screen Message

The Application informs the Host that it has a GUI for executing the assigned task, and requests that the Host reserve space for the Application's GUI.

4.92.4.4.1 Trigger Events

The Application will use a GUI in performing the started task. If the Application has no GUI or command window for interacting with the user, the Application need not send this message.

4. 92.4.4.2 Message Semantics

The message is an invocation by the Application of the getAvailableScreen() method of the Host interface described in DICOM PS 3.19.

The Application shall provide its preferred window size to the Host.

4. 92.4.4.3 Expected Actions

The Host shall recognize that the task has a GUI, and shall return to the Application a suggested size and location for the task's GUI, taking into account the hint that the Application passed in the getAvailableScreen() call.

The Application shall set its main window size and location to that returned by the Host from the getAvailableScreen() call.

4.92.5 Security Considerations

No special security considerations are specified for this transaction beyond what is specified in DICOM PS 3.19, and the audit considerations listed in 3.92.5.1.

4.92.5.1 Security Audit Considerations

No audit messages are expected with this transaction.

Add section 4.93

4.93 Get Task Details [RAD-93]

4.93.1 Scope

This transaction retrieves the contents of a Unified Procedure Step (UPS) instance using the Application Hosting interface.

4.93.2 Use Case Roles

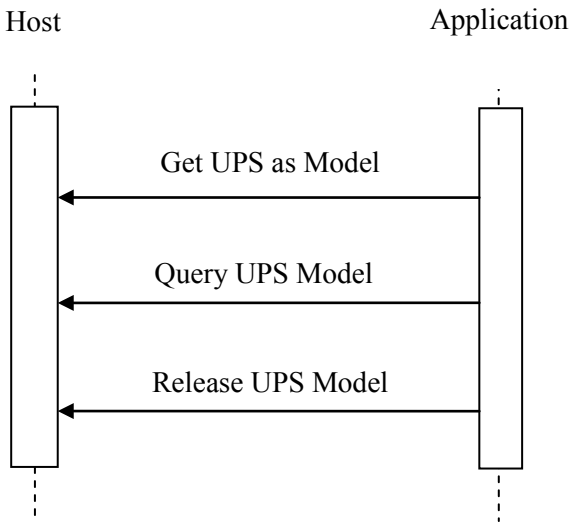
Role:	Application: Requests the contents of a UPS instance.
Actor(s):	The following actors may play the role of Application: Hosted Application
Role:	Host: Provides the contents of a UPS instance.
Actor(s):	The following actors may play the role of Host: Hosting System

4.93.3 Referenced Standards

DICOM 2011 PS 3.17: Annex XX Use Cases for Application Hosting

DICOM 2011 PS 3.19: Application Hosting

4.93.4 Interaction Diagram



4.93.4.1 Get UPS as Model Message

The Application requests that the Host be prepared to provide data from the claimed UPS workitem that triggered this task.

The Host shall support requests from all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.93.4.1.1 Trigger Events

The Application needs details for its assigned task.

4.93.4.1.2 Message Semantics

The message is an invocation by the Application of the getAsModels() method of the Data Exchange interface described in DICOM PS 3.19.

The objectUUIDs Array shall contain the UUID (previously provided by the Host) of an Object Descriptor that refers to a UPS SOP Instance, i.e., the ClassUID of the Object Descriptor is set to "1.2.840.10008.5.1.4.34.6.1".

The classUID that the Application supplies in the getAsModels() call shall be "1.2.840.10008.7.1.1", which is the class UID for the Native DICOM Model described in DICOM PS 3.19 Annex A.1.

Note: DICOM PS 3.19 does not restrict Hosted Applications from asking a Hosting System to provide data in ways other than as Native DICOM Models. For example, a Hosted Application might ask for the data as a file. A Host

System typically should be prepared for such requests, particularly if the Host might be configured with Hosted Applications that are unaware of this profile.

The Application may call this interface multiple times to acquire multiple access points to the UPS model.

4.93.4.1.3 Expected Actions

The Host shall return ModelSetDescriptors for the referenced UPS instance and be prepared to respond to queries against those models.

4.93.4.2 Query UPS Model Message

The Application requests task details, such as task parameters, from the UPS SOP Instance.

The Host shall support requests from all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.93.4.2.1 Trigger Events

The Application requires certain pieces of information that reside in the UPS SOP Instance.

It is a pre-requisite that the Application has received a ModelSetDescriptor for the UPS SOP Instance returned in a getAsModels() call.

4.93.4.2.2 Message Semantics

The message is an invocation by the Application of the queryModel() method or the queryInfoset() method of the Data Exchange interface on the Host, as described in DICOM PS 3.19.

The Application may choose to support queryModel(), queryInfoset() or both. The Host shall support both. For a given invocation, the Application's choice of queryModel() or queryInfoset() will also depend on the InfosetType in the ModelSetDescriptors returned by the Host in the getAsModels() call.

The Application provides the UUID of the ModelSetDescriptor of the model for the UPS SOP Instance along with XPath statements specifying the exact information sought by the Application. The XPath statements shall only specify DICOM Attributes at the root level of the DICOM Dataset, that are allowed by the Get Unified Procedure Step Information (N-GET) DIMSE Service Group specified in DICOM PS 3.4 Annex CC.

The Application may repeat this message as often as needed to fetch UPS information from the Host throughout the running of the Application's assigned task.

4.93.4.2.3 Expected Actions

The Host shall return the requested information from the UPS SOP Instance as the response to the queryModel() interface call.

Notes: 1. The Workitem Performer grouped with Host may or may not have the requested information available locally. For example, it might need to use the Get UPS Workitem [RAD-83] transaction to get the requested information.

2. DICOM PS 3.19 does not restrict Hosted Applications in what they may request in an XPath Statement. For example, a Hosted Application that does not conform to this transaction may simply supply a single slash character ("/") in the XPath statement, implying that the Hosted Application wishes to retrieve the entire UPS SOP Instance, or may request specific data below the root level of the DICOM Dataset. DICOM PS 3.19 also does not restrict a Hosted Application to just using a Native DICOM Model. A Hosted Application that does not conform to this transaction might also request the UPS SOP Instance data as a file. Hence, if the Host deploys Applications that do not conform to this IHE Transaction, the Host should be prepared to respond to such non-conformant requests. A suggested method for responding to requests for the entire UPS SOP Instance is for the Workitem Performer grouped with the Host to query the Workitem Manager using the Get UPS Workitem [RAD-83] transaction, listing all of the top level Attributes of the UPS IOD, and forwarding the information returned as the response to this message.

4.93.4.3 Release UPS Model

The Application informs the Host that it is finished accessing the contents of the model.

Note that the Application could request another model of the UPS workitem of the Host at some other time.

4.93.4.3.1 Trigger Events

The Application is finished with this access point to the UPS model.

4.93.4.3.2 Message Semantics

The message is an invocation by the Application of the releaseModels() method of the Data Exchange interface on the Host as described in DICOM PS 3.19.

The Application shall provide the UUID of the ModelSetDescriptor for the UPS SOP Instance model being released.

4.93.4.3.3 Expected Actions

The Host shall release the UPS model, freeing any resources consumed by the model.

4.93.5 Security Considerations

No special security considerations are specified for this transaction beyond what is specified in DICOM PS 3.19, and the audit considerations listed in 4.93.5.1.

4.93.5.1 Security Audit Considerations

In general, the Application need not concern itself with audit messages, as that responsibility lies with the Host.

Add section 4.94

4.94 Get Task Data [RAD-94]

4.94.1 Scope

This transaction is used to retrieve data from the Hosting System.

4.94.2 Use Case Roles

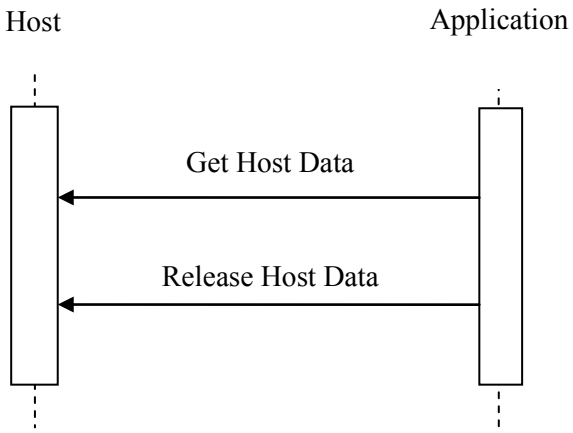
Role:	Application: Requests task related data.
Actor(s):	The following actors may play the role of Application: Hosted Application
Role:	Host: Provides the requested data.
Actor(s):	The following actors may play the role of Host: Hosting System

4.94.3 Referenced Standards

DICOM 2011 PS 3.17: Annex XX Use Cases for Application Hosting

DICOM 2011 PS 3.19: Application Hosting

4.94.4 Interaction Diagram



4.94.4.1 Get Host Data Message

The Application requests data from the Host, using information from the AvailableData structures that the Host gave the Application during the Start Application Task [RAD-92] transaction.

The Host shall support requests from all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.94.4.1.1 Trigger Events

The Application needs data to perform the assigned task.

It is a pre-requisite that the Application has received ModelSetDescriptors from the Host for the data, for example when the task was started (See Start Task [RAD-92]).

4.94.4.1.2 Message Semantics

The message may be done using any of the data exchange methods described in DICOM PS 3.19 (i.e., the model-based or file-based data exchange methods):

- The Application calls the getAsModels() interface of the Host as described in DICOM PS 3.19 with any model class that both the Host and the Application support.
- The Application calls the queryModel() or queryInfoset() interfaces of the Host as described in DICOM PS 3.19 as needed to retrieve desired data from the Host.
- The Application calls the getData() interface of the Host as described in DICOM PS 3.19 as needed to retrieve bulk data for a model, or file-based data from the Host.

Note that the Application may call any of these interfaces multiple times to get multiple instances of the data, and may mix data exchange methods without restriction. DICOM requires the Host to support all three interfaces, and permits the Application to use those it chooses.

A given logical instance of an Application only executes a single task at a time, hence only requests data associated with that task.

4.94.4.1.3 Expected Actions

The Host shall provide the requested data to the Application in responses to the interface calls, as described in DICOM PS 3.19.

4.94.4.2 Release Host Data Message

The Application informs the Host that it no longer needs the models or data pointers requested in the Get Host Data message.

Note that the Application could request the data of the Host again at some other time, up until the Application completes the assigned task (i.e., transitions to the COMPLETED state).

4.94.4.2.1 Trigger Events

The Application is finished using the data references or models.

4.94.4.2.2 Message Semantics

The message is an invocation by the Application of the releaseData() method or the releaseModels() method of the Data Exchange interface on the Host as described in DICOM PS 3.19.

To release data, the Application shall provide the UUIDs of the data references being released and invoke the releaseData() method.

To release models, the Application shall provide the UUIDs of the models being released and invoke the releaseModels() method.

The Application may wait for the implicit release of all models and data references when the Application enters the IDLE state for simple tasks. In general, a ‘good citizen’ would release the models and data references as soon as possible, to keep resource usage to a minimum.

4.94.4.2.3 Expected Actions

The Host shall release the models and data references, freeing any resources consumed by them.

4.94.5 Security Considerations

No special security considerations are specified for this transaction beyond what is specified in PS 3.19, and the audit considerations listed in 4.94.5.1.

4.94.5.1 Security Audit Considerations

In general, the Application need not concern itself with audit messages, as that responsibility lies with the Host.

It is expected that the Host shall generate all needed audit messages dealing with data access and data storage.

Add section 4.95

4.95 Notify Task Status [RAD-95]

4.95.1 Scope

This transaction is used to inform the Hosting System of notable events during the processing of an assigned task.

The events may be informational, such as progress messages, or they may be warnings or error reports.

4.95.2 Use Case Roles

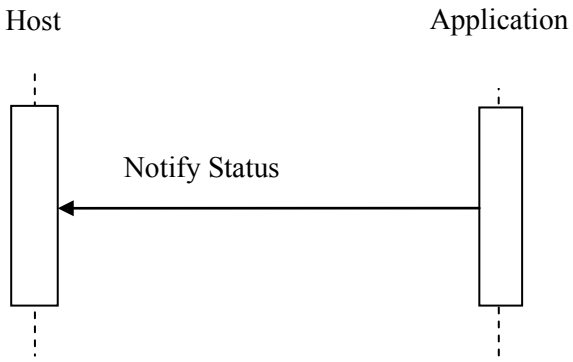
Role:	Application: Sends a notification of progress, errors or other changes in task status.
Actor(s):	The following actors may play the role of Application: Hosted Application
Role:	Host: Receives the notification.
Actor(s):	The following actors may play the role of Host: Hosting System

4.95.3 Referenced Standards

DICOM 2011 PS 3.17: Annex XX Use Cases for Application Hosting

DICOM 2011 PS 3.19: Application Hosting

4.95.4 Interaction Diagram



4.95.4.1 Notify Status Message

The Application notifies the Host that some notable event occurred during the processing of the assigned task.

4.95.4.1.1 Trigger Events

The Application has an event of note to report back to the Host. Such events include progress reports, error reports, or aborting an assigned task.

The Host shall support notifications from all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.95.4.1.2 Message Semantics

The Notify Status message includes the following interactions of Application Hosting, as described in DICOM PS 3.19:

- As an Application processes a given task, it may periodically report progress or other events of potential interest to the Host through calls to the DICOM PS 3.19 notifyStatus() interface.
- If an Application cannot complete the processing of a task (i.e., is aborting the task), it shall issue a notifyStatus() call to the Host, with a status that indicates why it cannot complete the task, followed by a transition to the CANCELED state, followed by a transition to the IDLE state, as required by DICOM PS 3.19.

4.95.4.1.3 Expected Actions

The Host may log the status and/or inform the user (if a human operator is involved) as appropriate.

The Workitem Performer grouped with the Host shall update the UPS workitem, as appropriate based on the received status information, using an Update UPS Workitem [RAD-84] transaction.

If the Application aborted the Task (i.e., the Application issued an error status notification, and then transitioned to the CANCELED, then IDLE state), the Workitem Performer grouped with the Host may at its discretion cancel its claim on the workitem (i.e., with a Complete UPS Workitem [RAD-85] transaction), or take other appropriate action, such as starting a task in a different Application to carry out the workitem.

4.95.5 Security Considerations

No special security considerations are specified for this transaction beyond what is specified in DICOM PS 3.19, and the audit considerations listed in 4.95.5.1.

4.95.5.1 Security Audit Considerations

In general, the Application need not concern itself with audit messages, as that responsibility lies with the Host.

The Host shall be capable of generating an Actor Stop audit message if the Application transitioned to the CANCELED, then the IDLE states after the Notify Status (i.e., the Application aborted the task due to an error).

Add section 4.96

4.96 Notify Task Results [RAD-96]

4.96.1 Scope

This transaction is used to inform the Hosting System that the Hosted Application has data available for storage, created through the processing of the Application's assigned task.

4.96.2 Use Case Roles

Role:	Application: Sends a notification that data is available for storage.
Actor(s):	The following actors may play the role of Application: Hosted Application

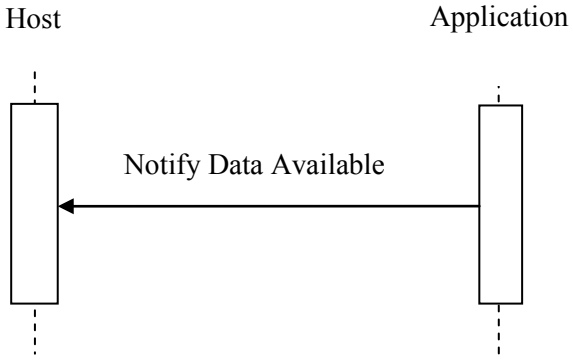
Role:	Host: Receives the notification.
Actor(s):	The following actors may play the role of Host: Hosting System

4.96.3 Referenced Standards

DICOM 2011 PS 3.17: Annex XX Use Cases for Application Hosting

DICOM 2011 PS 3.19: Application Hosting

4.96.4 Interaction Diagram



4.96.4.1 Notify Data Available Message

The Application informs the Host that the Application has produced output data during task processing, and is now waiting for the Host to capture that output data.

The Host shall support notifications from all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.96.4.1.1 Trigger Events

The Application has prepared output data during the processing of a task and is ready for the Host to retrieve it.

4.96.4.1.2 Message Semantics

The message is an invocation by the Application of the notifyDataAvailable() method of the Data Exchange interface on the Host as described in DICOM PS 3.19.

The Application shall populate the AvailableData structure with references to the result data.

The Application may invoke the generateUID() or getOutputLocation() methods of the Host interface in preparing data to be sent to the Host. The Application may invoke these methods either prior to or after it invokes the notifyDataAvailable() method.

The Application may invoke the notifyDataAvailable() method multiple times during the performance of a task.

4.96.4.1.3 Expected Actions

The Host shall make note of the data references in the AvailableData structure received from the Application.

The Host has a responsibility to get all the referenced data (using the Get Task Results [RAD-97] transaction) and store it; however, the timing is at the discretion of the Host.

4.96.5 Security Considerations

No special security considerations are specified for this transaction.

4.96.5.1 Security Audit Considerations

No audit messages are expected with this transaction.

Add section 4.97

4.97 Get Task Results [RAD-97]

4.97.1 Scope

This transaction is used to retrieve data from the Hosted Application.

4.97.2 Use Case Roles

Role:	Host: Requests data.
Actor(s):	The following actors may play the role of Host: Hosting System
Role:	Application: Provides requested data.

Actor(s):	The following actors may play the role of Application: Hosted Application

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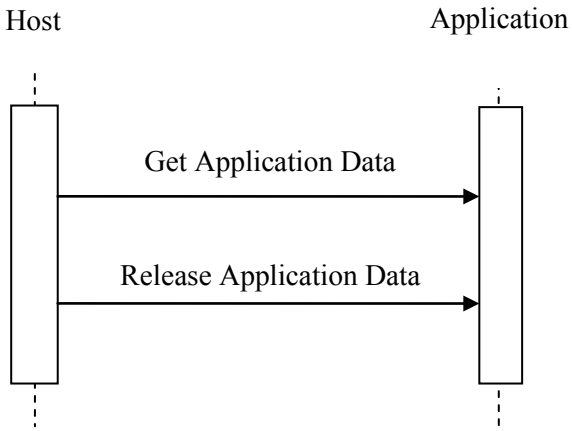
4.97.3 Referenced Standards

DICOM 2011 PS 3.17: Annex XX Use Cases for Application Hosting

DICOM 2011 PS 3.19: Application Hosting

4.97.4 Interaction Diagram



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4.97.4.1 Get Application Data Message

The Host requests and receives data from the Application.

A given logical instance of an Application only executes a single task at a time, hence only provides data associated with that task.

2015 The Host may launch multiple instances of an Application to run multiple tasks in parallel, and must be prepared to pull, sort, and store data from all of those tasks; however, these tasks do not interact with each other.

4.97.4.1.1 Trigger Events

The Host is ready to retrieve and store the output data.

2020 It is a pre-requisite that the Host has received descriptions of available output data from the Application (i.e., in one or more Notify Task Results [RAD-96] transactions).

4.97.4.1.2 Message Semantics

The message may be done using any of the data exchange methods described in DICOM PS 3.19 (i.e., the model-based or file-based data exchange methods) that the Application supports:

- The Host calls the getAsModels() interface of the Application as described in DICOM PS 3.19 with any model class that both the Host and the Application support.
- The Host calls the queryModel() or queryInfoset() interfaces of the Application as described in DICOM PS 3.19 as needed to retrieve desired data from the Host.
- The Host calls the getData() interface of the Application as described in DICOM PS 3.19 as needed to retrieve bulk data for a model, or file-based data from the Host.

Note that the Host may call any of these interfaces multiple times to get multiple instances of the data, and may mix data exchange methods that the Application Supports. Per DICOM PS 3.19, the Application is only required to support one of the Data Exchange methods, and it is up to the Host to discover which methods the Application actually supports. The Host is required to support all three data exchange methods.

4.97.4.1.3 Expected Actions

The Application shall provide the requested data to the Host in responses to the interface calls, as described in DICOM PS 3.19. While generating or preparing the data, the Application may call the Host's generateUID() or getOutputLocation() interfaces as needed, as described in DICOM PS3.19.

The Workitem Performer grouped with the Host, upon receiving the data, has a responsibility to store the data (for example using the Evidence Documents Stored [RAD-43] transaction or the Creator Images Stored [RAD-18] transaction); however the timing is at the discretion of the Workitem Performer.

The Workitem Performer grouped with the Host is also responsible for updating the Output Information Sequence (0040,4033) of the UPS worklist item with the retrieval information of the stored data.

4.97.4.2 Release Application Data Message

The Host informs the Application that it no longer needs the models or data pointers requested in the Get Application Data message.

The Host shall be designed such that it will not request the data of the Application after having once released the application data.

4.97.4.2.1 Trigger Events

The Host is finished using the data references or models.

4.97.4.2.2 Message Semantics

The message is an invocation by the Host of the releaseData() method or the releaseModels() method of the Data Exchange interface on the Application as described in DICOM PS 3.19.

To release data, the Host shall provide the UUIDs of the data references being released and invoke the releaseData() method.

To release models, the Host shall provide the UUIDs of the models being released and invoke the releaseModels() method

The Host may wait for the implicit release of all models and data references when the Application enters the IDLE state for simple tasks. In general, a 'good citizen' would release the models and data references as soon as possible, to keep resource usage to a minimum. This is especially true with an Application that generates lots of data during the course of task execution, and may need the resources to generate additional data.

4.97.4.2.3 Expected Actions

The Application shall release the models and data references, freeing any resources consumed by them.

4.97.5 Security Considerations

No special security considerations are specified for this transaction beyond what is specified in DICOM PS 3.19, and the audit considerations listed in 4.97.5.1.

4.97.5.1 Security Audit Considerations

In general, the Application need not concern itself with audit messages, as that responsibility lies with the Host.

It is expected that the Host shall generate all needed audit messages dealing with data access and data storage.

Add section 4.98

4.98 Notify Task Complete [RAD-98]

4.98.1 Scope

This transaction is used to inform the Hosting System that the Hosted Application has completed processing of its assigned task.

4.98.2 Use Case Roles

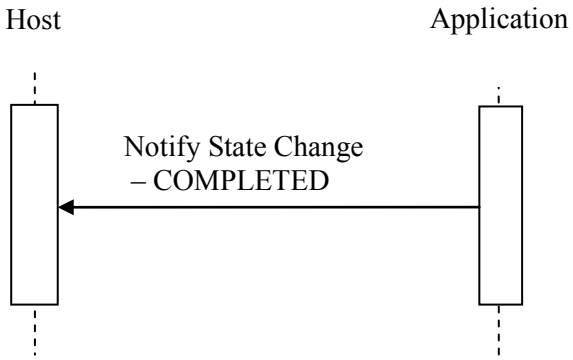
Role:	Application: Sends a notification that a task has been completed.
Actor(s):	The following actors may play the role of Application: Hosted Application
Role:	Host: Receives the notification.
Actor(s):	The following actors may play the role of Host: Hosting System

4.98.3 Referenced Standards

DICOM 2011 PS 3.17: Annex XX Use Cases for Application Hosting

DICOM 2011 PS 3.19: Application Hosting

4.98.4 Interaction Diagram



4.98.4.1 Notify State Change – COMPLETED Message

The Application informs the Host that it has completed task processing (and is now waiting for the Host to finish capturing the output data, if any, and finalize the application task).

The Host shall support receiving notifications from all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.98.4.1.1 Trigger Events

The Application has finished processing, and has received an indication from the Host that no more data is forthcoming.

It is a pre-requisite that, if the Application has produced any output data during the processing of the assigned task, the Application has executed a Notify Task Results [RAD-96] transaction, with the lastData flag of the notifyDataAvailable() interface call to TRUE.

4.98.4.1.2 Message Semantics

The message is an invocation by the Application of the notifyStateChange() method of the Host Interface described in PS 3.19.

The value of the State parameter shall be COMPLETED.

4.98.4.1.3 Expected Actions

The Host has a responsibility to IDLE the Application (using the Finalize Task transaction [RAD-99]); however the timing is at the discretion of the Host. Since idling the Application will make result data unavailable, the Host may need to get any remaining results (using the Get Task Results [RAD-97] transaction) first.

If completion of the Task completes an associated Workitem, the Workitem Performer grouped with the Host has a responsibility to notify the Workitem Manager (using the Complete UPS Workitem transaction [RAD-85]); however the timing is at the discretion of the Workitem Performer. The Workitem Performer may need to store results and/or update the workitem contents first.

4.98.5 Security Considerations

No special security considerations are specified for this transaction.

4.98.5.1 Security Audit Considerations

No audit messages are expected with this transaction.

Add section 4.99

4.99 Finalize Task [RAD-99]

4.99.1 Scope

This transaction is used to request an Application to finalize a task by releasing all remaining resources consumed by the task and going into the IDLE state.

4.99.2 Use Case Roles

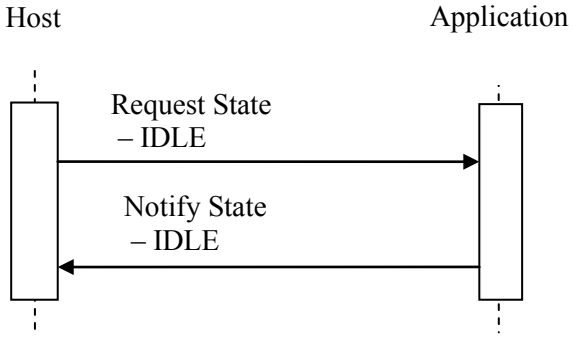
Role:	Host: Asks an Application to release data and go idle.
Actor(s):	The following actors may play the role of Host: Hosting System
Role:	Application: Releases data and goes idle.
Actor(s):	The following actors may play the role of Application: Hosted Application

4.99.3 Referenced Standards

DICOM 2011 PS 3.17: Annex XX Use Cases for Application Hosting

DICOM 2011 PS 3.19: Application Hosting

4.99.4 Interaction Diagram



4.99.4.1 Request State – IDLE Message

The Host requests that the Application finalize the processing of a task.

The Host shall support sending requests to all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.99.4.1.1 Trigger Events

The Host has received notification that the Application task processing is in the COMPLETED state (transaction [RAD-98]) and the Host has captured any pertinent output from the processing task.

4.99.4.1.2 Message Semantics

The message is an invocation by the Host of the setState() method of the Application Interface described in DICOM PS 3.19.

The value of the State parameter shall be IDLE.

4.99.4.1.3 Expected Actions

The Application shall free up resources used in processing the task, and prepare itself to potentially receive another processing task request.

The Application shall enter the IDLE state (and notify the Host accordingly) then await the next processing task request.

4.99.4.2 Notify State – IDLE Message

The Application informs the Host that it has finalized task processing, and is now ready to receive additional task processing requests.

The Host shall support receiving notifications from all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.99.4.2.1 Trigger Events

The Application enters the IDLE state.

4.99.4.2.2 Message Semantics

The message is an invocation by the Application of the notifyStateChange() method of the Host Interface described in DICOM PS 3.19.

The value of the State parameter shall be IDLE.

4.99.4.2.3 Expected Actions

The Host may either:

- request that the Application process another task (e.g., from another UPS workitem claimed by the Workitem Performer grouped with the Host),
- hold the Application in reserve for some future task processing request, or
- ask the Application to exit using the Stop Application [RAD-90] transaction.

4.99.5 Security Considerations

No special security considerations are specified for this transaction beyond what is specified in DICOM PS 3.19, and the audit considerations listed in 4.99.5.1.

4.99.5.1 Security Audit Considerations

No audit messages are expected with this transaction.

Add section 4.100

4.100 Cancel Task [RAD-100]

4.100.1 Scope

This transaction is used to cancel task processing in a Hosted Application.

4.100.2 Use Case Roles

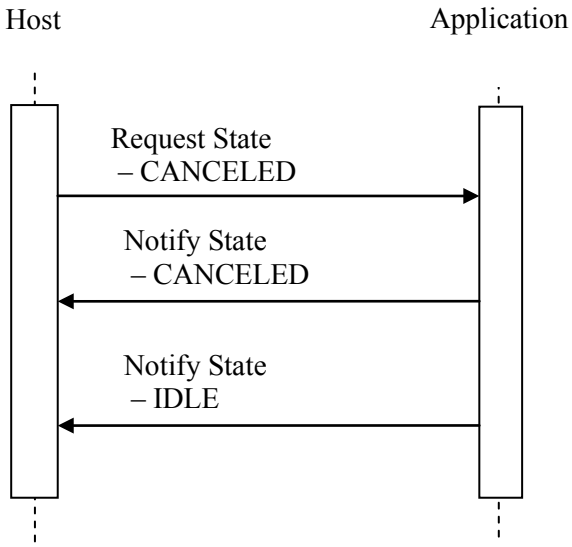
Role:	Host: Asks an Application to cancel a task.
Actor(s):	The following actors may play the role of Host: Hosting System
Role:	Application: Cancels the task.
Actor(s):	The following actors may play the role of Application: Hosted Application

4.100.3 Referenced Standards

DICOM 2011 PS 3.17: Annex XX Use Cases for Application Hosting

DICOM 2011 PS 3.19: Application Hosting

4.100.4 Interaction Diagram



4.100.4.1 Request State – CANCELED Message

The Host requests that the Application cancel the processing of a task.

The Host shall support canceling tasks on all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.100.4.1.1 Trigger Events

The Host wishes to cancel the processing of a task.

It is a pre-requisite that the Application is in either the INPROGRESS or the SUSPENDED state.

This could be, for example, in response to a user request, or in response to a Send UPS Notification [RAD-87] transaction received by the Workitem Performer grouped with the Host indicating that cancelation of the workitem has been requested. Note that honoring such requests is at the discretion of the Workitem Performer (i.e. the Host is not necessarily obligated to send a Request State – CANCELED Message.)

4.100.4.1.2 Message Semantics

The message is an invocation by the Host of the setState() method of the Application Interface described in DICOM PS 3.19.

The value of the State parameter shall be CANCELED.

4.100.4.1.3 Expected Actions

The Application shall halt execution of the task, enter the CANCELED state (and notify the Host accordingly) and proceed with resource cleanup and moving to the IDLE state.

If the Application does not respond to the Host's request to transition to the CANCELED state then the IDLE state in a timely fashion, the Host may at its discretion take other actions to halt the wayward Application (e.g. force a stop or kill via the operating system). The nature of these actions is implementation dependent.

4.100.4.2 Notify State – CANCELED Message

This Application informs the Host that it is in the process of halting the processing of a task.

The Host shall support receiving notifications from all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.100.4.2.1 Trigger Events

This Application enters the CANCELED state.

4.100.4.2.2 Message Semantics

The message is an invocation by the Application of the notifyStateChange() method of the Host Interface described in PS 3.19.

The value of the State parameter shall be CANCELED.

4.100.4.2.3 Expected Actions

None.

4.100.4.3 Notify State – IDLE Message

This Application informs the Host that it is now ready to start another task, if requested.

The Host shall support receiving notifications from all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.100.4.3.1 Trigger Events

The Application enters the IDLE state.

4.100.4.3.2 Message Semantics

The message is an invocation by the Application of the notifyStateChange() method of the Host Interface described in DICOM PS 3.19:

The value of the State parameter shall be IDLE.

4.100.4.3.3 Expected Actions

The Host may either:

- request that the Application process another task (e.g., from another UPS workitem claimed by the Workitem Performer grouped with the Host),
- hold the Application in reserve for some future task processing request, or
- ask the Application to exit using the Stop Application [RAD-90] transaction.

If the Workitem Performer grouped with the Host is not planning to restart a task in order to complete the processing of the claimed UPS workitem, then it shall put the workitem in the CANCELED state (i.e., via the Complete UPS Workitem transaction [RAD-85]). The Workitem Performer may need to first use an Update UPS Workitem [RAD-84] transaction to meet DICOM Final State Requirements.

4.100.5 Security Considerations

No special security considerations are specified for this transaction beyond what is specified in DICOM PS 3.19, and the audit considerations listed in 4.100.5.1.

4.100.5.1 Security Audit Considerations

No audit messages are expected with this transaction.

Add section 4.101

4.101 Suspend Application [RAD-101]

4.101.1 Scope

This transaction is used to suspend a running Application.

This transaction may only occur when the host is in the INPROGRESS state.

4.101.2 Use Case Roles

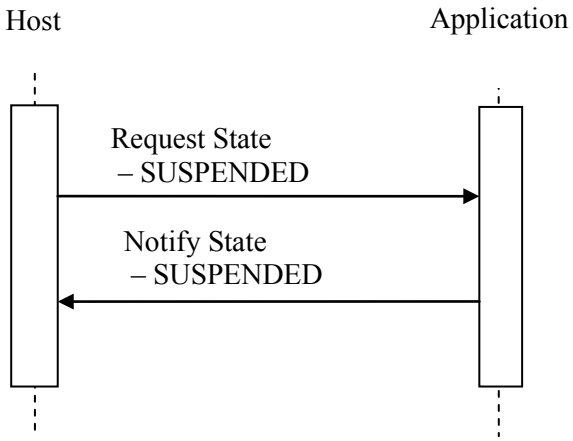
Role:	Host: Asks an Application to (temporarily) suspend processing.
Actor(s):	The following actors may play the role of Host: Hosting System
Role:	Application: Suspends processing.
Actor(s):	The following actors may play the role of Application: Hosted Application

4.101.3 Referenced Standards

DICOM 2011 PS 3.17: Annex XX Use Cases for Application Hosting

DICOM 2011 PS 3.19: Application Hosting

4.101.4 Interaction Diagram



4.101.4.1 Request State – SUSPENDED Message

The Host requests that the Application suspend processing of a task.

The Host shall support sending requests to all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.101.4.1.1 Trigger Events

The Host wishes to suspend a processing task.

This could be, for example, in response to a user request to pause. Or it may occur when the Host needs to put this task on hold to free up resources for a higher priority task running in a different Application.

4.101.4.1.2 Message Semantics

The message is an invocation by the Host of the setState() method of the Application Interface described in DICOM PS 3.19:

The value of the State parameter shall be SUSPENDED.

4.101.4.1.3 Expected Actions

The Application shall, as quickly as possible, find a logical holding point in the task execution and enter the SUSPENDED state. The Application shall free up as many resources as possible while in the SUSPENDED state, without losing any required context for continuing the task at the point the task was suspended.

It is a pre-requisite that Application is in the INPROGRESS state.

A given instance of an Application only holds a single task in suspension at a time.

The Application will keep the task in the SUSPENDED state, consuming as few resources as possible, until the Host either resumes (Resume Application transaction [RAD-102]) or cancels (Cancel Task transaction [RAD-100]) the task.

4.101.4.2 Notify State – SUSPENDED Message

The Application informs the Host that it has suspended task processing.

The Host shall support receiving notifications from all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.101.4.2.1 Trigger Events

The Application enters the SUSPENDED state.

4.101.4.2.2 Message Semantics

The message is an invocation by the Application of the notifyStateChange() method of the Host Interface described in DICOM PS 3.19:

The value of the State parameter shall be SUSPENDED.

4.101.4.2.3 Expected Actions

None, although the Workitem Performer grouped with the Host might choose to update the progress details of the associated workitem to reflect that work is currently suspended.

4.101.5 Security Considerations

No special security considerations are specified for this transaction.

4.101.5.1 Security Audit Considerations

No audit messages are expected with this transaction.

Add section 4.102

4.102 Resume Application [RAD-102]

4.102.1 Scope

This transaction is used to resume task processing in a Hosted Application that had been suspended.

4.102.2 Use Case Roles

Role:	Host: Asks an Application to resume processing on a suspended task.
Actor(s):	The following actors may play the role of Host: Hosting System
Role:	Application: Resumes processing.
Actor(s):	The following actors may play the role of Application:

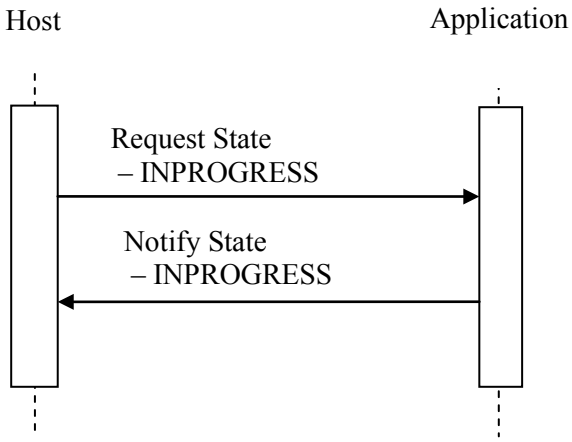
	Hosted Application

4.102.3 Referenced Standards

DICOM 2011 PS 3.17: Annex XX Use Cases for Application Hosting

DICOM 2011 PS 3.19: Application Hosting

4.102.4 Interaction Diagram



4.102.4.1 Request State – INPROGRESS Message

The Host requests the Application resume processing of a suspended task.

The Host shall support sending requests to all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.102.4.1.1 Trigger Events

The Host wishes to resume a processing task that had been suspended.

This could be, for example, in response to a user request.

4.102.4.1.2 Message Semantics

The message is an invocation by the Host of the setState() method of the Application Interface described in DICOM PS 3.19.

The value of the State parameter shall be INPROGRESS.

4.102.4.1.3 Expected Actions

The Application shall enter the INPROGRESS state and resume execution of the task (including reacquiring access to task data as necessary).

It is a pre-requisite that the Application is in the SUSPENDED state.

4.102.4.2 Notify State – INPROGRESS Message

The Application informs the Host that it has resumed processing a task.

The Host shall support receiving notifications from all instances of all Applications that it launches (including multiple instances of the same Application). An instance of the Application only communicates with a single Host.

4.102.4.2.1 Trigger Events

The Application enters the INPROGRESS state..

4.102.4.2.2 Message Semantics

The message is an invocation by the Application of the notifyStateChange() method of the Host Interface described in PS3.19:

The value of the State parameter shall be INPROGRESS.

4.102.4.2.3 Expected Actions

None, although the Workitem Performer grouped with the Host might choose to update the progress details of the associated workitem to reflect that work has resumed.

4.102.5 Security Considerations

No special security considerations are specified for this transaction.

4.102.5.1 Security Audit Considerations

No audit messages are expected with this transaction.

Add the following new Appendix

Appendix W: Populating UPS Workitem Attributes during Creation

This appendix describes how to populate attributes when creating UPS Workitems in several situations:

- Append – the new Workitem represents additional work associated with a prior existing UPS Workitem. Some attribute values in the new workitem are copied from the associated prior workitem.
- Ad Hoc – the new Workitem represents work associated with an existing study, but not with an existing workitem. Some attribute values in the new workitem are copied from the associated input data.

The following table lists all Type 1 UPS attributes and a number of significant Type 2 attributes. The blank cells indicate that the value of the attribute is not derived from a value in the source indicated at the top of that column.

Table W-1: Attribute Values in Created Workitems

Attribute Name	Tag	Req. Type N-CREATE (SCU/SCP)	Append	Ad Hoc	
(Source of values)			**(prior UPS)**	**(selected data)**	
Transaction UID	(0008,1195)	2/2 Shall be empty			
Scheduled Procedure Step Priority	(0074,1200)	1/1			
Procedure Step Label	(0074,1204)	1/1			
Scheduled Procedure Step Start DateTime	(0040,4005)	1/1			
Scheduled Workitem Code Sequence	(0040,4018)	2/2	See Note 1		
>Include Code Sequence Macro Table CC.2.5-2a					
Input Readiness State	(0040,4041)	1/1	See Note 2	See Note 2	
Input Information Sequence	(0040,4021)	2/2	Copy (See Note 3)	Copy (See Note 3)	
>Include Referenced Instances and Access Macro Table CC.2.5-2c					
Study Instance UID	(0020,000D)	1C/2	Copy	Copy (See Note 4)	
Patient ID	(0010,0020)	1C/2	Copy	Copy	
Include Issuer of Patient ID Macro Table CC.2.5-2e					
Referenced Request Sequence	(0040,A370)	2/2			

Attribute Name	Tag	Req. Type N-CREATE (SCU/SCP)	Append	Ad Hoc	
(Source of values)			**(prior UPS)**	**(selected data)**	
>Study Instance UID	(0020,000D)	1/1	Copy	Copy (See Note 4)	
>Accession Number	(0008,0050)	2/2	Copy	Copy (See Note 4)	
>Issuer of Accession Number Sequence	(0008,0051)	2/2	Copy	Copy	
>>Include HL7v2 Hierarchic Designator Macro Table UUU.2.5-2d					
Procedure Step State	(0074,1000)	1/1 Shall be created with a value of "SCHEDULED"			
Unified Procedure Step Performed Procedure Sequence	(0074,1216)	2/2 Shall be created empty			

Notes: 1. If the new Workitem involves repeating the task of the prior UPS or continuing it, or performing it on additional data, it may be appropriate to copy the Scheduled Workitem Code Sequence.

2. This profile constrains the value of Input Readiness State to be READY at the time of creation.

3. Since the Input Information Sequence is a list of the DICOM instances which were used as input for the workitem, it is technically copied from the Instance UID attributes of the selected/processed data.

4. In general, copying these values will be the reasonable approach; however there will be cases (such as the Scheduled Workflow Group Case or when an ad hoc task combines inputs from multiple studies) where it will be several possible values to copy. The application should document how it handles such cases (e.g. by asking the operator, by using internal logic such as creating a new study or using the newest of the input studies, or just halting with an exception).

Add the following new Appendix

Appendix V: Attribute Consistency between UPS and Resulting Composite IODs

This appendix provides requirements for populating attributes in the result objects generated by Workitem Performers in the Post-Acquisition Workflow Profile. In particular, it specifies which attributes provided by the UPS shall be used unaltered to populate attributes in objects that result from performing workitems.

The table lists attributes for which requirements or guidance is provided. Attributes for which no guidance is provided are omitted from the table, but that does not imply that missing attributes should be omitted from the resulting instances.

"Source" indicates the source of the attribute value. "Copy" indicates to which object the attribute value should be copied. If it is not copied from the same row/attribute, the cell will more specifically indicate where it is copied from. "Equal" indicates that both cells in the row are populated by the Workitem Performer and should be populated with the same value. If it is not equal to the same row/attribute, the cell will more specifically indicate which attribute it is equal to.

Copying attribute values from the UPS Workitem is the defined behavior for most relevant attributes, as shown below. If an attribute is not populated in the source UPS Workitem, implementations may consider copying the corresponding value from an appropriate instance listed in the Input Information Sequence (0040,4021).

Table V-1: Mapping UPS attributes to Resulting IODs

DICOM attribute	UPS Workitem	→ Image/ Standalone IOD
Patient's Name (0010,0010)	Source	Copy
Patient ID (0010,0020)	Source	Copy
Issuer of Patient ID Macro	Source	Copy
Other Patient IDs Sequence (0010,1002)	Source (See Note 1)	Copy
Patient's Birth Date (0010,0030)	Source	Copy
Patient's Sex (0010,0040)	Source	Copy
Admission ID (0038,0010)	Source	Copy
Issuer of Admission ID Sequence (0038,0014)	Source	Copy
Admitting Diagnoses Description (0008,1080)	Source	Copy
Admitting Diagnoses Code Sequence (0008,1084)	Source	Copy
Study Instance UID (0020,000D)	Source (See Note 2)	Copy

DICOM attribute	UPS Workitem		Image/ Standalone IOD		
Requested Procedure ID (0040,1001)	**Referenced Request Sequence** (0040,A370)	Source	**Request Attributes Sequence** (0040,0275)	Copy	
Accession Number (0008,0050)		Source		Copy (See Note 3)	
Issuer of Accession Number (0008,0051)		Source		Copy	
Study Instance UID (0020,000D)		Source (See Note 2)		Copy	
Requested Procedure Description (0032,1060)		Source		Copy	
Requested Procedure Code Sequence (0032,1064)		Source		Copy	
Reason for Requested Procedure (0040,1002)		Source		Copy	
Reason for Requested Procedure Code Sequence (0040,100A)		Source		Copy	
Scheduled Procedure Step Description (0040,0007)	n.a.			Copy from: **Procedure Step Label** (0074,1204)	
Scheduled Protocol Code Sequence (0040,0008)	n.a.			Copy from: **Scheduled Workitem Code Sequence** (0040,4018)	
Procedure Step Label (0074,1204)	Source		n.a.		
Scheduled Workitem Code Sequence (0040,4018)	Source		n.a.		
Performed Procedure Step ID (0040,0253)	n.a.		Leave blank.		
Performed Procedure Step Start DateTime (0040,4050)	Equal (internally generated)		n.a.		
Performed Procedure Step Start Date (0040,0244)	See above		Equal (internally generated) to the Date component of **Performed Procedure Step Start DateTime** (0040,4050)		
Performed Procedure Step Start Time (0040,0245)	See above		Equal (internally generated) to the Time component of **Performed Procedure Step Start DateTime** (0040,4050)		
Performed Procedure Step End DateTime (0040,4051)	(internally generated)		n.a.		
Performed Procedure Step Description (0040,0254)	Equal (internally generated).		Equal (internally generated).		
Performed Workitem Code Sequence (0040,4019)	Equal (internally generated)		n.a.		
Performed Protocol Code Sequence (0040,0260)	n.a.		Equal (internally generated) to **Performed Workitem Code Sequence** (0040,4019).		
Performed Processing Parameters Sequence (0074,1212)	Equal (internally generated)		n.a.		

DICOM attribute	UPS Workitem	Image/ Standalone IOD	
Protocol Context Sequence (0040,0440)	n.a.	Equal (internally generated) to **Performed Processing Parameters Sequence** (0074,1212).	
Performed Station Name Code Sequence (0040,4028)	Equal (internally generated)	n.a.	
Actual Human Performers Sequence (0040,4035) **>Human Performer's Name** (0040,4037) **>Human Performer Code Sequence** (0040,4009)	Equal (internally generated) (See Note 5)	n.a.	
Station Name (0008,1010)	n.a.	**Contributing Equipment Sequence** (0018,A001)	Equal (internally generated) to **Performed Station Name Code Sequence** (0040,4028). (See Note 4)
Operators' Name (0008,1070) **Operator Identification Sequence** (0008,1072) **>Person Identification Code Sequence** (0040,1101)	n.a.		Equal (internally generated) to contents of **Actual Human Performers Sequence** (0040,4035). (See Note 5)
Referenced SOP Class UID (0008,1150)	n.a.	**Referenced PPS Sequence** (0008,1111)	1.2.840.10008.5.1 .4.34.6.1
Referenced SOP Instance UID (0008,1155)	n.a.		Equal to SOP Instance UID of the associated UPS (See Note 6).
Protocol Name (0018,1030)	n.a.	Consider Copying from Performed Procedure Step Description	

Notes: 1. Other Patient IDs (0010,1000) is redundant with Other Patient IDs Sequence (0010,1002) and insufficient as it does not allow the Assigning Authority to be conveyed for each Patient ID. Correspondingly, only Other Patient IDs Sequence (0010, 1002) exists in the UPS Workitem instance.

2425 2. Study Instance UID (0020,000D) appears twice in this table. Although both values will be the same in simple cases, they are still permitted to have different values when necessary to support situations such as doing post-processing on a dataset that belongs to an acquisition group case. The value nested within the Referenced Request Sequence is taken from the originating request, if known. The unnested value, represents the study to which the result objects were assigned.

2430 3. A Zero Length Accession Number (One of the options proposed by DICOM PS 3.17 Annex J) shall be created when no reliable value for this attribute is available. Reliable values are those that can be conveyed by means other than manual data entry such as a value received from the Workitem Manager via a UPS Workitem including an Accession Number, or from the Order Filler via a Modality Worklist, or received through a bar code reader.

4. Map the Code Meaning of the item in the Performed Station Name Code Sequence (0040,4028) into the Station Name (0008,1010)

5. Although the sequence structure is not identical, the mapping is straightforward.

6. The SOP Instance UID of the UPS instance is sent in the Affected SOP Instance UID (0000,1000) of the UPS N-Create message and in the Requested SOP Instance UID (0000,1001) for the UPS N-Set or UPS N-GET message. It can also be found in the Referenced SOP Instance UID (0008,1155) of the C-FIND Response Identifier. SOP Instance UID (0008,0018) shall not be used.