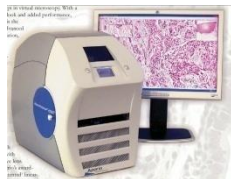




DICOM WG26

IHE/HL7 Anatomic Pathology

C.Daniel
August 27, 2011
Helsinki



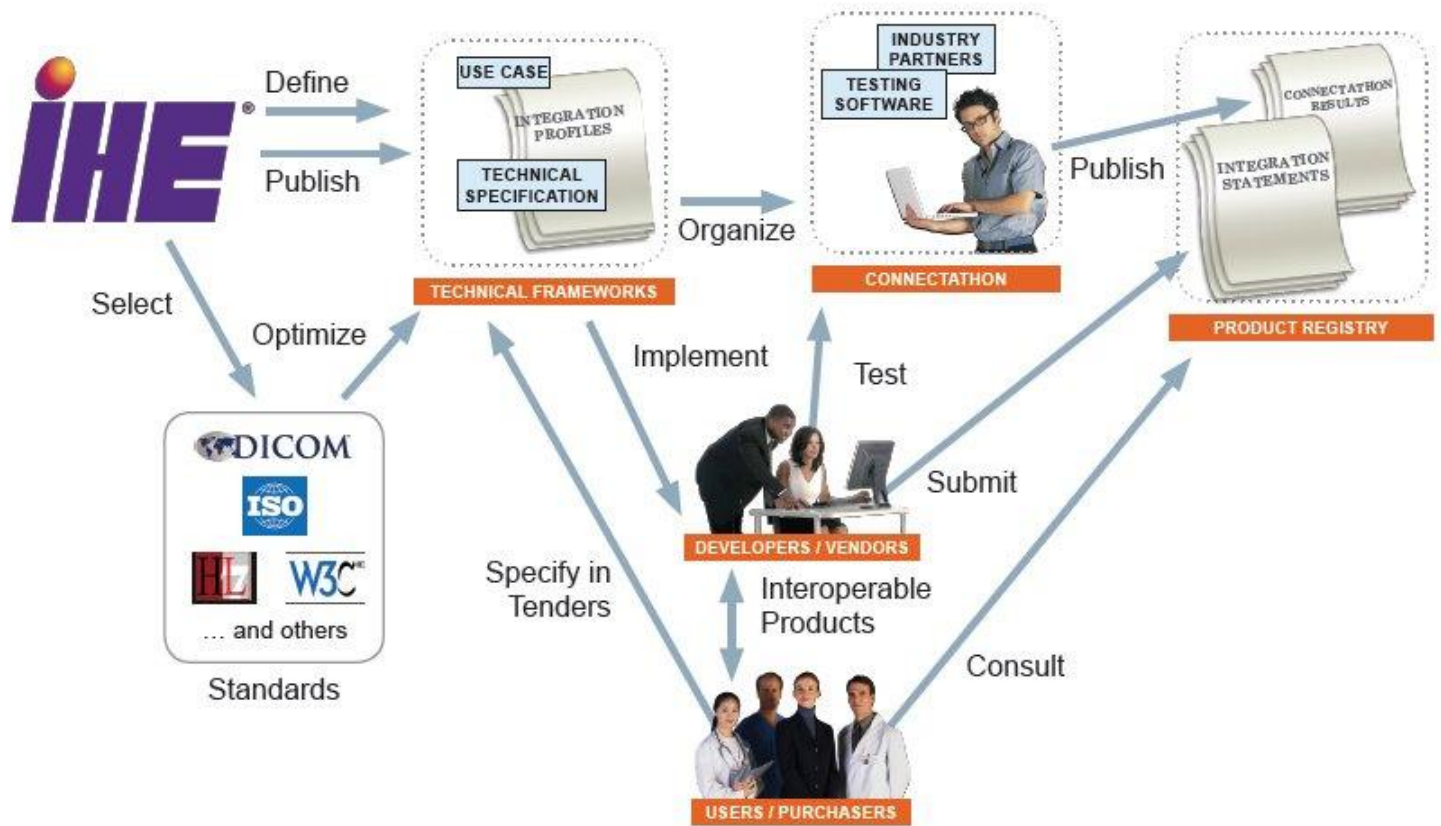
About IHE[®]

- Optimal patient care requires that **care providers and patients be able to create, manage and access comprehensive electronic health records (EHRs)** efficiently and securely.
- Integrating the Healthcare Enterprise (IHE) accelerates the adoption of EHRs by **improving the exchange of information among healthcare systems.**

Engaging HIT Stakeholders in a Proven Process

- IHE brings together users and developers of healthcare information technology (HIT) in an annually recurring four-step process:
 - 1. Clinical and technical experts define **critical use cases for information sharing**.
 - 2. Technical experts create **detailed specifications** for communication among systems to address these use cases, selecting and optimizing established standards.
 - 3. **Industry implements** these specifications called IHE Profiles in HIT systems.
 - 4. **IHE tests** vendors' systems at carefully planned and supervised events called **Connectathons**.

Engaging HIT Stakeholders in a Proven Process



IHE also organizes demonstrations of IHE-compliant systems working in real-world clinical scenarios at medical meetings and other venues.

Integration Profiles

A Framework for Interoperability

- IHE Profiles provide a standards-based framework for sharing information within care sites and across networks.
 - available online at www.ihe.net/profiles
 - They address critical interoperability issues related to information access for care providers and patients, clinical workflow, security, administration and information infrastructure.
 - Each profile defines the actors, transactions and information content required to address the clinical use case by referencing appropriate standards.
- IHE Profiles are compiled into IHE Technical Frameworks—detailed technical documents that serve as implementation guides and are freely
 - available online at www.ihe.net/technical_framework.

Connectathons

Testing Interoperability and Conformance

- IHE Connectathons for more than a decade
 - Testing the interoperability of HIT systems
 - At held regularly in several locations internationally, trained technical experts supervise testing of vendor systems, making use of advanced testing software developed by IHE and several partner organizations.
 - **More than 250 vendors worldwide have implemented and tested products with IHE capabilities.**
 - Contact : testing@ihe.net.
- **Advice for Purchasers and Implementers**
 - Product Registry, User Handbooks, White papers
 - available at www.ihe.net/registry.
 - www.ihe.net/resources.

Learn More about IHE International

- IHE Webinar Series runs June-September 2011
 - Visit www.ihe.net/Events/webinars2011.cfm for the full list of webinars
- Sign up for the IHE International News
 - Email secretary@ihe.net
 - Sign up for the [IHE Webinar Series listserv](#)
- Apply for IHE International's Free Membership
 - Visit: www.ihe.net/apply

Domain Committees

- Domains
 - Anatomic Pathology (since 2005)
 - Eye Care
 - IT Infrastructure
 - Laboratory
 - Patient Care Coordination
 - Patient Care Devices
 - Quality, Research and Public Health
 - Radiation Oncology
 - Radiology
- IHE invites clinical and technical domain experts to become leaders in this work by
 - **Participating** in IHE domain committees
 - Reviewing the documents they publish for public comment

IHE

- The best (single!) way to promote the use IT standards (HL7, DICOM) for efficiently and consistently reaching users' needs
- BUT there is no miracle
 - Planning committee shall not only decide what needs to be done
 - Planning committee **SHALL decide** Technical committee **TO DO** what needs to be done
 - **Vendor or national agency involvement +++**
 - And defines how to do it

Anatomic Pathology Technical Framework

- **Current Technical Framework - Revision 2.0**
July 23, 2010. Copyright © 2010: IHE International, Inc. Trial Implementation
 - Vol. 1 (PAT TF-1): Integration Profiles
 - Vol. 2 (PAT TF-2): Transactions
 - These volumes provide specification of the following profile:
 - Anatomic Pathology Workflow (APW)
- **Supplements for Trial Implementation**
 - To be tested at subsequent IHE Connectathons.
 - Supplements extend the IHE Anatomic Pathology Technical Framework, Rev. 2.0 for Trial Implementation.
 - Anatomic Pathology Reporting to Public Health (ARPH) - Published 2010-07-23
 - Anatomic Pathology Structured Reports (APSR) - Published 2011-03-31
 - APSR Value Sets Appendix - Published 2011-03-31

Significant Deployment Activity

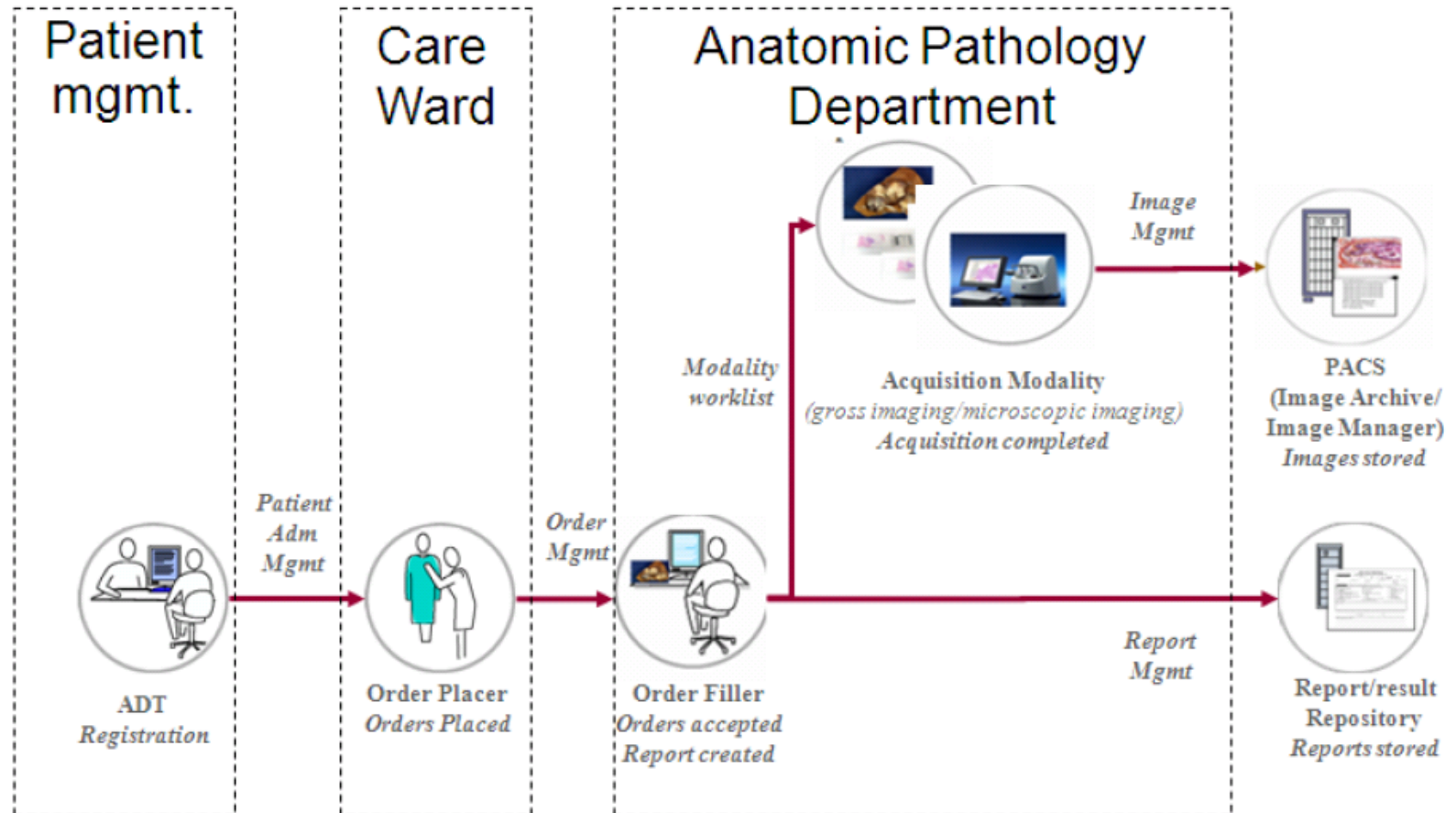
- APW : implemented by vendors in "real world" in Spain (Hospital General de Ciudad Real) and on-going implementation in Paris (AP-HP) (ADICAP, ASIP Santé)
- ARPH: North America (NAACCR, CDC)
 - Successfully tested at 2010 NA Connectathon (One sender, one receiver)
 - Successfully tested at 2011 NA Connectathon (one sender, same receiver as 2010)
- APSR : on-going implementation by vendors in "real world" in France (ADICAP, ASIP Santé - INCa-national pEHR project (DMP & DCC project))

[APW] - Anatomic Pathology

Workflow

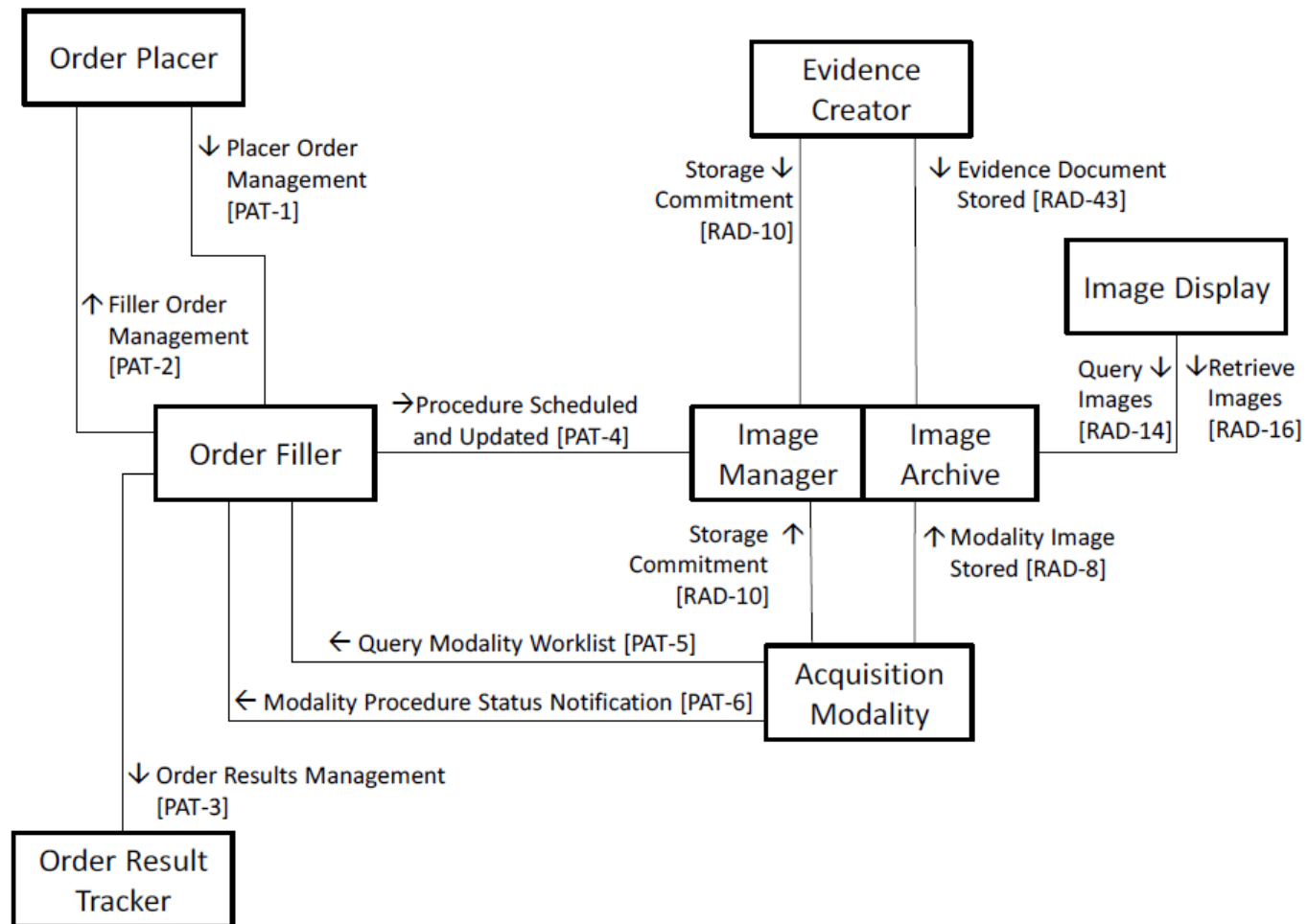
- Establishes the continuity and integrity of basic pathology data acquired for examinations being ordered for an identified inpatient or outpatient. It focuses on the main transactions of the ordering, reporting and imaging aspects of the workflow.
- This profile covers three main aspects of the workflow:
 - **The ordering aspects of the workflow** - APW specifies a number of transactions to maintain the consistency of ordering information and specimen management information.
 - **The imaging aspects of the workflow** - APW specifies a number of transactions to create and store images and to maintain the consistency of these images. Worklists for image acquisition is generated and can be queried. This Integration Profile also describes evidence creation.
 - **The reporting aspects of the workflow** - APW specifies a number of transactions to create and store reports outside the Pathology department and to maintain the consistency of these results.

[APW] - Anatomic Pathology Workflow



[APW] - Anatomic Pathology Workflow

8 Actors & 12 transactions for basic WF



[APW] - Anatomic Pathology Workflow

Needed improvements (Vol 1 - Open issues 2, 4 & 5)

Intra-hospital WF

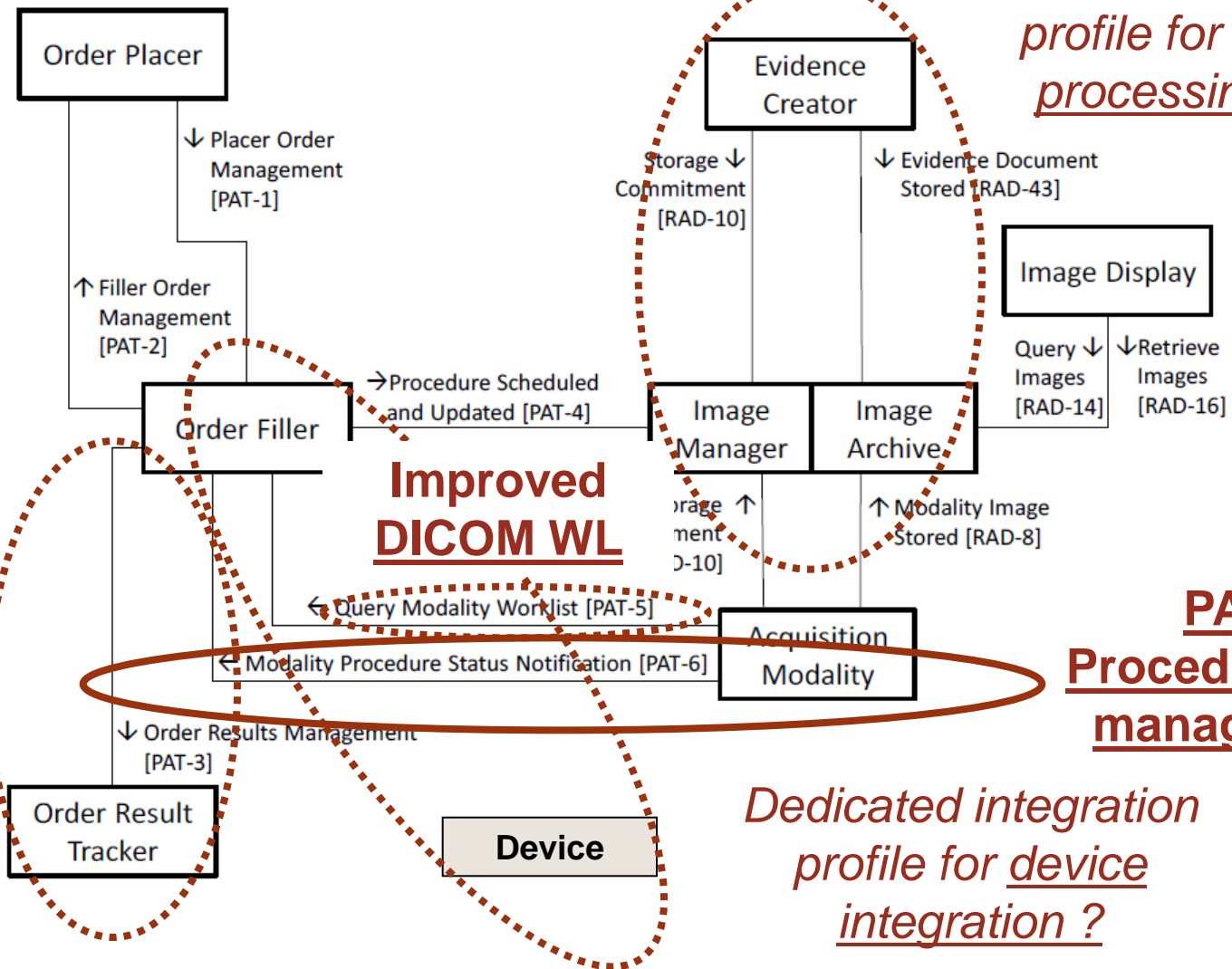
Dedicated integration profile for post processing ?

Dedicated integration profile for reporting WF

Improved DICOM WL

**PAT6
Procedure step management**

Dedicated integration profile for device integration ?



Needed improvements

(Change proposals)/Profiles/White papers

- 2010-11
 - Change proposals
 - Integration : Anatomic Pathology Structured Order (APW - PAT-1)
 - Content: Anatomic Pathology Structured Reports (for Biobanks) (APSR)
 - Integration Profiles
 - Anatomic Pathology Reporting Workflow (APRWF) (G.Rodriguez – Satec)
 - Content Profiles
 - White papers
 - Enhanced Imaging Workflow Integration Profile
- 2011-12 ?
 - Change proposals
 - **Integration Profiles +++**
 - Anatomic Pathology Reporting Workflow (APRWF) (G.Rodriguez – Satec)
 - White papers ??
 - Device automation integration profile (with LAB, ITI)
 - Inter-departments workflow (with LAB ITI)
 - Telepathology (with ITI)
 - Opinion request (content and workflow)
 - Relationships between pathology/radiology/endoscopy
 - Sharing templates/terminology (with ITI)

Timeline/Milestones

Date	Activity	Location
Oct 2010	PC&TC meeting : discussion of 2010-11 Profiles/White papers	IHE AP & HL7 AP joint meeting (HL7 Meeting - Cambridge, MA)
Dec 2010	Selection of 2010-11 Profiles/White papers	
2011		
Jan 2011		US Connectathon
March 2011	Publication of trial implementation supplement	lhe.net
Jan 2011		European Connectathon
May 2011	PC&TC meeting	IHE AP & HL7 AP joint meeting (HL7 WG Meeting – Orlando)
June 20-21, 2011	PC&TC meeting	IHE/HL7 AP & IC0604 COST Action WG1/WG2 joint meeting (Paris)
Aug 27, 2011	PC&TC meeting	IHE/HL7 AP & IC0604 COST Action WG2 & DICOM WG26 joint meeting (Helsinki)
Sept 13-15, 2011	Submission of 2011-12 Profiles/White papers	IHE AP & HL7 AP joint meeting (HL7 Meeting - San Diego)
Dec 2011	Selection of 2011-12 Profiles/White papers	
2012		
Jan, 2011		IHE AP & HL7 AP & DICOM WG26 joint meeting (HL7 Meeting - San Antonio) (to be confirmed)
June 6-9, 2012	Publication of public comment supplement	Telepathology & Virtual microscopy – Venice () (to be confirmed)
17 August, 2012	Publication of trial implementation supplement	lhe.net

Learn More about IHE Anatomic Pathology

- Googlegroup : ihe-anatomic-pathology-committee@googlegroups.com
- Wiki
 - http://wiki.ihe.net/index.php?title=Anatomic_Pathology



The screenshot shows the IHE Anatomic Pathology wiki page. The page has a header with the IHE logo and a navigation bar with links: article, discussion, edit, and history. The main content area is titled "Anatomic Pathology" and contains a paragraph describing the initiative. To the left of the main content is a sidebar with a "navigation" section containing links like Main Page, Technical Frameworks, Domains, Committees, Process, Implementation, International, Recent changes, and Help. Below the navigation is a "search" box with "Go" and "Search" buttons. At the bottom left is a "toolbox" section with links like What links here, Related changes, Upload file, and Special pages. The main content area also includes a "Contents [hide]" section with a list of links: 1 How to participate, 2 Timeline - 2008-2009 Development Cycle, 3 Roadmap, 4 Current Activity, 4.1 Profile Selection, 5 Demonstrations & Presentations, 6 Supporters and Endorsements, and 7 See Also. The page footer contains a paragraph about the aim of the initiative and the scope of the anatomic pathology.

IHE

Log in / create account

article discussion edit history

Anatomic Pathology

IHE Anatomic Pathology addresses information sharing, workflow and patient care in Pathology, including anatomical pathology.

IHE Anatomic Pathology is sponsored by the [the Organization for the Modernization of French Hospital Information Systems \(GMSIH\)](#), the [French Association for the Development of Informatics in Pathology \(ADICAP\)](#), the [Spanish Health Informatics Society \(SEIS\)](#), the [Spanish Society of Pathology \(SEAP\)](#), the [French Society of Pathology \(SFP\)](#). It manages the [Pathology Profiles](#) and the [Pathology Technical Framework](#).

Contents [hide]

- 1 How to participate
- 2 Timeline - 2008-2009 Development Cycle
- 3 Roadmap
- 4 Current Activity
 - 4.1 Profile Selection
- 5 Demonstrations & Presentations
- 6 Supporters and Endorsements
- 7 See Also

The aim is to extend the IHE initiative to anatomic pathology laboratories, their information, automation, imaging systems and equipments.

The scope of the anatomic pathology includes surgical pathology, biopsies pathology, cytopathology, autopsies, and related techniques (immunohistochemistry, molecular pathology, etc).

Information systems in anatomic pathology laboratories gather medical data (text, images, etc) throughout specimen management from specimen reception to report editing. The diagnostic process in anatomical pathology (figure 1) differs from that in the clinical laboratory since it relies on image interpretation. It also differs from that in radiology since it is specimen-driven and when digital imaging is performed many types of imaging equipments (gross imaging, microscopic still imaging, whole slide imaging, multispectral imaging, etc) may be involved for a single examination. Moreover, images of the same study may be related to different specimen (parts and/or slides) from one or even different patients (e.g Tissue

Procedure step management

(Florence, 2009)

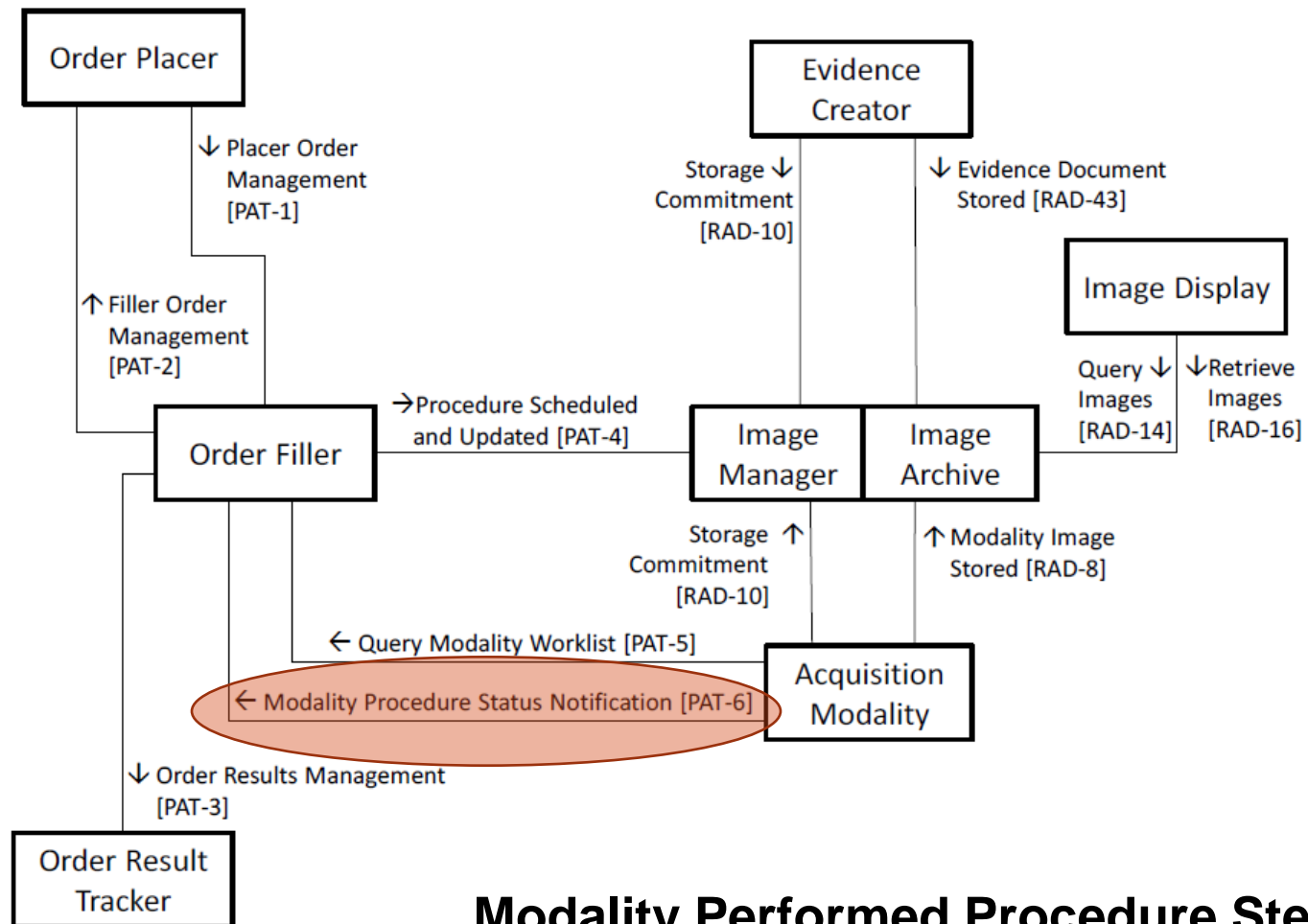
Basically addressed (Change proposal APW)

Procedure step management

- Performed Procedure Step Manager
 - A system that re-distributes the Modality Performed Procedure Step information from the Acquisition Modality or Evidence Creator to the Order Filler, Image Manager and Report Manager
- Expected outcomes
 - Image availability notification to the Order Filler
 - to notify that a DICOM instance has been stored.
 - It may enable the Order Filler to include such information in the transaction to the Order Result Tracker.
 - It may be used by the Order Filler to update the work list

Anatomic Pathology Workflow (APW)

Actors & transactions



Modality Performed Procedure Step

Anatomic Pathology Reporting Workflow (ARW) *To be addressed*

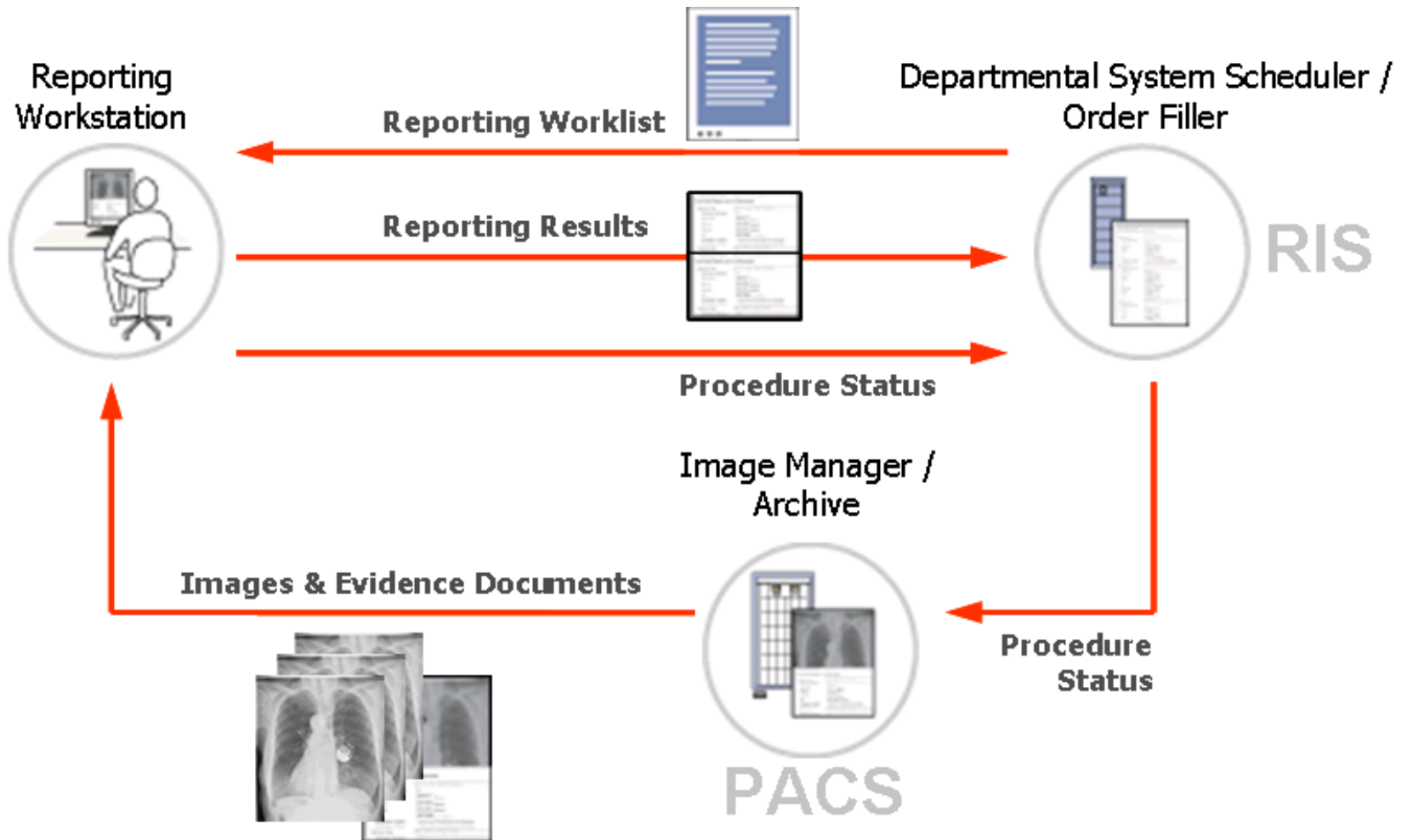
New profile: Anatomic Pathology Reporting Workflow (ARW)

- Issue
 - In the current Anatomic Pathology Workflow (APW) there is **no report oriented activity description**, and thus it might be challenging for implementers to find scalable, easy to build architectures offering the capabilities to manage, store and retrieve report information.
 - The **Order Filler is too tightly coupled with the reporting tasks** so it also difficult for implementers to provide a scalable solution.
- Objective
 - Provides a **Reporting Workflow** profile inspired by the similar one described in the Radiology Technical workflow.
 - Defines the actors and transactions involved in the management of anatomic pathology reports

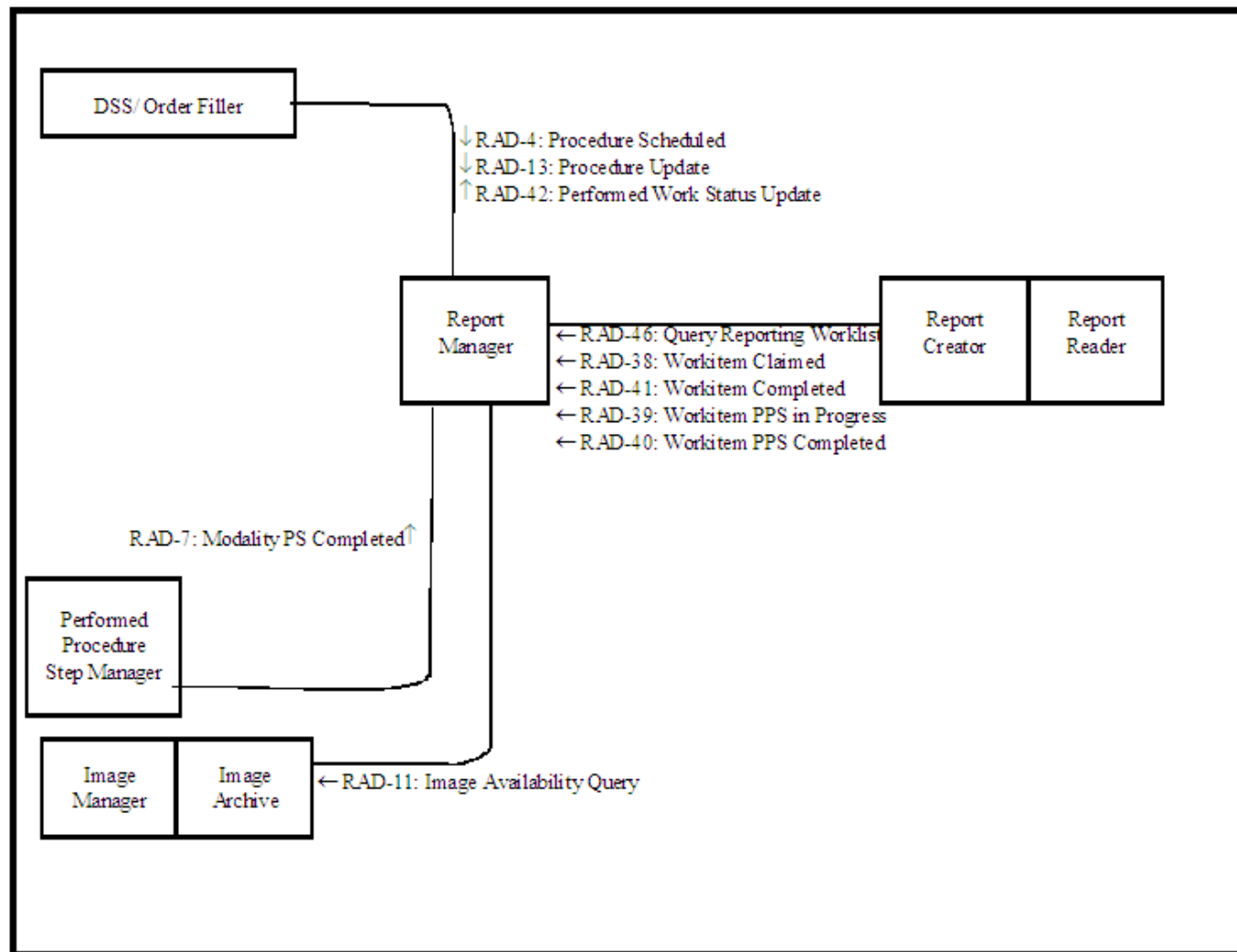
New profile: Anatomic Pathology Reporting Workflow (ARW)

- Systems it would impact
 - Anatomic Pathology Information System
 - “Report creator” (new players)
 - Acquisition modalities
 - Image viewers
- Impact/Benefits
 - To improve the management of reporting tasks introducing reporting worklists and observation results queries
 - To allow external systems to retrieve the report in a raw format allowing then to further process that information.
 - This will allow, for example, showing the report along with links to the DICOM images which could be opened with the chosen viewer
- Proposal Editors
 - Gustavo Rodríguez (gustavo.rodriguez@satec.es) - Antonio González (antonio.gonzalez@satec.es) - Date: 2009/12/17

[RWF] Reporting Workflow

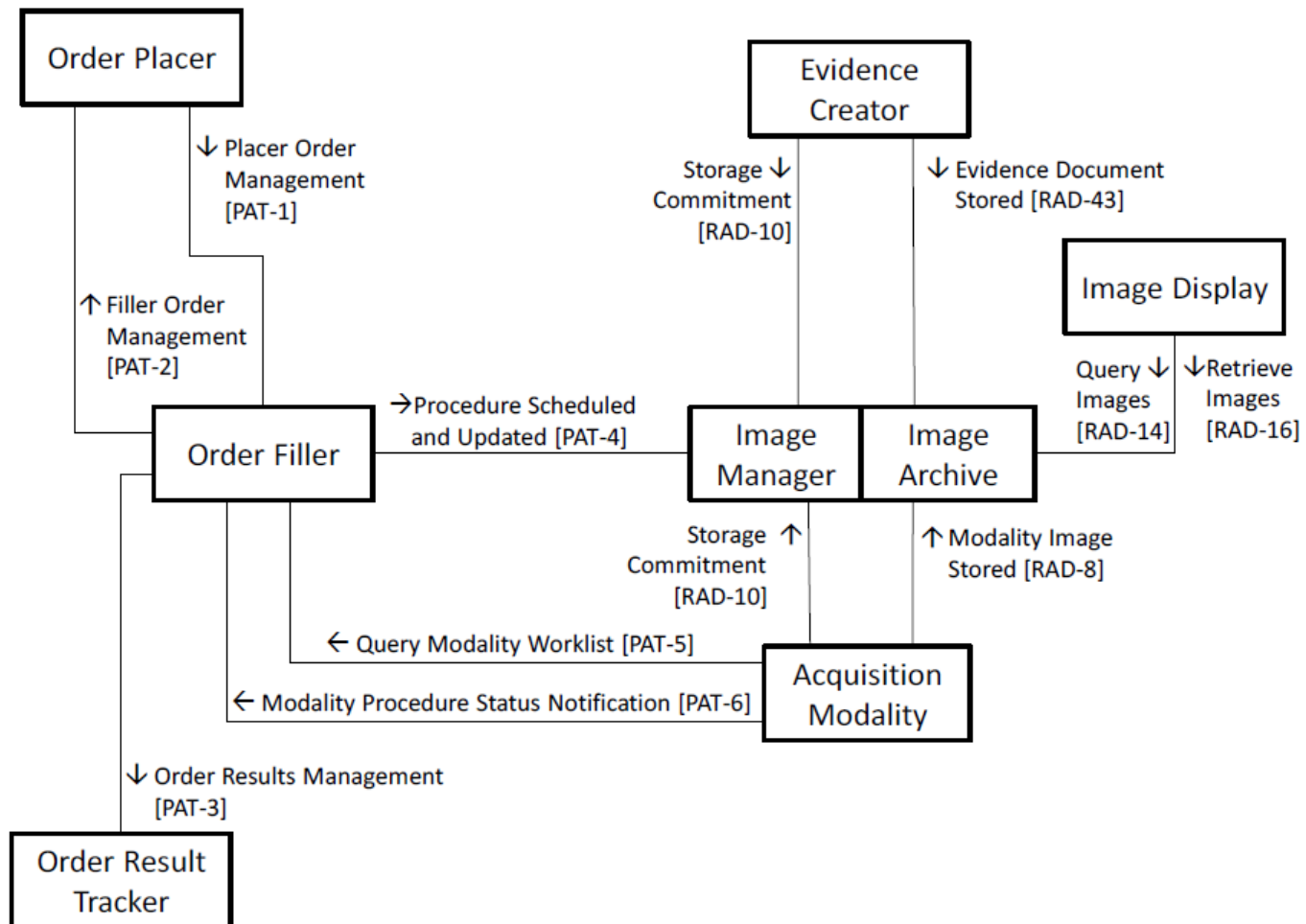


[RWF] Reporting Workflow

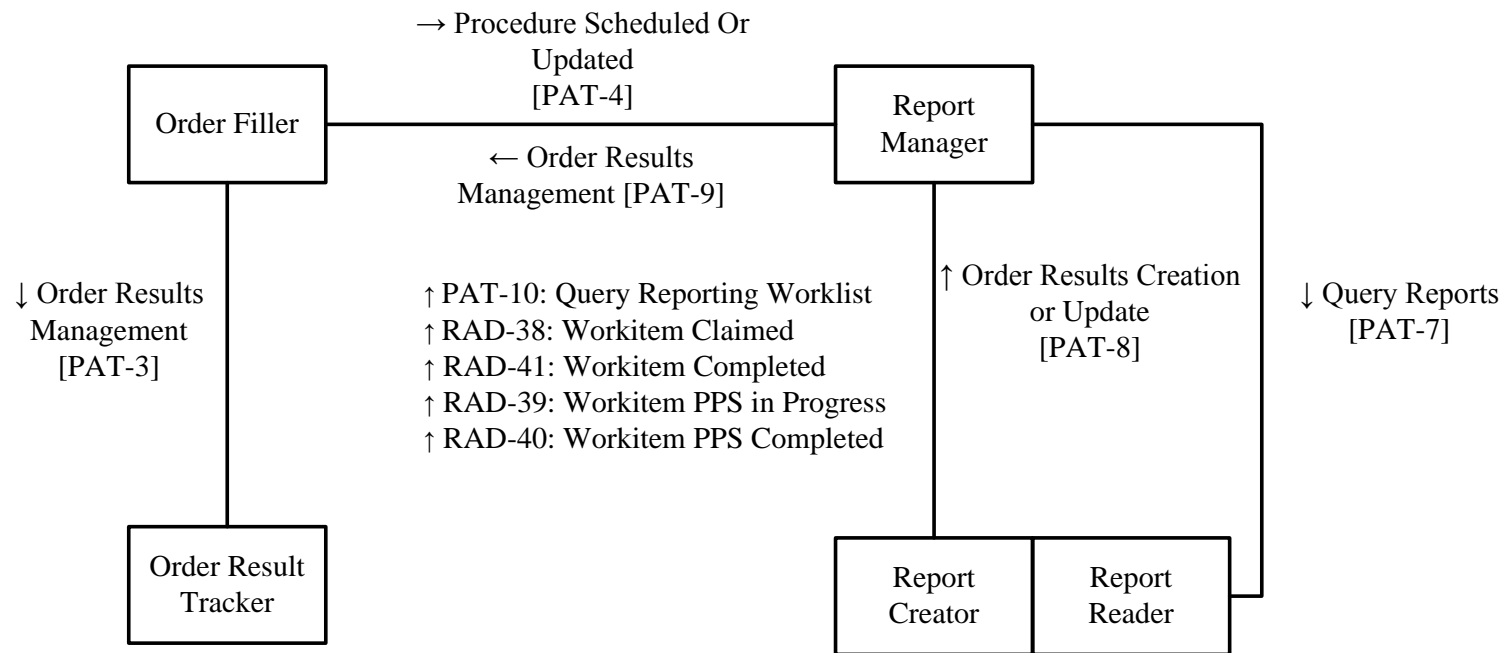


Anatomic Pathology Workflow (APW)

Actors & transactions



Anatomic Pathology Reporting Workflow (APRWF) – Actors & transactions



Device connectivity

Worklist & Procedure step management

(Florence, 2009)

To be addressed consistently with LAB &
RAD domains

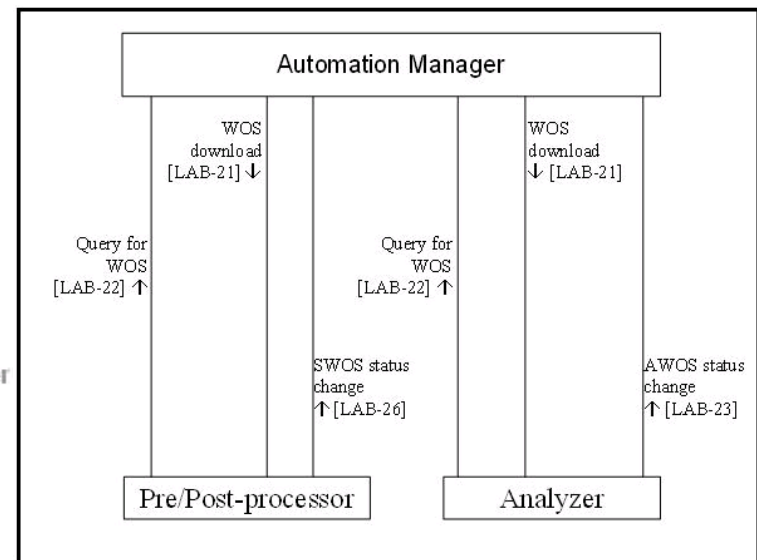
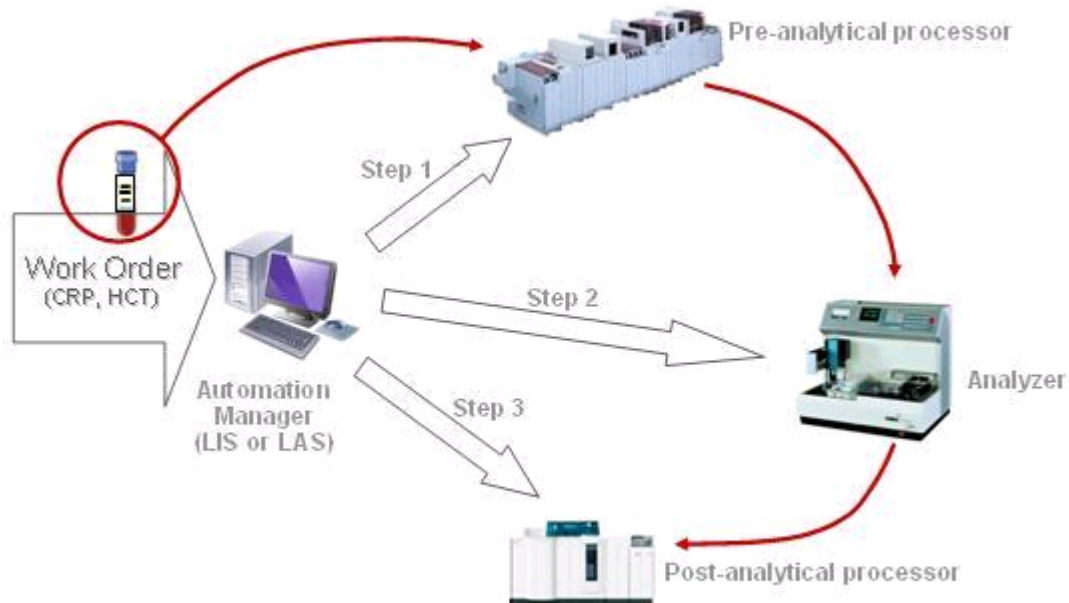
In collaboration with DICOM WG26

Device connectivity

- Consistent management of **lab procedure steps** (work order steps (WOS))
- Automation Manager
 - Order Filler / Automation Manager / Device

[LDA] - Laboratory Device Automation

- integrates an Automation Manager and robotic laboratory equipment (pre-analytical devices, analyzers, post-analytical devices)
- F.Macary (IHE LAB – Florence, 2009)



Device interfaces show variable functional levels

- One-way interfaces
 - EITHER Download a worklist (list of WOS) – e.g. a diluter
 - OR Upload a list of test results – e.g. erythrocyte sedimentation rate analyzer
- Bi-directional interfaces
 - Input:
 - Automatic **download WOS** in advance, with later updates as needed
 - Query WOS by specimen ID, just in time. This is the best mode.
 - Content: patient data, order ID, operation to be performed (e.g. list of tests), specimen ID
 - Output:
 - **Status of the step performed** (specimen ID, Device ID, technician ID)
 - **Results** measured and/or calculated
 - **interpretation & comments**, automatically generated or entered by technician

Other device interface functionalities

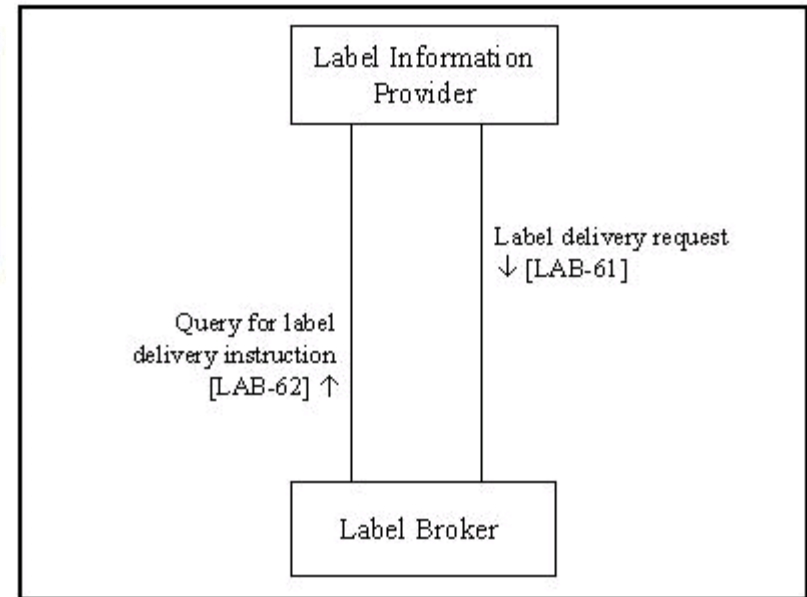
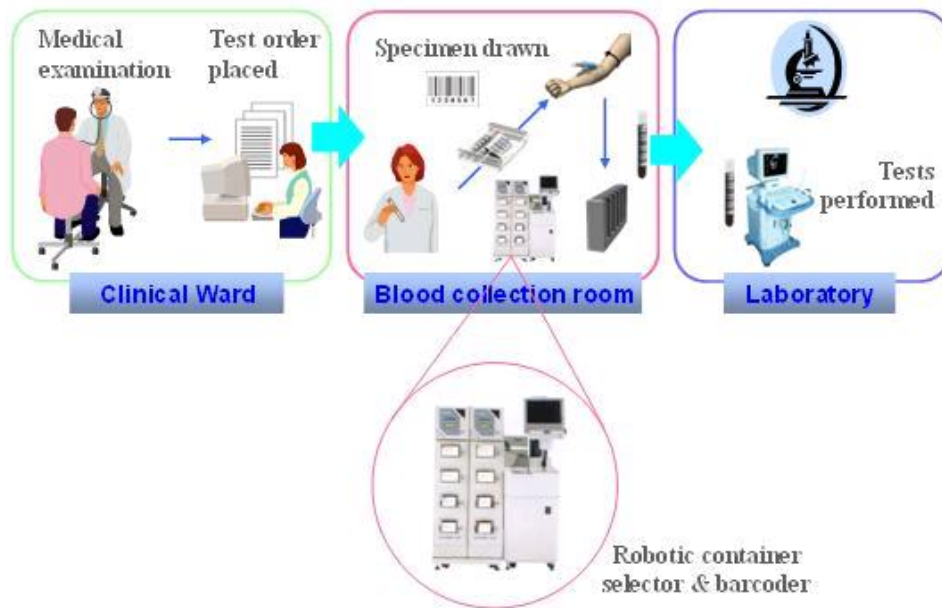
- Upload of process data
 - Calibration results
 - Quality control results
- Management of re-run with or without dilution
- Add automatically a new test, upon result of the current test
 - E.g. add reticulocytes count depending on the CBC results
- Upload graphics and simple images
 - electrophoresis chart
 - Blood cells charts
 - Electrophoresis image
 - ...

Protocols and formats met in the field

- Transport
 - Serial interfaces (RS232c)
 - Low level protocol ASTM E1381
 - Proprietary protocols
 - LAN interfaces
 - Socket (e.g. HL7 Minimum Lower Layer Protocol)
 - File transfer (ftp)
- Data format
 - ASTM E1394 (many variations from one manufacturer to the other)
 - HL7 (OML, OUL, ORM, ORU)
 - Proprietary formats

[LBL] - Laboratory Barcode Labeling

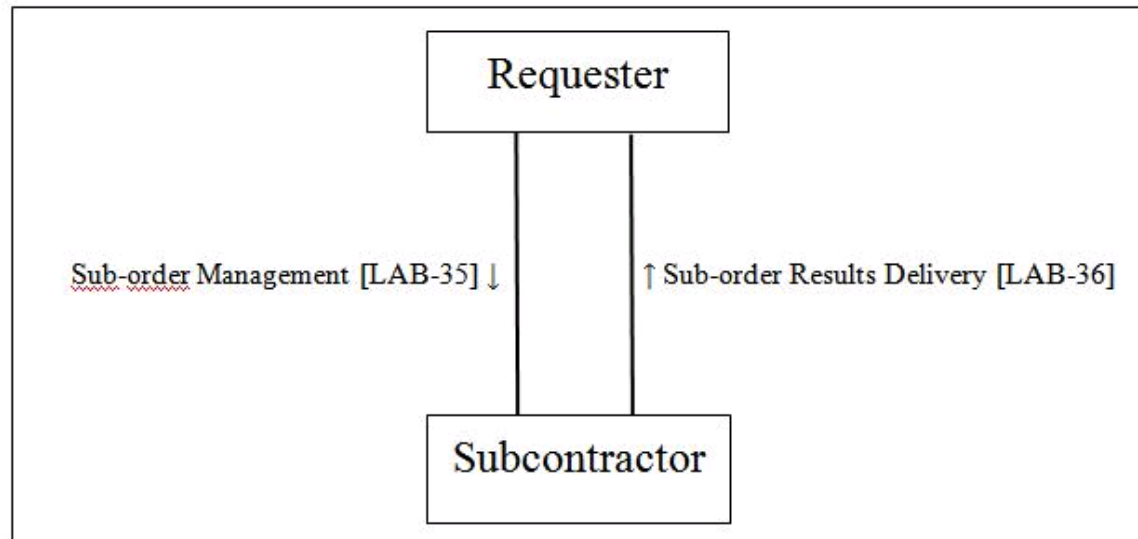
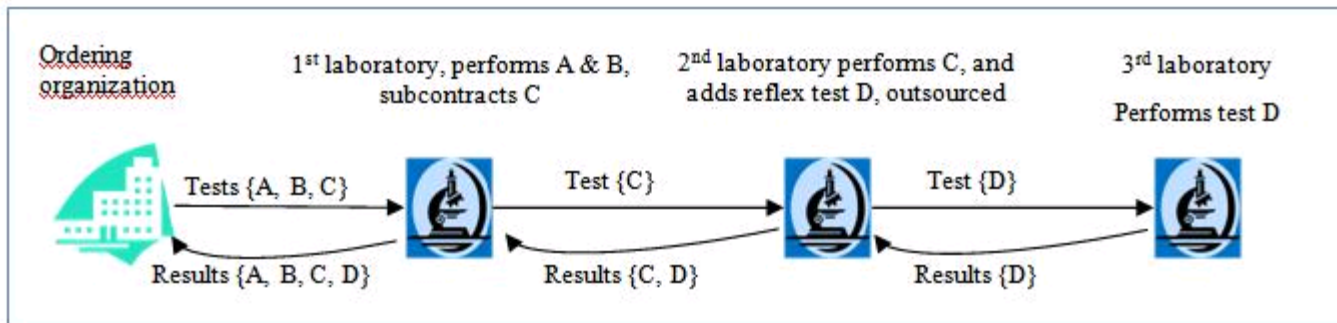
- integrates robotic specimen container labeling systems with sources of order-related labelling information.



Inter Anatomic pathology Department Workflow *(Vilnius, 2010)*

[ILW] - Inter Laboratory Workflow

- Supports the workflow of orders and results with a subcontracting laboratory.



Improved DICOM Modality Work list

(Florence, 2009)

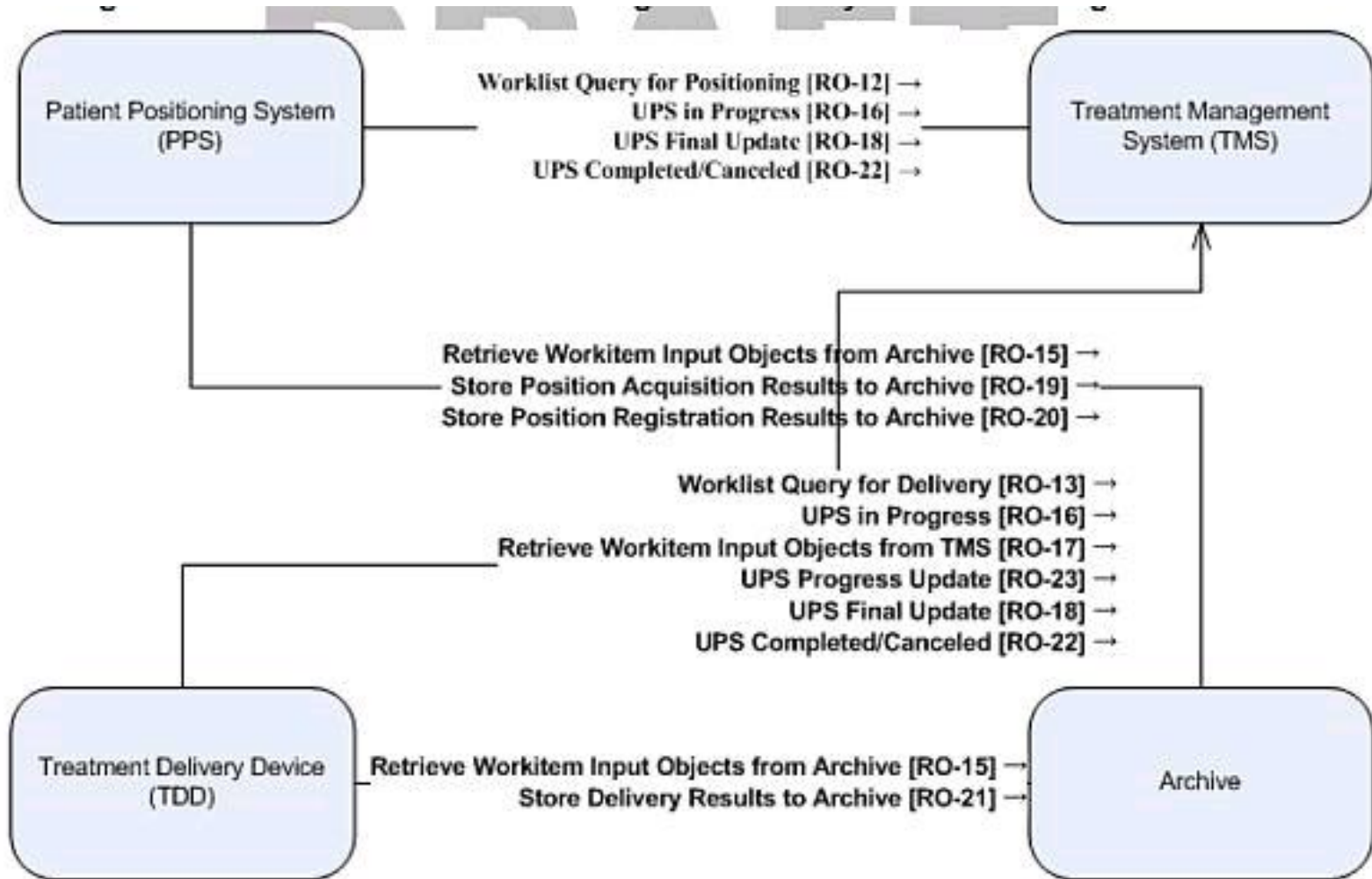
DICOM WL

- Issue
 - Image acquisition & management depend on the knowledge of the context (specimen, disease, specimen processing)
 - Therefore DICOM WL items depend on this knowledge
- Objective
 - Defining the WF required for defining and using the specific DICOM WL items according to the context
 - Knowledge-driven imaging procedure step management

[TRWF] RT Treatment Workflow

- Integrates daily imaging with radiation therapy treatments using workflow
- Two Workflows are described by this profile:
 - **Discrete** Positioning and Delivery Workflow involves positioning a patient and subsequent treatment delivery performed by **separate devices**.
 - **Integrated** Positioning and Delivery Workflow involves positioning a patient and subsequent treatment delivery both performed by a **single device**.

[TRWF] RT Treatment Workflow



Telepathology (Vilnius, July 2010)

AP Opinion Request Use Case

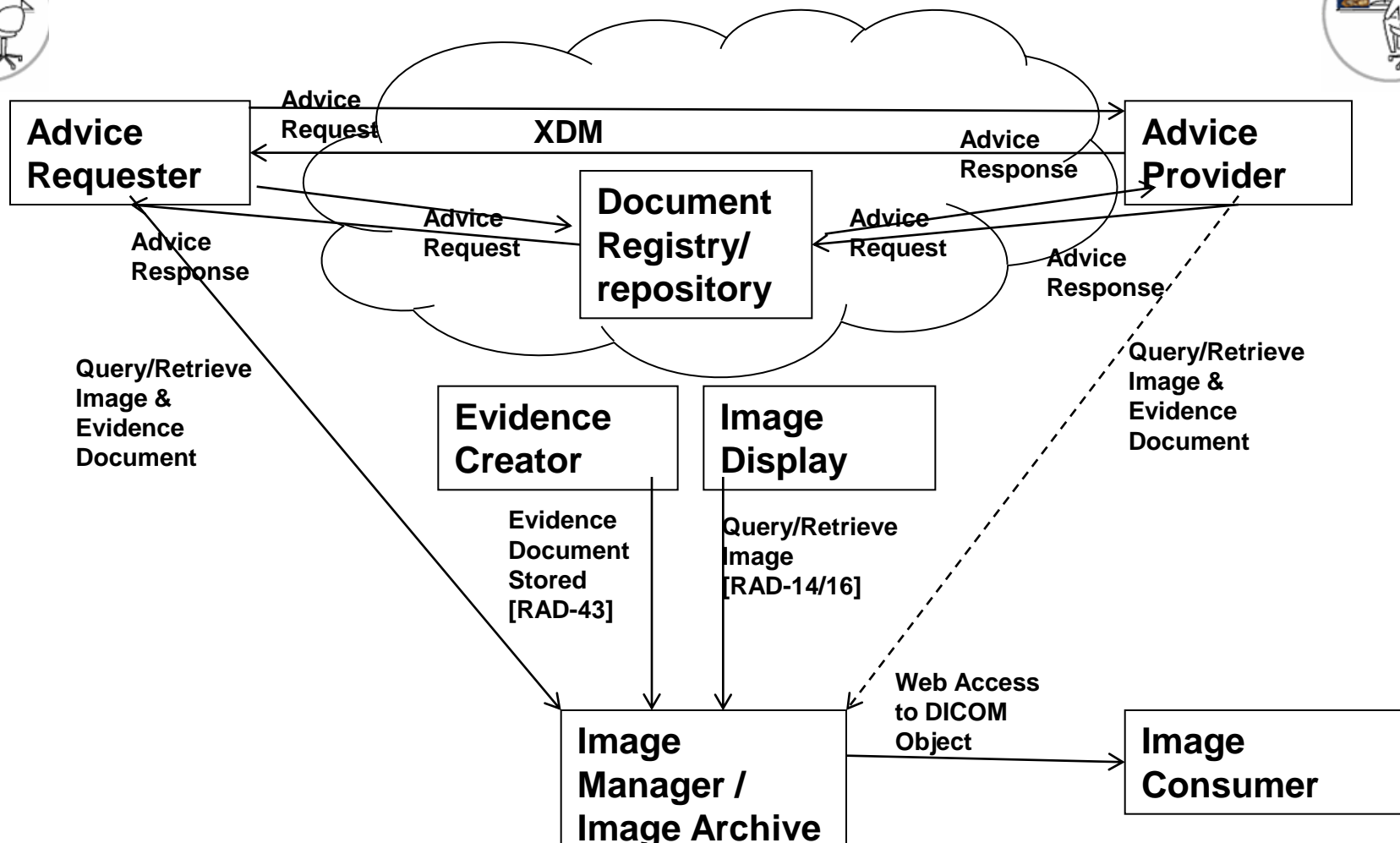
- A requesting pathologist ask a remote expert pathologist or network of expert pathologists for **second opinion on specimen**
- The specimen is sent to this remote site
 - Physically (**blocks, slides**)
 - Virtually (**image(s)**) : gross images, histological images including VS)
 - In that case, a “Manifest” document is sent, referencing the images that were either sent previously or made accessible remotely
- In every case the **Opinion Request and Response are communicated through IT**
 - Asynchronous or synchronous communication is possible

AP Opinion Request Diagram

Anatomic Pathology

Advice Request Document Cross-Enterprise

Interchange or Sharing



Gap analysis: Content profile for AP Opinion Request

- The Opinion Request in Anatomic Pathology (APOR) is not different per se than other kind of Medical Imaging based Advice Request (primary diagnosis, therapeutic advice or second opinion)
- So it has to be described as a specific « content » profile being an extension of a more generic « content » profile « Imaging Opinion Request »
- The WSI (huge images) introduces some constraints that are emerging in other imaging use cases (CT, MR studies...)

Gap analysis: WSI

- The WSI (huge images) introduces some constraints that are emerging in other imaging use cases (CT, MR studies...)

Gap analysis : Integrating AP Opinion Request Workflow to basic APW

- All the documents are managed in the context of the Anatomic pathology Workflow, from both sides
 - Pre-populating the Opinion Request
 - Tracking the Opinion Request & Response
 - Integration expert Response to the AP report

Post processing Workflow

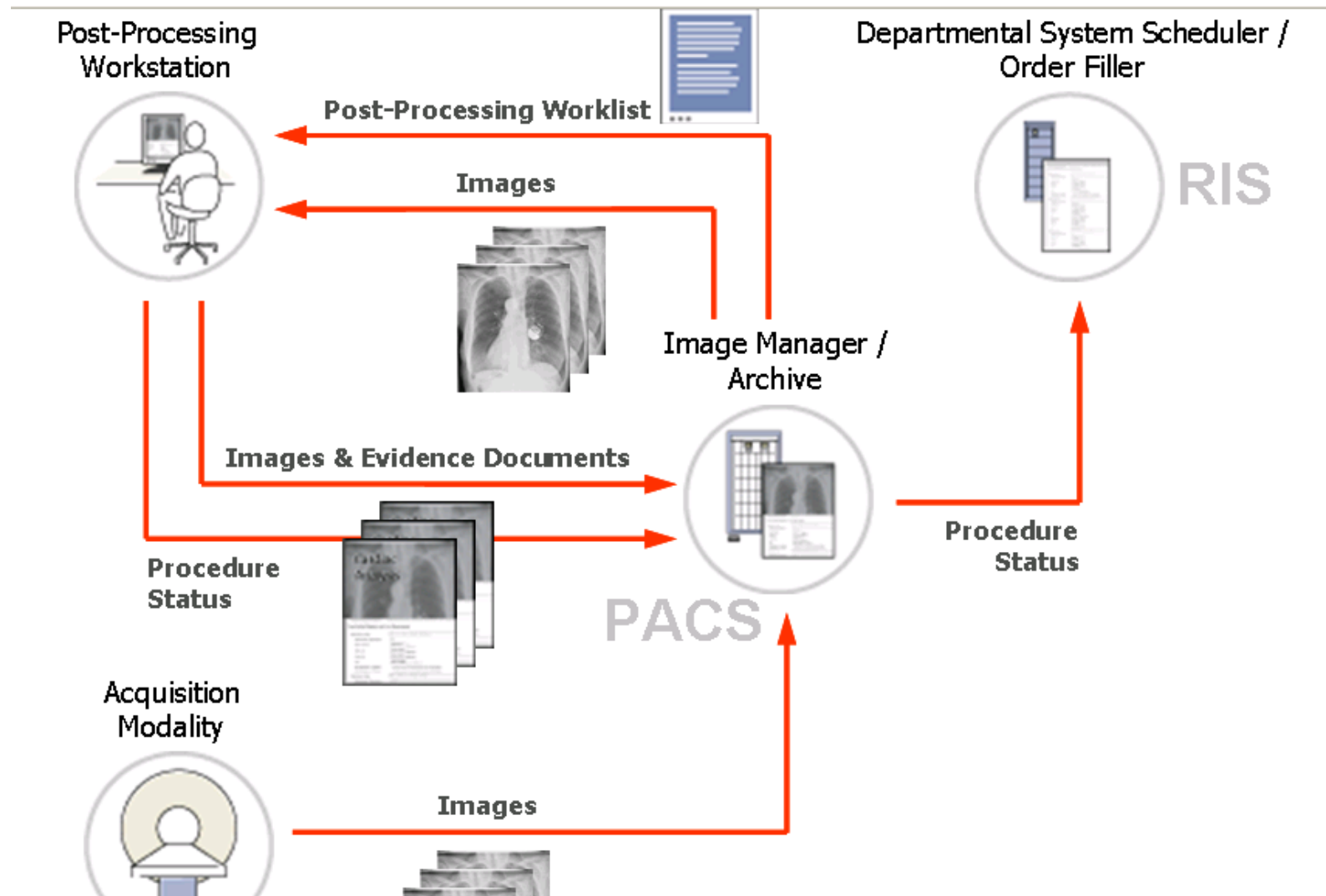
Post Processing WF

- Issue
 - Post processing depends on the knowledge of the context (specimen, disease, specimen processing)
- Objective
 - Defining the post processing WF according to the context
 - Knowledge-driven post processing WF

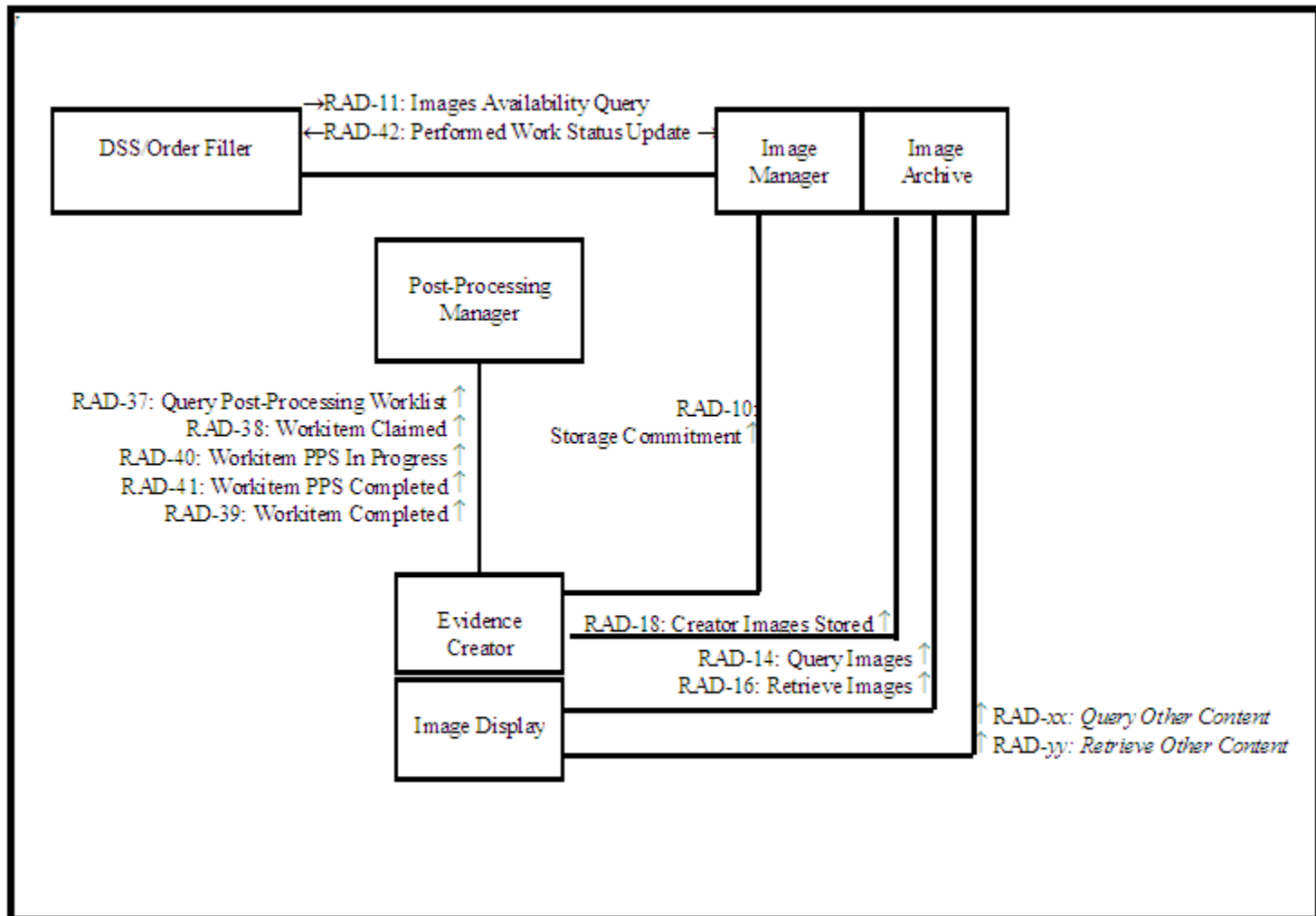
[PWF] Post-Processing Workflow

- Provides worklists, status and result tracking for post-acquisition tasks, such as Computer-Aided Detection or Image Processing.
- The Post-Processing Workflow Profile provides the means to organize and schedule post-processing tasks and to monitor their progress and completion.
- PWF is a natural / logical extension of the Scheduled (Acquisition) Workflow Profile and provides the capabilities to sustain and optimize several tasks typically performed after image acquisition in preparation for the following image interpretation (reporting). It specifies transactions to support a seamless flow of information for typical post-processing tasks such as:
 - Quality control
 - Image reconstruction
 - Computer Aided Detection
 - 3D views generation

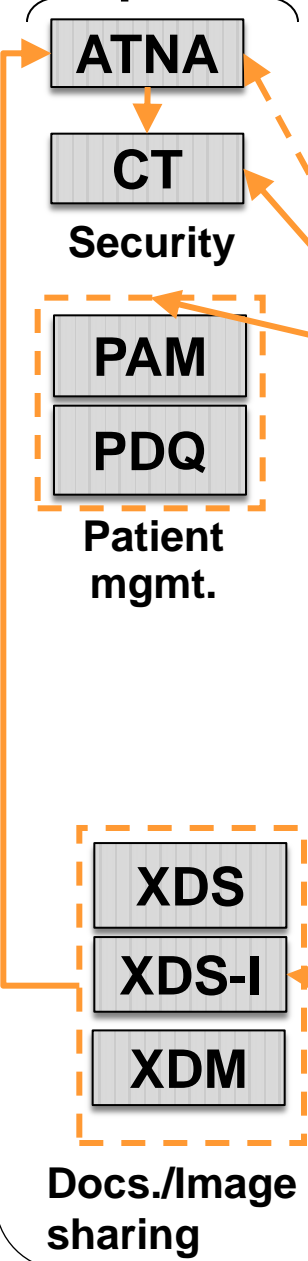
[PWF] Post-Processing Workflow



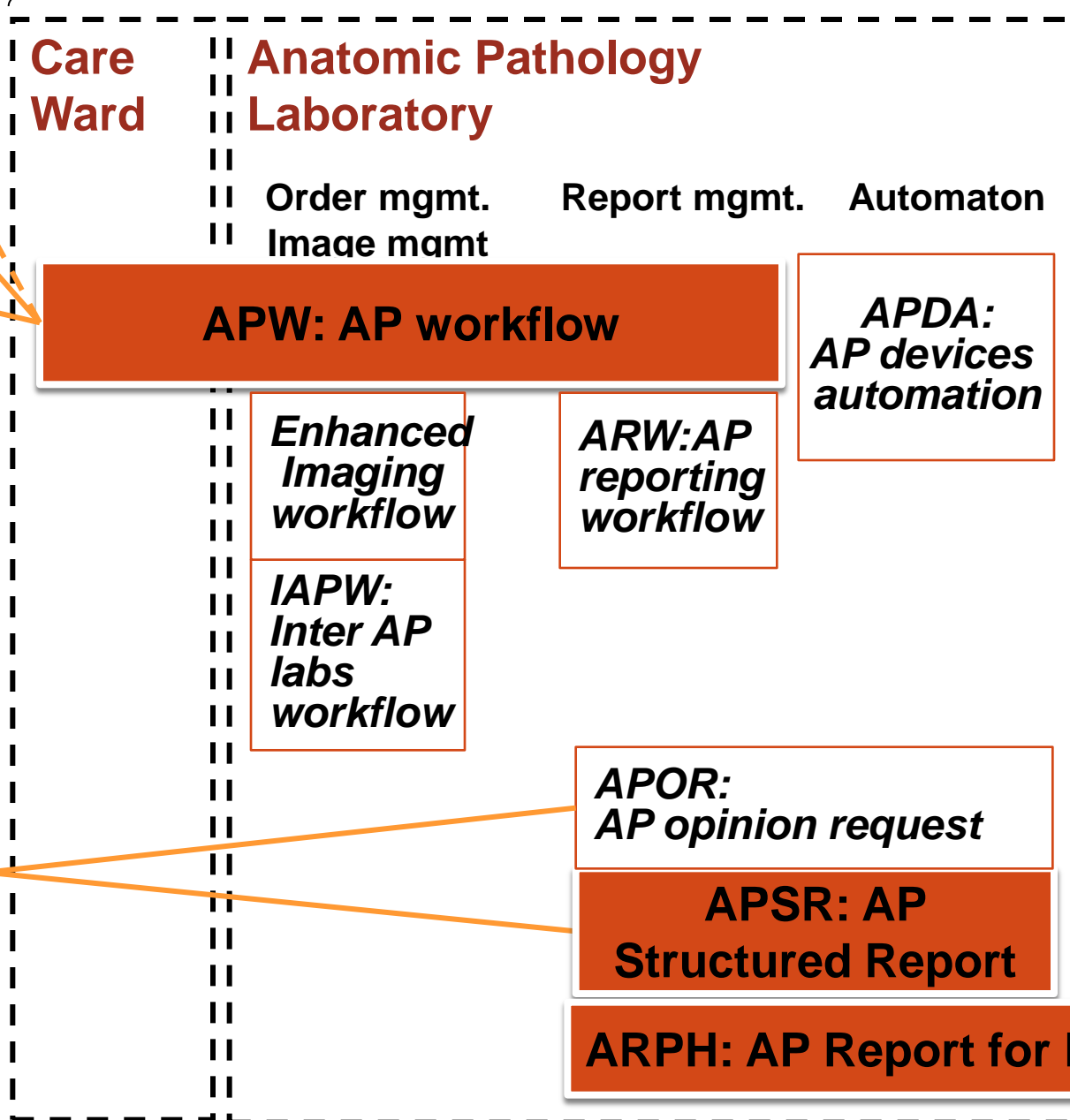
[PWF] Post-Processing Workflow



IT Infrastructure profiles



IHE Anatomic Pathology profiles



Informatic Technology Infrastructure (ITI domain) Workflow

Integrating the Healthcare Enterprise



**IHE IT Infrastructure (ITI)
Technical Framework Supplement**

**Cross-Enterprise Document Workflow
(XDW)**