

DICOMweb in IHE-Integrationsprofilen

(und Aktivitäten der MCWG)

Wien, 14.03.2024

- **Web-based Image Access (WIA)**
- **Web-based Image Capture (WIC)**

Zusätzlich

- **Encounter-Based Imaging Workflow (EBIW)**
- **AI Results (AIR)**
- **AI Workflow for Imaging (AIW-I)**
- ...

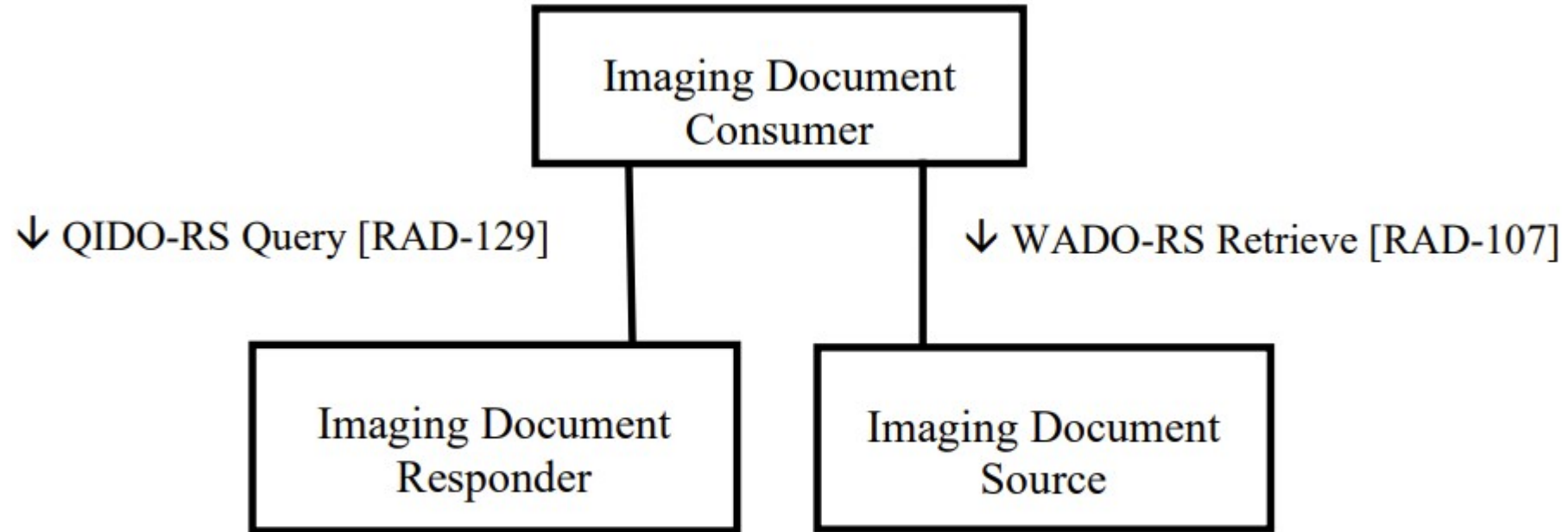


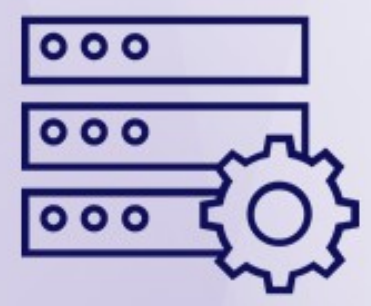
Figure 42.1-1: WIA Actor Diagram

Step 1: QIDO-RS Query

What studies do you have for patient 12345?



Imaging Document Source



Imaging Document Responder

`https://radiology.hospital.com/qidors/studies?PatientID=12345&includefield=NumberOfStudyRelatedSeries&includefield=NumberOfStudyRelatedInstances HTTP/1.1`
`Accept: application/dicom+json`



Imaging Document Consumer

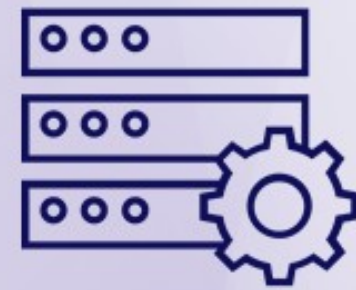
Patient's Name	Patient ID	Patient's Birth Date
WALLACE^PETE	12345	19740701
Study Instance UID	Accession Number	Modality in Study
1.2.250.1.59.40211.12345678.678910	1619823	CT
Study Date	Instance Availability	Retrieve URL
20170405	ONLINE	https://radiology.hospital.com/wadors/studies/1.2.250.1.59.40211.12345678.678910

Step 2: WADO-RS Retrieve

Retrieve Study!



Imaging Document Source



Imaging Document Responder

<https://radiology.hospital.com/wadors/studies/1.2.250.1.59.40211.12345678.678910>



Imaging Document Consumer

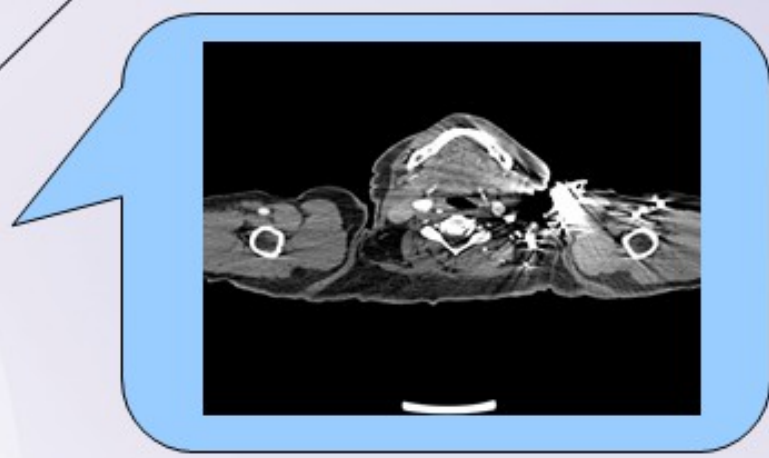


Table 42.2-1: Web-based Image Access - Actors and Options

Actor	Option Name	TF Reference
Imaging Document Consumer	XDS-I Backend Option	Section 42.2.1
	MHD Document Consumer Integration Option	Section 42.2.2
Imaging Document Responder	XDS-I Backend Option	Section 42.2.1
Imaging Document Source	XDS-I Backend Option	Section 42.2.1

□ Beispielhafte Anwendungsfälle

1. **Studienabruf;** Suchen nach Studien zu einem bestimmten Patienten und Auswahl auf Basis der Metadaten. Abruf der Studie und Rendern für die Anzeige.
2. **Interactive Viewing;** Suchen nach Studien zu einem bestimmten Patienten und Auswahl auf Basis der Metadaten. Abruf weiterer Metadaten direkt vom Archiv und laden der ersten Bilder zur Anzeige. Danach laden weiterer Bilder auf Basis der Benutzerinteraktionen.

Web-based Image Capture (WIC)

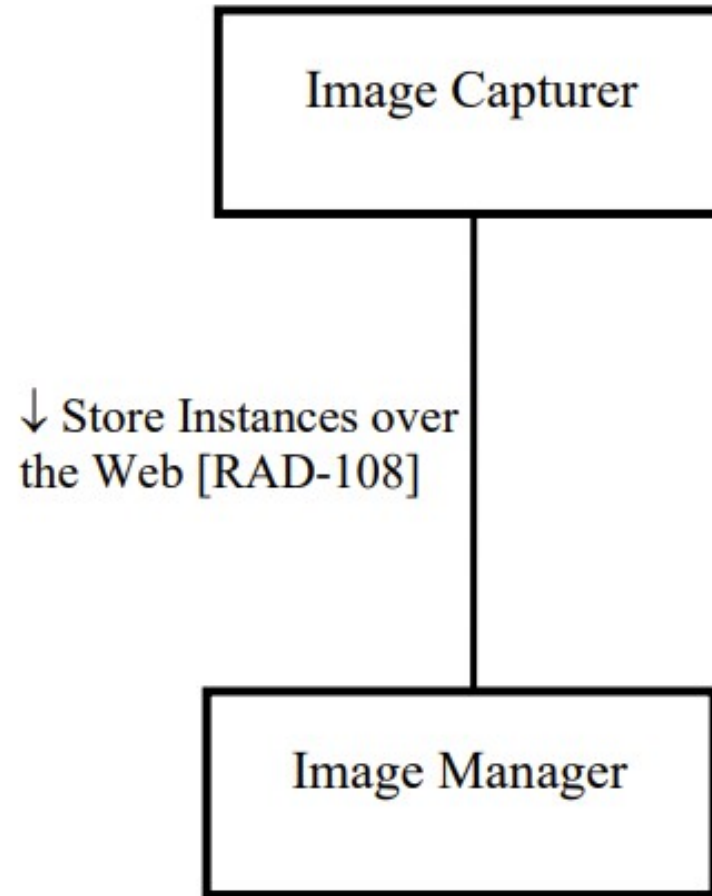
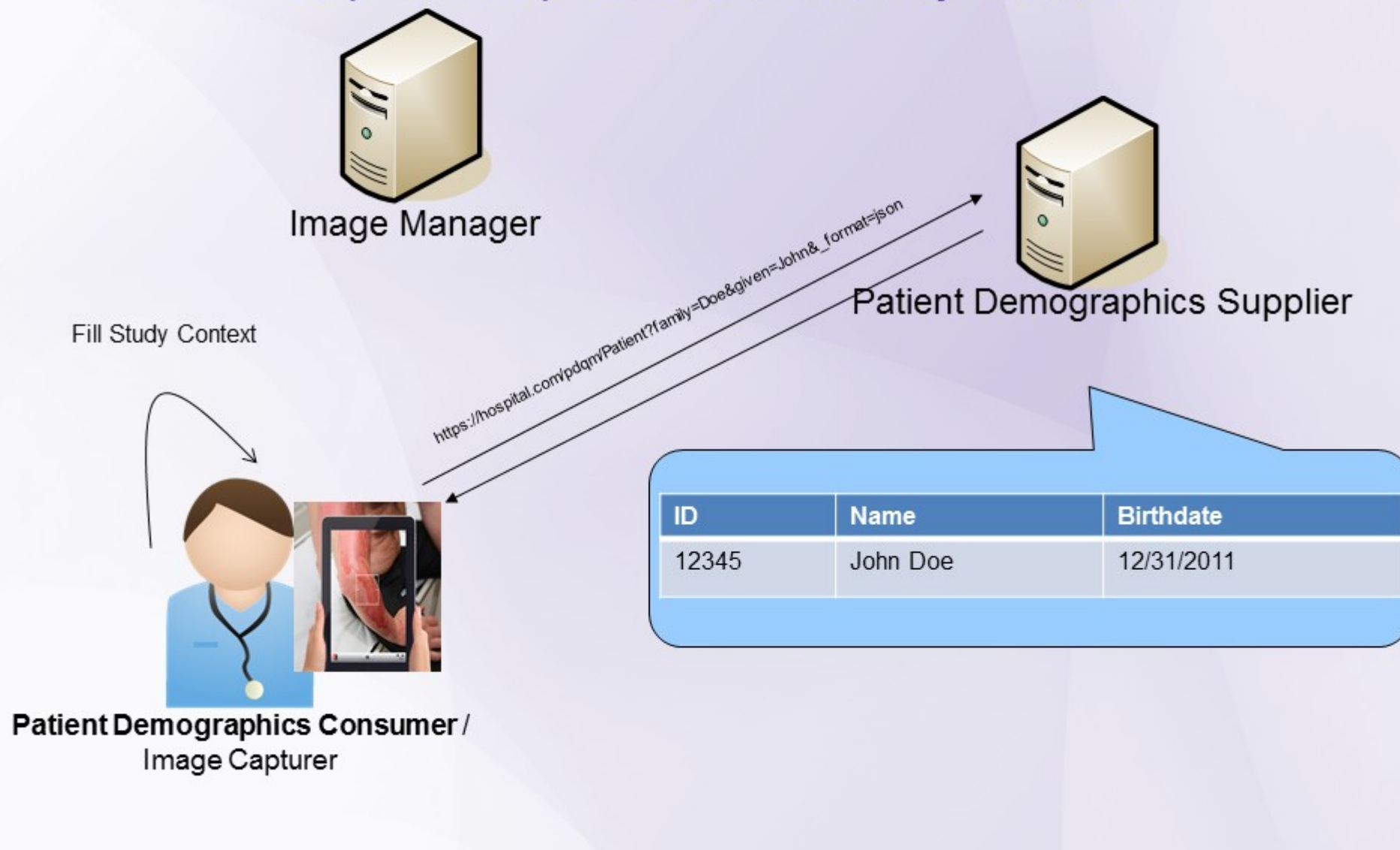


Figure 38.1-1: WIC Actor Diagram

Step 1: Setup Patient and Study Context



Step 2: Store Composite Objects

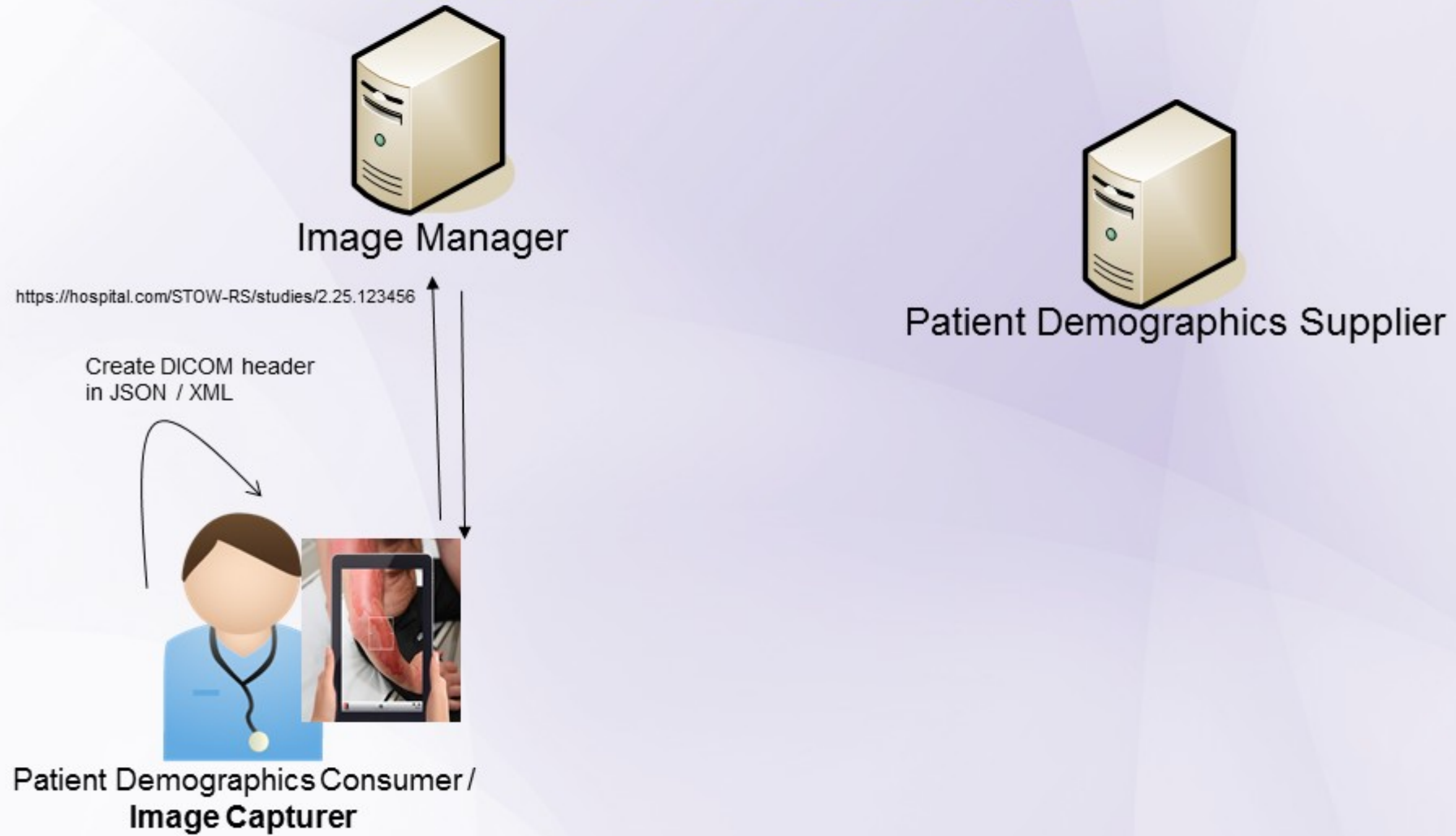


Table 38.2-1: WIC - Actors and Options

Actor	Option Name	TF Reference
Image Capturer (Note 1)	JPEG Storage	Section 38.2.1
	MPEG4 Storage	Section 38.2.2
	Evidence Document Storage	Section 38.2.3
	DICOM Instance Storage	Section 38.2.4
	PNG Storage	Section 38.2.5
Image Manager (Note 2)	PNG Storage	Section 38.2.5

Note 1: The Image Capturer shall support at least one option.

Note 2: The Image Manager is required to support JPEG, MPEG4, DICOM Instance and Evidence Document Storage.

□ Beispielhafte Anwendungsfälle

1. **Wundmanagement;** Aufnahme eines Fotos durch Pflegefachkraft mit eigenem Mobiltelefon. Die Bilder werden in das Bildarchiv zum korrekten Patienten abgelegt und eine entsprechende Notiz abgelegt.
Vgl. Lightweight Imaging Modality im Profil EBIW
2. **Key Images;** Eine Radiologin nutzt ein Tablet, um Bilder zu betrachten (WIA) und zeichnet direkt auffällige Regionen ein. Die Applikation sendet die Markierungen, Key Images und einen Report an das Archiv.

Exzerpt der MCGW Ergebnisse

Wien, 14.03.2024



Integrating
the Healthcare
Enterprise



Multi-Country Working Group (MCWG) on Image Information Sharing

February 2nd , 2024 - eHN Imaging Task Force

MCWG Operating principles

Scope:
Deployment of interoperability for
Imaging Exchange

- **national or regional level**
- Complementary to Cross-Border imaging exchange focus of EU Commission (eHN, JA9).

Goal:
Deliver design analysis for specific
extensions

- Extensions are needed to effectively deploy IHE Profiles, DICOM, FHIR and other standards within countries' ehealth services. Complementary to eHDSI for Cross-Border.

Benefits:
Pool expertise and resources

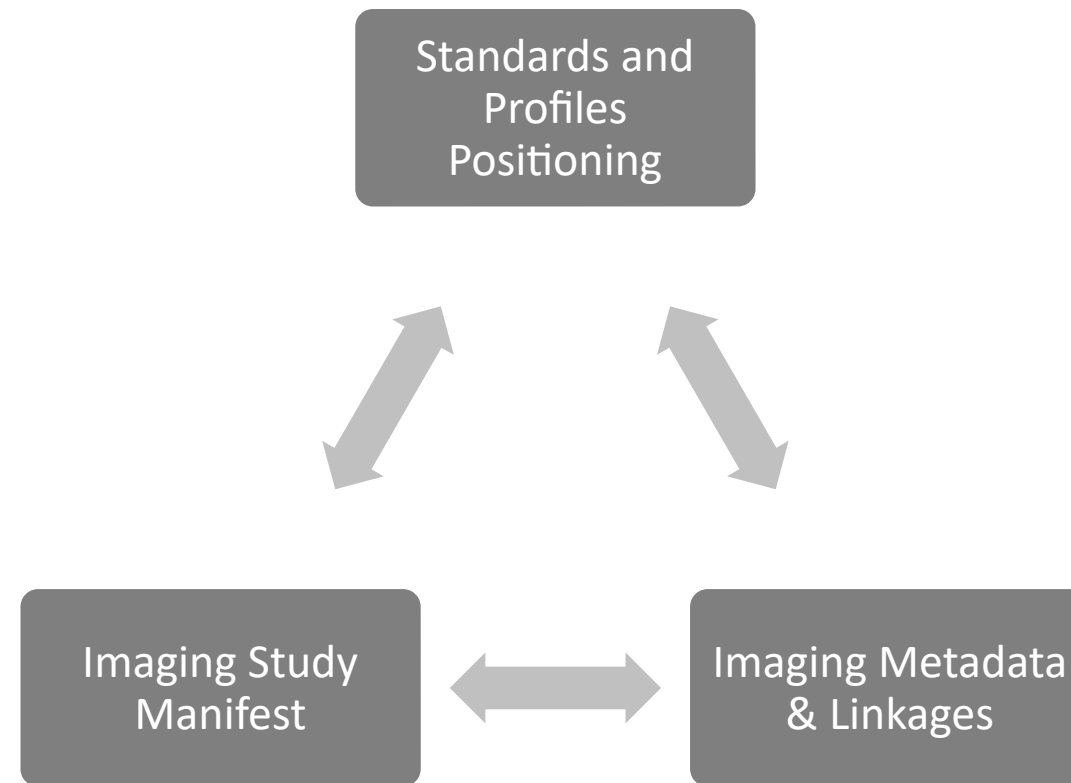
- direct engagement in an active national deployment
- perform analysis of specific issues
- seek increased consistency between such deployments.

Deliverables:
Analysis results as MCWG
recommendations.

- sufficiently mature and complete (multi-country consensus)
- offered for adoption and easily included into national interoperability frameworks.

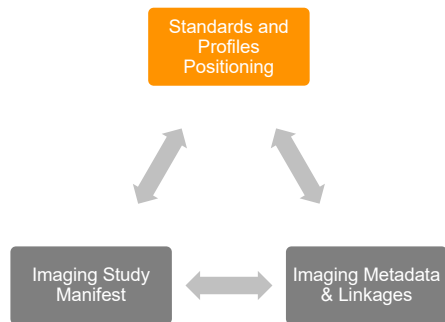
MCWG Recommendations

Status Update on February 1st, 2024



Standards and Profiles Positioning Recommendation Highlights

Scope



Use Case aligned with the *eHN Guidelines on Medical imaging studies and reports* :

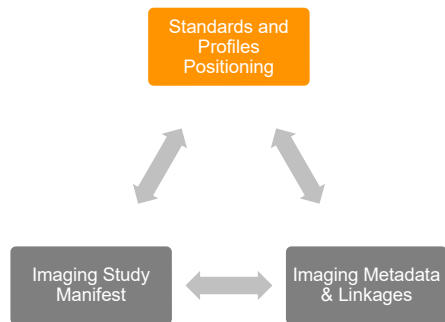
- search and select imaging studies of interest
- access to images
 - links in report to server-side image viewer
 - to native DICOM images by a requester-side image viewer/processor.

Propose choice of profiles and standards

- Position the role of HL7 FHIR in the sharing of imaging information architectures
- Select profiles and standards for the use case (FHIR/MHD, IHE/XDS-I, DICOM WADO-RS)

Standards and Profiles Positioning Recommendation Highlights

Recommendation S



Three different deployment architectures that may coexist (See Note) :

- Country (or stand-alone Region) with a central document registry both with distributed PACS/VNAs
- Country with federated regional document registries & regions with distributed PACS/VNAs
- Country (or region) with a central document registry and a central VNA

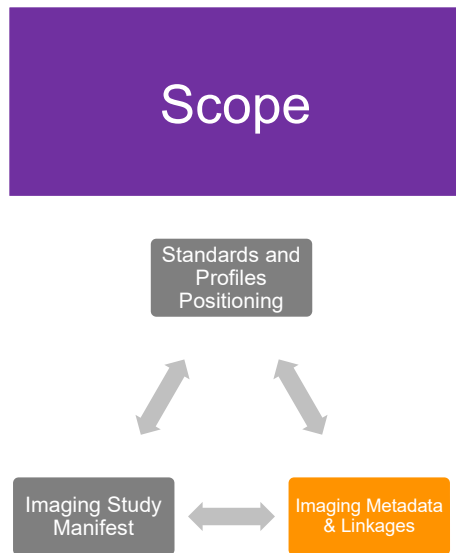
Note: Manifest Document Repositories whether centralized or distributed should be possible in all three architectures.

Imaging Study Manifest (DICOM KOS) used in all three deployment architectures.

Transactions recommended are from the following profiles:

- {A, B or C}: MHD (FHIR based with document reference resource) + DICOM WADO-RS (Rest)
- {A or C}: XDS-I (WS SOAP-Based) + DICOM WADO-RS (Rest)
- {B} : XCA-I (WS SOAP based) + DICOM WADO-RS (Rest)

Imaging Metadata & Linkages Recommendation Highlights



Ensuring effective sharing with linkage between imaging requests

- For clinician as well as for imaging production
- Both for imaging reports and imaging examinations.

Setting a basic imaging metadata strategy

- for filtering access in queries (key filtering elements) for imaging studies.

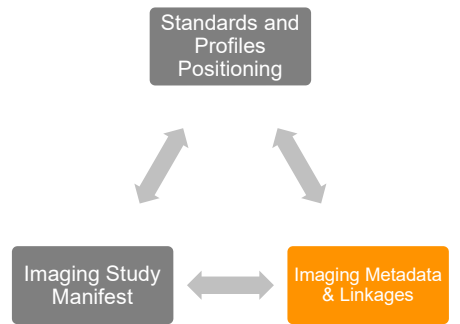
Imaging Metadata & Linkages

Recommendation Highlights

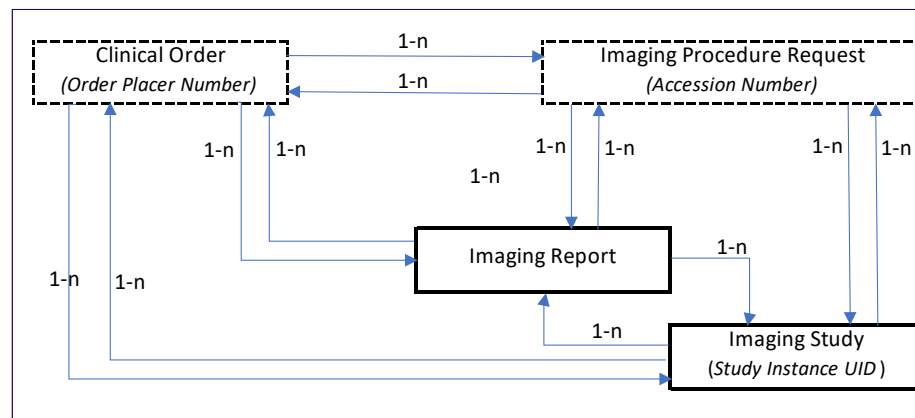
Recommendations

Filtering in queries :
criteria needed for health professionals (imaging and others) when exploring a patient imaging records

- initial request (level 1) and
- subsequent selection (visually or level 2) among list of initial responses.



Metadata element	Description	Query level	Type of value
Anatomical Regions	Set by RIS per each imaging procedure code	1 (or 2)	Classification Value Set
Study level modality	Set by RIS per each imaging procedure code	1 (or 2)	Classification Value Set
Study Instance UID	Set by RIS (sometimes by modality)	2 (or 1)	None - Identifier
Accession number	RIS generated imaging procedure request identifier	2 (or 1)	None - Identifier
Order Placer number	From ordering module EHR/EMR	2 (or 1)	None - Identifier
Imaging Procedure Code	Set by RIS per each performed procedure code	2	Display Name



Linkages for relationships between various entities

- clinical order(s),
- imaging procedure request(s),
- acquired imaging study(ies) and
- resulting report(s)

Codes

- Laterality
- Imaging Procedure

Non-imaging specific metadata

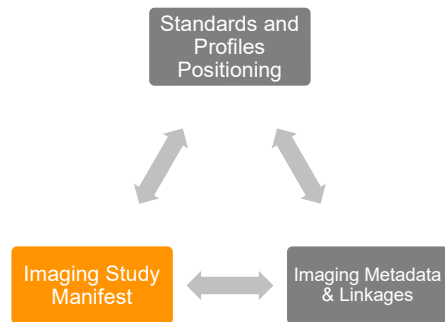
- (Level 1 and Level 2),
- Value sets.

Policy

- Imaging reports header data
- publication trigger

Imaging Study Manifest Recommendation Highlights

Scope



Analysis of the detailed content of the imaging manifest (KOS)

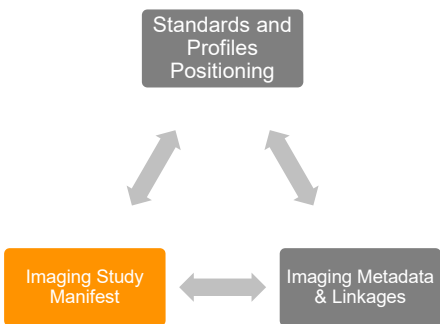
- such as patient IDs,
- accession numbers,
- additional content in study/series/instance descriptions.

Use definition of Imaging Study Manifest

- Based on [eHN Guidelines on Medical imaging studies and reports](#)

Imaging Study Manifest Recommendation Highlights

Recommendations



- Choice of standard: DICOM KOS
- KOS vs FHIR Document bundle (incl. Imaging Studies Resource) :
 - ➔ KOS better match
 - Content match 90+% covered - Missing only a few standard attributes:
 - Imaging SW Alignment for consumption with 80% created from Imaging Data
 - Adoption Very wide – 84 vendors passed Connectathon testing of KOS Manifests (XDS-I). Over 100 sharing environments (Hospital, Regional, national) in Europe
- Transaction to support sharing of manifests and workflows variants
- Key requirements on SOP Classes retrieved by WADO-RS
- Detailed recommendations for manifest content (what needs to be added, why and how)
 - Patient Identification,
 - Study Information,
 - Workflow/identifiers,
 - Series and Instance Information
- Retrieval
 - Locating the Referenced Studies, Series and Instances.
 - Management of retrieve URL and location OIDs
- Selection of Significant Images

CONCLUSIONS

The Multi-Country Working Group on Imaging Information Sharing is well established and has delivered valuable refinements to the available standards and profiles for a consistent deployment across multiple countries.

These three companion recommendations are compact and assemble significant technical, imaging expertise with more than 15 years of standards deployment experience.

➤ Standards Positioning for sharing imaging information

completed in November 2023

➤ Metadata at the national/regional level

completed in November 2023

➤ Imaging Study Manifest.

to be released early February 2024

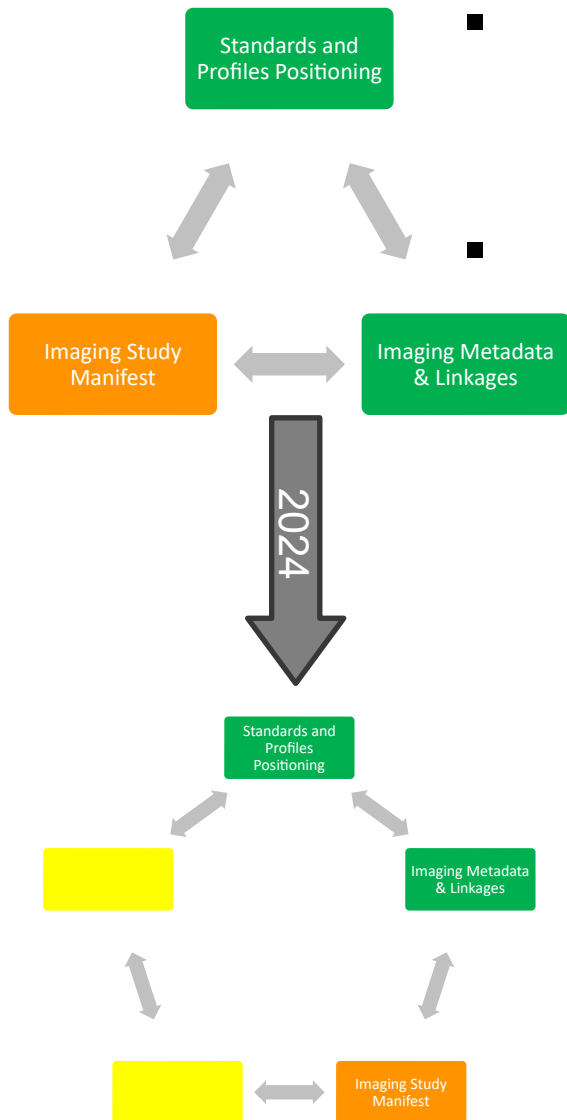
➤ Additional Recommendations are considered by MCWG

➤ product alignment for deployment

considered

➤ support of image compression algorithms.

considered



Building Blocks with Candidate Standards and profiles depending on deployment architecture

Slide from MCWG Recommendation on Standards and Profile Positioning

		A Country/Region with a central document registry & distributed PACS/VNAs	Country with federated Regions/document registries & distributed PACS/VNAs	Country/Region with a central document registry and central VNA
C o n s u m i n g	1-Query (Filter) for Reports and/or Studies	XDS-I Query Request and/or MHD (FHIR) List Doc Ref	XCA-I Query Request and/or MHD (FHIR) List Doc Ref	XDS-I Query Request and/or MHD (FHIR) List Doc Ref.
	2- Applies to a limited set of coded Metadata (generic / imaging)	Metadata (same as XDS-I)	Metadata (same as XCA-I)	Metadata (same as XDS-I)
S y s t e m	1-Query (Response) list of limited set of metadata for matching Reports and or Studies	XDS-I Query Response and/or MHD (FHIR) List Doc Reference response	XCA-I Query Response and/or MHD (FHIR) List Doc Reference response	XDS-I Query Response and/or MHD (FHIR) List Doc Reference response
	1-Retrieve Selected imaging Reports and/or Imaging Study (Manifests)	XDS-I Retrieve Document and/or MHD (FHIR) Get Doc	XCA-I Retrieve Document and/or MHD (FHIR) Get Doc	XDS-I Retrieve Document and/or MHD (FHIR) Get Doc
	3-Imaging Report Content Representation	CDA+PDF or FHIR+PDF for unstructured report. FHIR Document for structured Report. DICOM KOS manifest for imaging studies.	CDA+PDF or FHIR+PDF for unstructured report. FHIR Document for structured Report. DICOM KOS manifest for imaging studies.	CDA+PDF or FHIR+PDF for unstructured report. FHIR Document for structured Report. DICOM KOS manifest for imaging studies.
	4-Imaging Study (Manifest) Content Representation			
	5-Selected Image Access or Server-side viewing	DICOM WADO-RS IHE IID (URL SS viewing)	DICOM WADO-RS IHE IID (URL SS viewing)	DICOM WADO-RS IHE IID (URL SS viewing)

Detailed recommendations for manifest content (what needs to be added, why and how)

- Patient Identification**
- Study Information**
- Workflow/identifiers**
- Series and Instance Information**
- Overview of a KOS**

Open Issues

Open Issue 1: Transfer syntaxes supported and negotiation rules by consumer & producer need to be clarified. It does *not fit in Manifest recommendations and should be added to the standards and profile positioning Recommendations.*

**Questions, Comments and Suggestions are welcome
and should be sent to the IHE-Europe Secretariat:
secretariat@ihe-Europe.net**