Web-based Image Access (WIA)

Formerly known as MHD-I

Kinson Ho, Change Healthcare
IHE Radiology Technical Committee Co-Chair
Problems to Solve in Imaging

- Secure web access to imaging studies
- Image sharing & Interactive viewing
- Ease of integration

Neutral to image sharing infrastructure: DICOM, XDS-I, MHD
Web-based Image Access Value Proposition

Methods for image sharing and interactive viewing of imaging studies using RESTful services such as WADO-RS and QIDO-RS.
WIA Technical Highlights

• Neutral about backend image sharing infrastructure
  – XDS / XDS-I
  – DICOM / DICOMweb

• Integrates with ITI MHD
  – Document Consumer can locate and interact with imaging studies more efficiently using document metadata
WIA in Two Easy Steps
Step 1: QIDO-RS Query

What studies do you have for patient 12345?

<table>
<thead>
<tr>
<th>Patient’s Name</th>
<th>Patient ID</th>
<th>Patient’s Birth Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>WALLACE^PETE</td>
<td>12345</td>
<td>19740701</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Study Instance UID</th>
<th>Accession Number</th>
<th>Modality in Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2.250.1.59.40211.12345678.678910</td>
<td>1619823</td>
<td>CT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Study Date</th>
<th>Instance Availability</th>
<th>Retrieve URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>20170405</td>
<td>ONLINE</td>
<td><a href="https://radiology.hospital.com/wadors/studies/1.2.250.1.59.40211.12345678.678910">https://radiology.hospital.com/wadors/studies/1.2.250.1.59.40211.12345678.678910</a></td>
</tr>
</tbody>
</table>
Step 2: WADO-RS Retrieve

Retrieve Study!

Imaging Document Source

Imaging Document Consumer

https://radiology/hospital.com/wadors/studies/1.2.270.1.940211.153457516571.678910

Imaging Document Responder
Interactive Viewing: More QIDO-RS Queries

Give me the detailed metadata for the study!

<table>
<thead>
<tr>
<th>Patient's Name</th>
<th>Patient ID</th>
<th>Study Instance UID</th>
</tr>
</thead>
<tbody>
<tr>
<td>WALLACE^PETE</td>
<td>12345</td>
<td>1.2.250.1.59.40211.12345678.678910/instance?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Series Instance UID</th>
<th>Modality</th>
<th>Image Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2.250.1.59.40211.12345678.678910.12445</td>
<td>CT</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rows</th>
<th>Columns</th>
<th>Retrieve URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>512</td>
<td>512</td>
<td><a href="https://radiology.hospital.com/wadors/studies/1.2.250.1.59.40211.12345678.678910/instance">https://radiology.hospital.com/wadors/studies/1.2.250.1.59.40211.12345678.678910/instance</a>?</td>
</tr>
</tbody>
</table>
Interactive Viewing (2): WADO-RS RetrieveMetadata

Retrieve full series metadata!

Imaging Document Consumer

Imaging Document Source

Imaging Document Responder

[ { Object 1 in JSON},
  { Object 2 in JSON},
  ...
]
What is your experience with XDS-I?
What studies do you have for patient 12345?

<table>
<thead>
<tr>
<th>Patient's Name</th>
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<tr>
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<tbody>
<tr>
<td>1.2.250.1.59.40211.123456 78.678910</td>
<td>1619823</td>
<td>CT</td>
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</table>

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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>XDS-I Integration: QIDO-RS to XDS Registry Query Transformation</th>
</tr>
</thead>
</table>
XDS-I Integration: WADO-RS to Object Retrieve Transformation

Retrieve Study!

Imaging Document Source

Retrieve from Imaging Document Source

XDS-I

Imaging Document Responder

Imaging Document Consumer

https://radiologyhospital.com/wadors/studies/1.2.780.3.5.40211.1.2.11.2.67890
## Populate Registry Stored Query Parameters

<table>
<thead>
<tr>
<th>Registry Stored Query Parameter</th>
<th>QIDO-RS Matching Keys</th>
</tr>
</thead>
<tbody>
<tr>
<td>$XDS\text{DocumentEntryPatientId}$</td>
<td>Patient ID (0010,0020) and Issuer of Patient ID (0010,0021)</td>
</tr>
<tr>
<td>$XDS\text{DocumentEntryReferenceIdList}$</td>
<td>Accession Number (0008,0050) and Issuer of Accession Number Sequence (0008,0051) Study Instance UID (0020,000D)</td>
</tr>
<tr>
<td>$XDS\text{DocumentEntryEventCodeList}$</td>
<td>Modalities in Study (0008,0061) Anatomic Regions in Study Code Sequence (0008,0063)</td>
</tr>
<tr>
<td>$XDS\text{DocumentEntryServiceStartTimeFrom}$, $XDS\text{DocumentEntryServiceStartTimeTo}$</td>
<td>Study Date (0008,0020) and Study Time (0008,0030)</td>
</tr>
<tr>
<td>$XDS\text{DocumentEntryTypeCode}$</td>
<td>Procedure Code Sequence (0008,1032)</td>
</tr>
<tr>
<td>$XDS\text{DocumentEntryPracticeSettingCode}$</td>
<td>Requesting Service Code Sequence (0032,1034)</td>
</tr>
</tbody>
</table>
DICOMweb x HL7 FHIR
Mobile Access to Health Document (MHD)

- **Document Source**
  - Provide Document Bundle

- **Document Recipient**

- **Document Consumer**
  - Find Document Manifest
  - Find Document References
  - Retrieve Document

- **Document Responder**
MHD: XDS on FHIR Option
What **documents** do you have for patient 12345?

- **MHD Document Consumer** / Imaging Document Consumer

- **MHD Document Responder**

- **XDS Registry Stored Query**

- **XDS-I**

**Table:**

<table>
<thead>
<tr>
<th>created</th>
<th>Location</th>
<th>context.related.identifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-Jul-2014</td>
<td><a href="http://xds/repo/1.2.3.4.5">http://xds/repo/1.2.3.4.5</a></td>
<td>A23910 (accession number)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>context.event</th>
<th>format</th>
<th>subject.identifier (XAD Patient ID)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT, Head</td>
<td>1.2.840.10008.5.1.4.1.1.88.59</td>
<td>144^^^&amp;2.16.3.6.1.4.1.21367.2005.3.7&amp;ISO</td>
</tr>
</tbody>
</table>

**Diagram Details:**

- **MHD Integration: Imaging Study Discovery Continuation**

- **XDS Registry Stored Query**

- **MHD Document Consumer**

- **Imaging Document Consumer**

- **MHD Document Responder**

- **XDS-I**

- **Location context.related.identifier**
  - 10-Jul-2014
  - http://xds/repo/1.2.3.4.5
  - A23910 (accession number)

- **context.event format subject.identifier (XAD Patient ID)**
  - CT, Head
  - 1.2.840.10008.5.1.4.1.1.88.59
  - 144^^^&2.16.3.6.1.4.1.21367.2005.3.7&ISO
MHD Integration: Imaging Study Discovery Continuation

Retrieve metadata for study with accession #A23910 and retrieve the images

MHD Document Consumer / Imaging Document Consumer

No need to retrieve manifest. No need to extend manifest metadata.
Summary

Secure web access to imaging studies

Image sharing & Interactive viewing

Ease of integration

Neutral to image sharing infrastructure: DICOM, XDS-I, MHD
Recent Enhancements to XDS-I

• Imaging Document Source has a new Reference ID option
  – CP-RAD-352
  – Required to provide Accession Number and Study Instance UID in ReferencedIdList

• Imaging Document Source has a new Delete Imaging Document Option
  – CP-RAD-320
  – Grouped with ITI Remove Metadata and Document (RMD) Document Administrator actor
  – Delete manifest or report from Document Registry and Repository