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DUTCH NATIONAL PATIENT ID (BSN) & DICOM OBJECTS



Betere zorg door betere informatie

21 **Version history**

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Version	Date	Description	Author
0.1	11-02-2009	Initial version	AJS
0.2	29-06-2009		AJS/MS
0.3	08-07-2009		AJS
0.4	05-08-2009	Decisions 2 ^e meeting and examples added	AJS
0.5	26-10-2009	Added use cases, conclusions and recommendation	AJS

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DRAFT

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55 **1. Background**

56 As of June 1st, 2008 in The Netherlands the law on the use of the BSN (=Burger Service Nummer, =
57 Civilian's service number) for healthcare has become active. An introduction period of 1 year has
58 been given to the implementation process. That means, that as of June 1st, 2009, the Dutch
59 healthcare is obliged to use the BSN as the distinguishing ID property for cross-enterprise
60 communication.

61 As a consequence, Nictiz is asked frequently how to use the BSN in DICOM based communication
62 (electronic, by sending CD's, etc)

63 **2. Goal of this document**

64 The goal of this document is to give a start to the discussion on how to use the BSN in the Dicom
65 standard, finally resulting in a nationwide implementation guideline to be published by Nictiz in
66 cooperation with IHE-NL.

67 **3. Introduction**

68 For the introduction of the BSN for cross-enterprise communication agreement has to be reached on
69 how to use this number in the various standards. For HL7 and Edifact the direction is clear by now.
70 For the Dicom standard little has been done so far, partly due to the fact that a Dutch Dicom
71 organization does not exist.

72 Even in the IHE profiles there is no definition on how to handle a situation with various patient ID's.
73 This notwithstanding the fact that IHE is active in cross-enterprise settings. And finally, the so-called
74 Amsterdam feasibility study on radiology has not looked at it on an implementation level either.

75 **4. Intended audience**

76 Interface and communication experts on decision making and technical level with basic knowledge of
77 HL7 v2.x, v3.0 and DICOM 3.0.
78

79 **5. Methodology**

80 In order to get an overview of of the situations where the use of the BSN is applicable, a document is
81 prepared summarizing the most relevant use cases as described in other IHE profiles dealing with the
82 use of Dicom objects. This document is attached as annex B.

83 On the other hand the technical possibilities defined in the Dicom standard to cope with multiple
84 patient-id's are investigated. Based on a requirements analysis these possibilities can be ranked as
85 more or less favorable. Chapter 6 is dedicated to this subject

86 Combining the use cases and the preferred technical solution yields a overview of the feasibility of
87 the solution, now and in the future. Chapter 7 describes the possibilities, the requirements and the
88 limits of the solution.

89 Finally the concept recommendation is summarized in chapter 8

90 **6. Technical solutions**

91 **6.1 REQUIREMENTS**

92 To ensure objectivity in choosing solutions, the requirements for implementation of the BSN in the
93 DICOM standard are described conform the MoSCoW method.

94 The requirements are:

95 **MUST HAVE:**

- 96 1. Dutch national patient ID (BSN) must be used in cross enterprise communication (by law).
- 97 2. The solution must comply with the DICOM standard, that is, it must produce valid Dicom
98 objects for any application, whether this application is aware of the chosen solution or not.
- 99 3. The solution must support the use of multiple patient ID numbers.
- 100 4. Patient ID and information about the issuer of the patient ID must be available to identify type
101 of number used
- 102 5. Identification of issuers of identifiers must (at least on a national level) be traceable.
- 103 6. The solution must minimize the risk of erroneous renumbering of patient ID's when Dicom
104 objects cross the border of the enterprise

105 **SHOULD HAVE:**

- 106 1. Changes of patient ID should be verifiably correct
- 107 2. Proposed code system of identification of issuers should be in line with the environment the
108 Dicom objects are used in, e.g. HL7 messages or documents containing the radiology report
109 in an HL7 or XDS based system.
- 110 3. The solution should align with the existing applications of the major manufactures in the
111 domain of medical imaging, i.e. the application allows to fill en change the tag.
- 112 4. The solution should support the use of the national patient ID as internal ID.

113

114 **COULD HAVE:**

- 115 1. The solution could yield the possibility to query Dicom objects on the national patient ID (BSN)
116 at all time

117 **WON'T HAVE:**

118 None at this time

119

120 **6.2 NOTATION AND LOCATION OPTIONS**

121 Solutions for the implementation of the BSN in Dicom have to decide two sub issues:

- 122 1. Notation of the full patient Id information incl. issuer
- 123 2. Location of the BSN

124

125 **6.2.1 Notation of the full patient ID information**

126 Concerning the notation of the patient ID, HL7 is the standard most experienced in the
127 implementation of the BSN in the Netherlands. Currently there are two implementation guides,
128 describing the use of the BSN in HL7, one for HL7v2.4 and up, and one for HL7v3.0 for the use of the
129 BSN in relation to the Dutch national infrastructure (AORTA) .

130

131 **BSN in HL7v2.x**

132 The Dutch implementation guide for HL7 v2.4 recommends the use of PID segment 3 for the
133 communication of patient ID information. The use of other patient ID segments like PID-2 and PID-4
134 are discouraged. Segment PID-3 is a list type. Recommendation of the Dutch HL7 affiliation is to put
135 the internal hospital patient ID in the first place and the BSN in second place. If, in future, BSN
136 becomes the internal patient ID, it can be placed in the first place.

137 In the HL7 v2.4 standard the definition of PID-3 is:

138

139 PID-3 Patient identifier list (CX) :

140 Components: <ID (ST)> ^ <check digit (ST)> ^ <code identifying the check digit scheme employed (ID)> ^ < assigning
141 authority (HD)> ^ <identifier type code (ID)> ^ < assigning facility (HD) ^ <effective date (DT)> ^
142 <expiration date (DT)>

143 Subcomponents of assigning authority: <namespace ID (IS)> & <universal ID (ST)> & <universal ID type (ID)>

144 Subcomponents of assigning facility: <namespace ID (IS)> & <universal ID (ST)> & <universal ID type (ID)>

145

146 HL7v2.4 (and up) examples:

147

148 BSN: 066123456^^^NLSBV-Z^NNNLD

149 Internal HIS number: 1234567^^^PI

150 The code 'NLSBV-Z' for assigning authority comes from an HL7 user defined table.

151 The code 'NNNLD' of identifier type code comes from the *HL7 Table 0203 - Identifier type* :

152 NN (National number) + NLD being the ISO table 3166 3-character (alphabetic) country code

153

154

155 **BSN in HL7v3.0**

156 The Dutch implementation guide for HL7 v3.0 uses a different scheme for identification of the issuer.
157 Since HL7v3 heavily depends on the use of OID's, the type and the issuer of the patient ID are
158 represented by a ISO OID. (also see the annex on extra OID information)

159 HL7v3.0 examples:

160 BSN : <id extension="066123456" root="2.16.840.1.113883.2.4.6.3"/>
161 Internal HIS number: <id extension="0123456" root="2.16.528.1.1007.3.3.1234567.1.1"/>

162 **6.2.2 Location of the BSN in Dicom objects**

163 In the Dicom, there are three locations where patient ID information can be placed.

- 164 1. The primary patient ID tag (0010,0020) in combination with the issuer tag (0010,0021)
- 165 2. Other Patient IDs tag (0010,1000)
- 166 3. Other Patient IDs sequence tag (0010, 1002) (since 2006 in Dicom standard)

167
168 The properties of these attributes are:

169
170

Tag	Value	Multiplicity	Mandatory	Remark
0010,0020	LO	1	Y	LO: String ,max 64 char
0010,0021	LO	1	N	
0010,1000	LO	1-n	N	
0010,1002	SQ	1	N	Sequence: multiple records
> 0010,0020	LO	1	Y	
> 0010,0021	LO	1	N	HL7 v2 CX comp. 4 subcomp. 1.

171

172

173

174 In CP800 (Add Issuers of Identifiers, harmonized with HL7 v2.x) an tag 'Issuer of Patient ID Qualifiers
175 Sequence' (0010,0024) is added, additional to tag (0010,0021). (since 2008 in Dicom standard).

Tag	Value	Multiplicity	Mandatory	Remark
0010,0024	SQ	1	N	
>0040,0032			N	Universal Entity ID, HL7 v2 CX comp. 4 subcomp. 2
>0040,0033			Conditional	Universal Entity ID Type, HL7 v2 CX comp. 4 subcomp. 3
>0040,0035			N	Identifier Type Code, HL7 v2 CX component 5

176

177 In tag (0040,0035) the identifier type 'NNNLD' or 'PI' can be communicated.

178 Tag (0010,0024) is allowed wherever tag (0010,0021) is used.

179

180 Where in HL7v2.x recommendation is to retire the formerly used patient ID fields, in the Dicom
181 standard, being more the a communication standard this is not possible.
182 Although in theory it is allowed to nullify tag (0010,0020), compatibility issues with existing Dicom
183 objects and application behavior prevents discarding the use of this field.

184

185 Note that CP800 addresses more than just the issuer of patient ID's. It deals with issuers of all id's,
186 including accession numbers, striving to make these id's also unique cross the borders of the
187 enterprise by adding an issuer. This can become relevant in relating images to report v.v.

188

189 6.2.3 Mapping BSN notation on location options

190 Combining the notation choices and the location options, gives the following result.

Tag	Name	HL7 v2.x	Example	HL7v3	Example
0010,0020	PatientID	ID	066123456	ID	066123456
0010,0021	Issuer of PatientID	Assigning authority	NLSBV-Z^NNNLD	Root	2.16.840.1.113883.2.4.6.3
0010,1000	Other Patient IDs	PID-3	066123456^^^NLSBV-Z^NNNLD	ID+root	<i>e.g.:</i> 2.16.840.1.113883.2.4.6.3.066123456
0010,1002	Other Patient IDs sequence				
> 0010,0020	PatientID	ID	066123456	ID	066123456
> 0010,0021	Issuer of PatientID	Assigning authority	NLSBV-Z^NNNLD	Root	2.16.840.1.113883.2.4.6.3

191

192 Note that to use the HL7v2.x notation to express the full information, for all location options, except
193 for tag (0010,1000), the use of tag (0010,0024), sub tag (0040,0035) is indispensable.

194 The HL7v3.0 OID notation includes all information in one OID (See annex A).

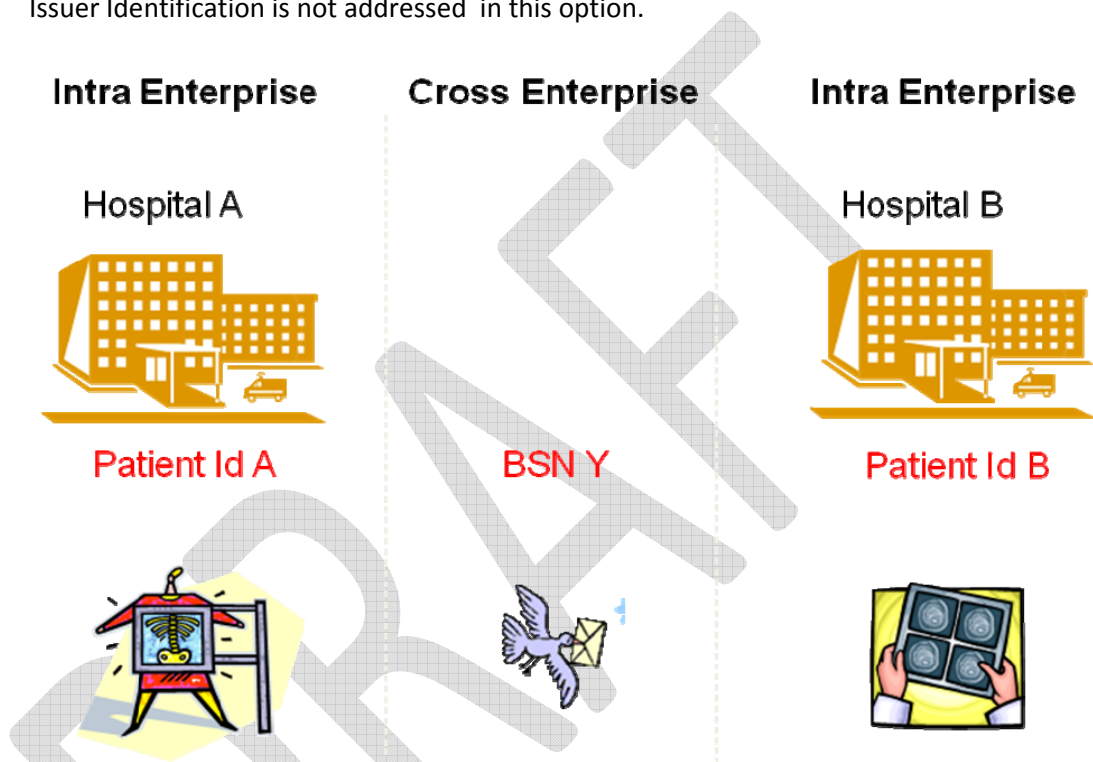
195

196

197 **6.3 SOLUTIONS**

198 For the implementation of BSN in Dicom four alternatives have been identified:

- 199 1. The value of tag (0010,0020) is changed every time the object crosses the border of the
200 enterprise.
201 When hospital A (HCPO A) sends a Dicom object to hospital B (HCPO B), tag (0010,0020) will
202 be changed from HCPO A internal number to BSN and when received in HCPO B, in HCPO b's
203 internal number.
204 Issuer Identification is not addressed in this option.



- 205
- 206 2. The national number (BSN) is put in tag (0010,1000) as a string, containing the full
207 information, including issuer information. The use of tag (0010,0020) is not described in this
208 option.
- 209 3. The national number (BSN) is put in the tag (0010,1002) sequence. When using the HL7v2
210 notation, support of tag (0010,0024) is necessary. The use of tag (0010,0020) is not
211 described in this option.
- 212 4. The national number (BSN) and the internal hospital ID's are stored in either (0010,1000) or
213 (0010,1002) for reference. Tag (0010,0020) contains the number, copied from (0010,1000) or
214 (0010,1002), that is relevant at a particular time and situation. In hospital A it will contain the
215 internal ID of hospital A, in the cross enterprise situation it will contain the BSN and in
216 hospital B it will contain the internal ID of hospital B. Changing de value of (0010,0020)
217 leaves tag (0010,1000) or tag (0010,1002) unchanged. Both notations can be used.

218 **6.4 ANALYSIS**

219 These four alternatives are evaluated against the requirements of paragraph 5.

Solution		Must have					Should have				C
		Dicom compliance	Multiple ID's	Issuer	Issuer traceable	Minimize risk	Verify correctness	Environment ²	Implemented	Internal use of BSN	
1	(0010,0020) ¹	+	-	+	+	-	-	+	++	-	-
2	(0010,1000)	+/-	+	+	+	+	-	+	+	+	+
3	(0010,1002)	++	+	+	+	+	-	+	-	+	-
4	Park on 1000	+/-	+	+	+	++	+	+	+	+	+
4	Park on 1002	++	+	+	+	++	+	+	-	+	-

220

221 ¹ in combination with (0010,0021) cq. (0010,0024)

222 ² depends on the chosen notation and environment

223 - Remarks:

224 Tag (0010,1000) is well implemented, but also already in use in some situations.

225 Defining a proprietary format for storing in Patient Id information like HL7 PID-3 as string may
 226 give compatibility issues.

227 - The solution chosen in CP800 for the notation of the issuer is lined up with HL7v2.x but rather
 228 disjunct from HL7v3 (incl. CDA) and XDS.

229

230 **6.5 CONCLUSION**

231 The analysis shows that the best fit with the requirement is achieved with solution 4 and tag
 232 (0010,1002). The drawback is that tag is rather new (2006). This does not have to introduce a
 233 problem, since the use of the BSN is compulsory only in cross enterprise communication. Initial filling
 234 of tag (0010,1002) can therefore be postponed to the moment of data exchange if the hospital's
 235 PACS does not support the tag yet. The filling can then be achieved outside the PACS. Obviously the
 236 hospital in that case cannot benefit from the presence of the BSN for internal use. Once the tag
 237 (0010,1002) is initially filled, it can be appended with additional patient ID's, but may not be cleared.

238 With respect to the 'Query on BSN' could have requirement, it can be concluded that optionally tag
 239 (0010,1000) can offer additional functionality, since querying a string is more straightforward than
 240 querying a sequence. Therefore organizations may additionally fill tag (0010,1000) with the
 241 relevant information for querying on BSN.

242 For the issuer of patient ID tag (0010,0021) offers the best solution. Sequence (0010,0024) is
243 especially designed for alignment with HL7v2.x and therefore offers a less flexible solution.

244 The coding of the issuer organization comes in two presentations, HL7v2 and HL7v3. When acquiring
245 the BSN via the Dutch national infrastructure the HL7v3 notation is used. When acquiring the BSN
246 directly from the issuer (SBV-z), an issuer code is not included in the information as it is implicit.
247 For use in the cross domain setting, where the national infrastructure is dominant, the HL7v3
248 notation seems the natural choice. For internal use in hospitals, where HL7v2.x is common, the
249 HL7v2.x is more beneficial. A drawback of the latter notation is that internal patient ID's are
250 identified as type 'PI', with no issuer. Without additions to the notation, the internal numbers cannot
251 be used outside the boundaries of the hospital.

252 In summary the conclusions are:

- 253 - Accumulate in sequence (0010,1002) all patient ID's that were ever used, including the BSN.
- 254 - Swap from sequence (0010,1002) into tag (0010,0020) and tag (0010,0021) the patient ID that in
255 a certain situation is the leading patient ID.
- 256 - Do not use tag (0010,0024) for issuer of patient ID
- 257 - Optionally fill tag (0010,1000) with information from tag (0010,1002) if needed to accommodate
258 querying on BSN.
- 259 - The issuer of patient ID is coded in the HL7v3 notation.

260 6.6 EXAMPLES

261 Based on these conclusions, this paragraph gives detailed information on what information is
262 present in the relevant tags, during the creation of a Dicom study and the subsequent exchange of
263 the study with another hospital.

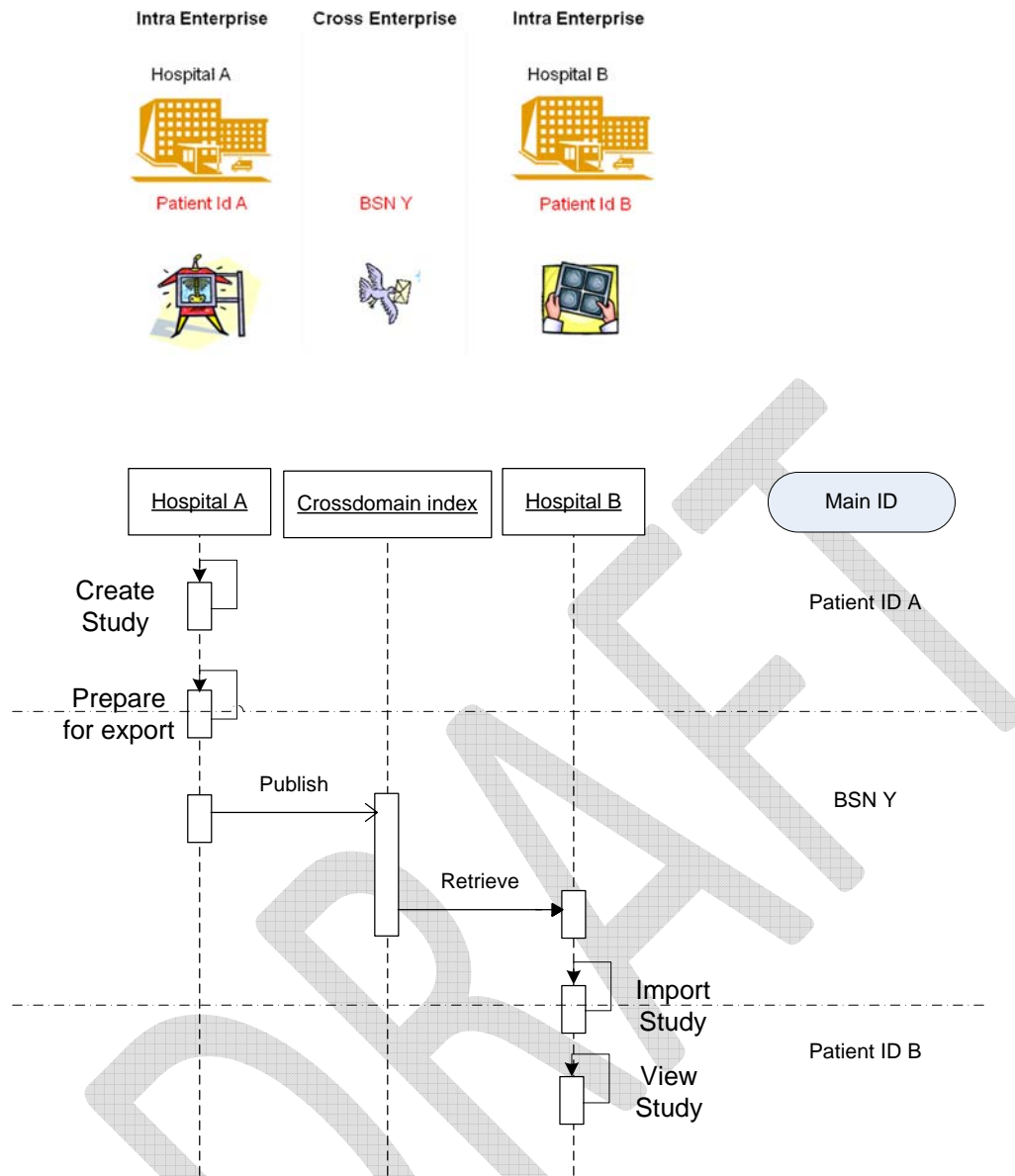
264 The patient ID information, used in the example, is:

Item	PatientID	Type	Hospital ID (URA) ¹	Issuer of PatientID and type
Hospital A	0156734	Internal	1234567	2.16.528.1.1007.3.3. 1234567 .1.1
Hospital B	2223451	Internal	5566778	2.16.528.1.1007.3.3. 5566778 .1.1
National ID	01820345	BSN	--	2.16.840.1.113883.2.4.6.3

265

266 The process flow is depicted in the sequence diagram below. Note that for completeness a cross
267 domain index is included, *e.g.* an XDS repository. For the use of the different patient ID's and the
268 filling of the DICOM tags this is not essential, as is clear from the diagram. When a Dicom study is
269 sent directly from hospital A to hospital B, the patient ID numbering scheme will remain the same.

¹ URA is a unique number identifying a healthcare provider organization (Uzi Register Abonnummer)



270

271

Figure 1: Procesflow relevant for the patient ID change use case

272

273 The content of the relevant Dicom tags in the consequent process steps according to the proposed solution is as indicated in the table below.
 274
 275

Tag/Step	Create Study ²	Prepare for export	Import Study
0010,0020	0156734	01820345	2223451
0010,0021 ³	2.16.528.1.1007.3.3. 1234567 .1.1	2.16.840.1.113883.2.4.6.3	2.16.528.1.1007.3.3. 5566778 .1.1
0010,1000 ⁴	01820345^2.16.840.1.113883.2.4.6.3, 0156734^2.16.528.1.1007.3.3. 1234567 .1.1	01820345^2.16.840.1.113883.2.4.6.3, 0156734^2.16.528.1.1007.3.3. 1234567 .1.1	01820345^2.16.840.1.113883.2.4.6.3, 0156734^2.16.528.1.1007.3.3. 1234567 .1.1, 2223451^2.16.528.1.1007.3.3. 5566778 .1.1
0010,1002			
>0010,0020	01820345	01820345	01820345
>0010,0021	2.16.840.1.113883.2.4.6.3	2.16.840.1.113883.2.4.6.3	2.16.840.1.113883.2.4.6.3
>0010,0020	0156734	0156734	0156734
>0010,0021	2.16.528.1.1007.3.3. 1234567 .1.1	2.16.528.1.1007.3.3. 1234567 .1.1	2.16.528.1.1007.3.3. 1234567 .1.1
>0010,0020			2223451
>0010,0021			2.16.528.1.1007.3.3. 5566778 .1.1
>0010,0020			
>0010,0021			
>0010,0020			
>0010,0021			

276
 277

² If the internal PACS does not support the use of tag (0010,1002) at creation time yet, the initial filling of this tag may be postponed to the 'Prepare for export' step. Once filled the tag may not be cleared.

³ For explanation of the meaning of the OID's, see appendix A

⁴ The use of tag (0010,100) is optional: an organization may choose to fill the tag with information from (0010,1002) at import

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280 7. Combining use cases and solutions

281

282 From the use cases described in ref nn a small number of atomic use cases emerge, which coincide
283 with the major moments of information exchange mentioned in the solutions paper, i.e.:

284 1. *Importing of Dicom objects*

285 With regard to the use of BSN there is no difference whether the imported object's origin is a
286 CD/DVD, a retrieval from a remote repository or the result of a direct data exchange.

287 2. *Exporting of Dicom objects for external use*

288 Again, whether the destination is a CD/DVD, a remote repository, regional or hospital owned,
289 or even a printer, the atomic use case remains unchanged.

290 3. *Creating Dicom objects*

291 4. *Querying for Dicom objects*

292

293 These four use cases come in two favours:

294 a. The hospital uses its own internal patient ID (HISid) as primary (or only) ID.

295 b. The hospital uses the national Patient ID (BSN) as primary (or only) ID.

296

297 In total this yields eight situations where the use of BSN should be determined.

298

299 Though XDS-i and Dicom communication are closely intertwined, registering a Dicom object with a
300 external XDS-I registry is not included as an use case, since the registering itself does not use Dicom
301 objects or Dicom communication. However it may be clear that in the Netherlands (by law) BSN has
302 to be used as patientID in the registering process.

303

304 In the description of the atomic use cases a number of assumptions are made:

305 • In the case of importing, the main patient ID of the Dicom objects to be imported is the BSN
306 (since this is required by law)

307 • The destination of exported Dicom objects is always cross-enterprise. So exporting from one
308 internal system to another internal system is not considered.

309 • The hospital has some kind of service in place to relate an internal HIS patientID to a
310 validated BSN and vice versa.

311 • To reduce the complexity of the illustrations only the main tags are shown. Both in the main
312 header section as in the (0010,1002) sequence the patient ID (0010, 0020) must be
313 accompanied by the issuer tag (0010,0021).

314

315 In the next section the atomic use cases are depicted in detail, showing transitions in patientID's and
316 the required actions to achieve this. For every real live situation it is easy to evaluate what is needed
317 and whether this feasible, *e.g.* if one would want to export Dicom study directly from a modality, the
318 modality must be able to acquire the BSN related to the HISid and must be able to write the relevant
319 Dicom tags.

320

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325 **7.1 ATOMIC USE CASES**

326 (Gray items MAY be present, black item MUST be present)

327 **1. IMPORTING DICOM OBJECTS FROM REGIONAL REPOSITORY, POINT TO POINT COMMUNICATION OR**
 328 **CD/DVD**

329

Dicom object to be imported originating from Hospital A

*Imported Dicom object in Hospital B
 HIS-id B is leading id*

330

Tag	Content
0010,0020	BSN
0010,1002	HIS-id A, BSN
Image data	



Tag	Content
0010,0020	HIS-id B
0010,1002	HIS-id A, BSN, HIS-id B
Image data	

- Required actions:**
1. Match BSN – HIS-id B
 2. (Create new patient)¹
 3. Read/write both Dicom tags

331

332

333

334

Dicom object to be imported, originating from Hospital A

*Imported Dicom object in Hospital B
 BSN is leading id*

335

Tag	Content
0010,0020	BSN
0010,1002	HISidA, BSN
Image data	



Tag	Content
0010,0020	BSN
0010,1002	HISidA, BSN
Image data	

- Required actions:**
1. (Create new patient)¹
 2. Read/write both Dicom tags

336

337

338

339 **2. EXPORTING DICOM OBJECTS TO REGIONAL REPOSITORY, POINT TO POINT COMMUNICATION, PRINTER OR**
 340 **CD/DVD FOR EXTERNAL USE**

341

Exported Dicom object

*Dicom object to be exported from Hospital B
 HIS-id B is leading id*

342

Tag	Content
0010,0020	BSN
0010,1002	HIS-id X, BSN, HIS-id B
Image data	



Tag	Content
0010,0020	HIS-id B
0010,1002	HIS-id X, BSN, HIS-id B
Image data	

- Required actions:**
1. If tag 1002 is not filled: Match HIS-id B –BSN
 2. Read/write both Dicom tags

343

344

345

Exported Dicom object

*Dicom object to be exported from Hospital B
 BSN is leading id*

346

Tag	Content
0010,0020	BSN
0010,1002	HIS-id X, BSN
Image data	



Tag	Content
0010,0020	BSN
0010,1002	HIS-id X, BSN
Image data	

- Required actions:**
1. Read/write both Dicom tags

347

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349 ¹ If the imported Dicom object belongs to a patient that is not known in Hospital B

350

351 **3. CREATING DICOM OBJECTS WITH BOTH TAGS FILLED**

Dicom Worklist object

*New Dicom object
 HIS-id is leading id*

Tag	Content
0010,0020	HIS-id
0010,1002	HIS-id, BSN



Tag	Content
0010,0020	HIS-id
0010,1002	HIS-id, BSN
Image data	

- Required actions:**
1. If Dicom worklist is not available: Match HIS-id –BSN
 2. Read/write both Dicom tags

352

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Dicom Worklist object

*Hospital B
 BSN is leading id*

Tag	Content
0010,0020	BSN
0010,1002	BSN



Tag	Content
0010,0020	BSN
0010,1002	BSN
Image data	

- Required actions:**
1. Read/write both Dicom tags

357

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362 **4. QUERYING DICOM OBJECTS IN SYSTEMS USING HIS ID AND BSN**

*Queried system:
 BSN is leading
 (e.g. XDS registry)*

*Querying system
 HIS-id is leading*

Tag	Content
0010,0020	BSN
0010,1002	HIS-id X, BSN



Query parameter	
Tag	Content
0010,0020	HIS-id

- Required actions:**
1. Match HIS-id – BSN

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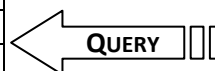
366

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*Queried system:
 HIS-id is leading
 (only intra-hospital e.g.
 Pacs)*

*Querying system
 BSN is leading*

Tag	Content
0010,0020	HIS-id
0010,1002	HIS-id X, BSN



Query parameter	
Tag	Content
0010,0020	BSN

- Required actions:**
1. Match BSN- HIS-id

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376 **7.2 CONCLUSIONS ON FEASIBILITY**

377 From the atomic use cases some conclusions can be drawn towards the feasibility of the proposed
378 implementation of the use of the BSN in Dicom objects.

- 379
- 380 • To make cross domain communication of Dicom object possible, an organization using a
381 internal patient id should have some kind of service available to translate a internal id into a
validated BSN vice versa.
 - 382 • To comply with the law it is sufficient, that at the point of import or export the acting
383 application or device has access to this service and is able to read and write the tag involved.
384 This may reduce the number of in- and export facilities, *e.g.* exporting an image directly from
385 a CT scanner, with no access to the internal BSN service or not able to write tag 0010,1002 is
386 not possible.
387 This, in turn, may require changes in the logistic process. When implementing this
388 recommendation, organizations should make a impact analysis to reveal possible caveats.
 - 389 • To fully take advantage of the multiple patient-id feature for internal use of both internal id
390 and BSN, tag 0010,1002 should be filled at the object creation time. This requires that all
391 devices in the process support tag 0010,1002 and that in the radiology order management
392 system is able to fill the Dicom worklist objects with both patient-id's

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395 **8. Recommendation**

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BSN in Dicom Objects

401

Recommendation for use

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403 In a healthcare environment with multiple patient-id's incl. the national patient-id (BSN) tag
404 0010,0020 must contain the primary patient-id defined for the environment where the
405 object resides. Tag 0010,0021 must contain the information of issuer of that patient-id.
406 This means that outside the boundaries of a healthcare organization tag 0010,0020 must
407 contain the BSN and tag 0010,0021 must contain the OID 2.16.840.1.113883.2.4.6.3
408 identifying this id as a BSN.

409 To retain the link between BSN and internal patient-id's on a permanent basis, sequence tag
410 0010,1002 must act as a vault to store BSN and all used internal patient-id's.

411 When crossing the boundary of an healthcare organization the content of tag 0010,0020 and
412 0010,0021 is swapped in and out of the vault to reflect the prevailing primary patient-id.

413

414

415 **9. References:**

- 416 1. HL7 v2.4 NL Implementation Guide , part 3 patient administration.
417 2. HL7v3 NL Implementation Guide Data Types and CMETs NL
418 3. Dicom standard release 2008 part 3.3, 3.6
419 4. Dicom change proposal CP-800, Add Issuers of Identifiers Harmonized with HL7

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423 **Annex A: Information on HL7v3 OID's (ref. 4)**

424 (translated from ref. 4)

425 Internal in the hospital:

426 Either

427

OID segment	Meaning
2.16.840.1.113883.2.4	HL7 Nederland
.6.1	AGB-Z
.6010756	AGB-Z number of the hospital issuing the number
.1	HIS within the hospital
.1	PatientId. als identification system in the HIS

428

429 Or:

OID segment	Meaning
2.16.528.1.1007	CIBG
.3	UZI
.3	URA
.1234567	URA of the hospital issuing the number
.1	HIS within the hospital
.1	PatientId. als identification system in the HIS

430

431 National patient ID

OID segment	Meaning
2.16.840.1.113883.2.4	HL7 Nederland
.6.3	BSN

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DUTCH NATIONAL PATIENT ID (BSN) & DICOM OBJECTS

ANNEX B: use cases



Use Cases DICOM and BSN
2009-11-16
UseCases DICOM_BSN v0.8.doc

Hans Mekenkamp, MedicalPHIT
Brian Sanderse, Amphia Ziekenhuis

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493 **Introduction**

494
495 This document describes a number of use cases that deal with the relationship between the
496 BSN and DICOM objects. DICOM objects in a broad sense and not only to radiology
497 departments.

498
499 The starting point is that the BSN must be present as the unique patient identity outside the
500 medical centre. The patient has within the medical centre his or her own unique patient
501 identifier issued by the hospital or careprovider.

502
503 The starting point is that the patient have a BSN as a national identification. All the medical
504 centres must communicate together with BSN. Internally they use their own patient identifier
505 for communication about the patient.

506
507 All use cases are grouped around existing IHE profiles which are available at the IHE
508 websites as www.ihe-nl.org and <http://wiki.ihe.net>.

509 **Remarks upfront**

510
511 In all described use cases the question is always:

- 512
513 1. What is the unique patient identifier used. In most cases either HIS number or BSN
514 2. What is the unique study identifier. The original from hospital A or the new number at
515 import in hospital B.
516 3. How do we display surnames in Dicom header. Especially women do have different
517 (semi)official names.
518 4. Which studynaming do we use and do we change original studyname into new
519 studyname. E.g. CT hersenen into CT brain.
520 5. Should BSN be validated on import in importing hospital?
521 6. In what format will report be distributed? HL7 v3 CDA? Currently radiology reports are
522 txt files, HL7 v2 ORU messages or PDF. Sometime Dicom SR objects.

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Version history

Version	Datue	Description	Author
0.6		Initial version	HM, BS
0.7		Second version	BS
0.8	19-8-2009	Several changes	HM

528

529 **Use Cases**

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531

1. (SWF) Scheduled Workflow within the hospital department

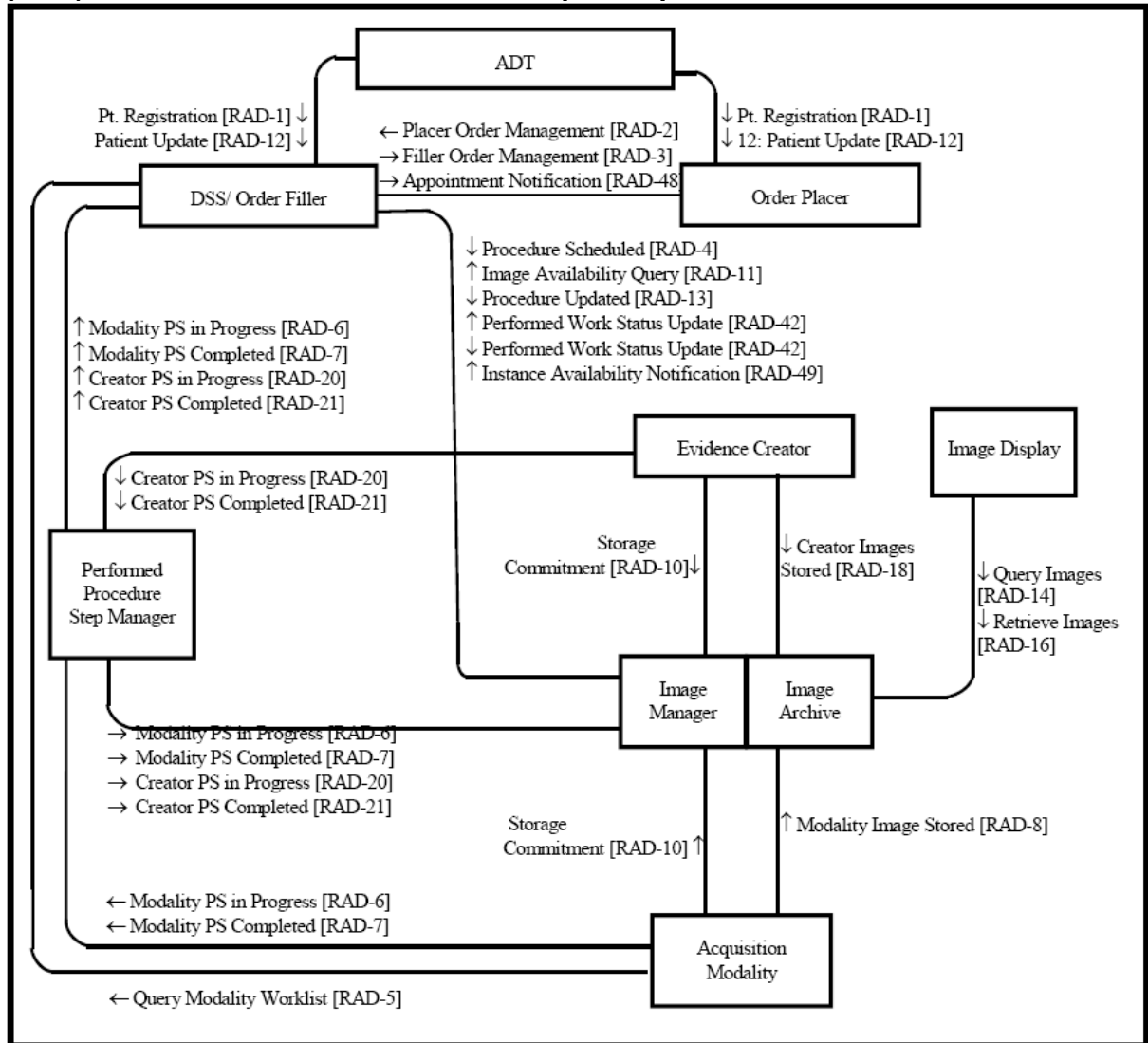


Figure 3.1-1. Scheduled Workflow Diagram

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- 1.1. (SWF) The medical images will be printed on a DICOM printer from a modality for extramural communication. From the modality the study is printed to a DICOM printer, the patient gets the prints and take the study outside the hospital. In this case the BSN must be printed.
- 1.2. (SWF) The medical images will be printed on a DICOM printer from a workstation for extramural communication. From the workstation the study is printed to a DICOM printer, the patient gets the prints and take the study outside the hospital. In this case the BSN must be printed.
- 1.3. (SWF) The medical images will be printed on a DICOM printer from a modality for internally communication. Normally only for emergency if the image archive is

- 547 broken. On the printed study the internally identifier must be used.
548
549 1.4. (SWF) Hospitals have a central archive for DICOM object. If the archived images are
550 only use four internally patients the internally identifier must be used. If the archive is
551 shared between different hospitals than the BSN is leading as a patient identifier.
552
553 1.5. (SWF) Within hospital A both BSN and HIS identifier is available for the patient to be
554 used to query with the EMR. HIS-A number is leading identifier. Within RIS/PACS
555 HAS-A number is leading (in tag 0010-0020).
556 1.5.1. Which number ZIS-A of BSN is used in HL7 ADT message
557 1.5.2. Which number ZIS-A of BSN is used in HL7 in ORM/order
558 1.5.3. Which number ZIS-A of BSN is used within RIS?
559 1.5.4. Which number ZIS-A of BSN is used in DMWL?
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563 2. 2. (RWF) Reporting Workflow

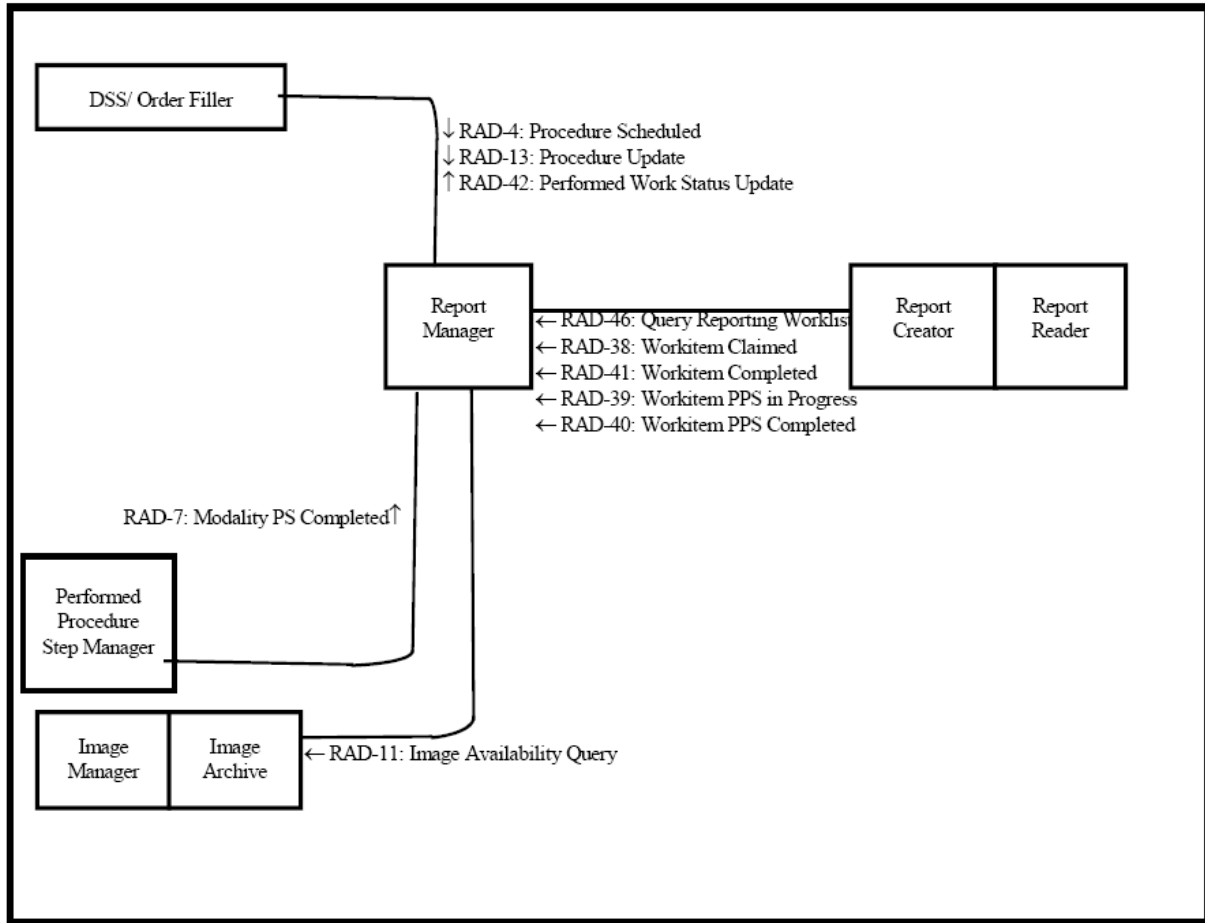


Figure 13.1-1. Reporting Workflow Actor Diagram

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2.1. (RWF) A radiologist reads images of a patient scanned at their facility (either as an in-patient or out-patient) in order to generate a report with findings. The radiologist uses the internal patient identifier.

571 3. (ARI) Access to Radiology Information

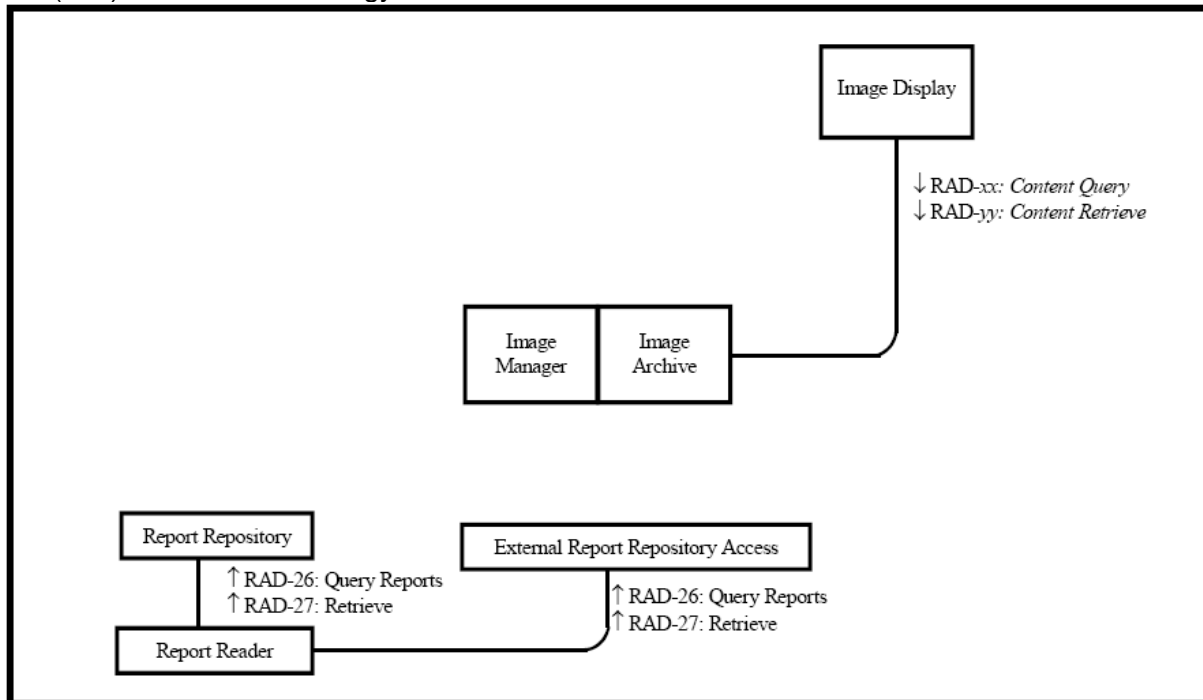


Figure 7.1-1. Access to Radiology Information Diagram

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- 3.1. (ARI) The patient has access to his personal electronic medical record in the hospital through a webportal. The patient can also retrieve personal DICOM object. The patient identifier is the BSN.
- 3.2. (ARI) Scenario 3: Within hospital A both BSN and HIS identifier is available for the patient to be used to query with the EMR. HIS-A number is leading identifier. Within PACS HAS-A number is leading (in tag 0010-0020).
 - 3.2.1. Can you find patient within EMR on BSN and will the PACS-webapplication which is integrated (URL call) show the images (as the PACS uses ZIS-A number)?

585 **4. (XDS-I) Cross Enterprise Document Sharing for Imaging**

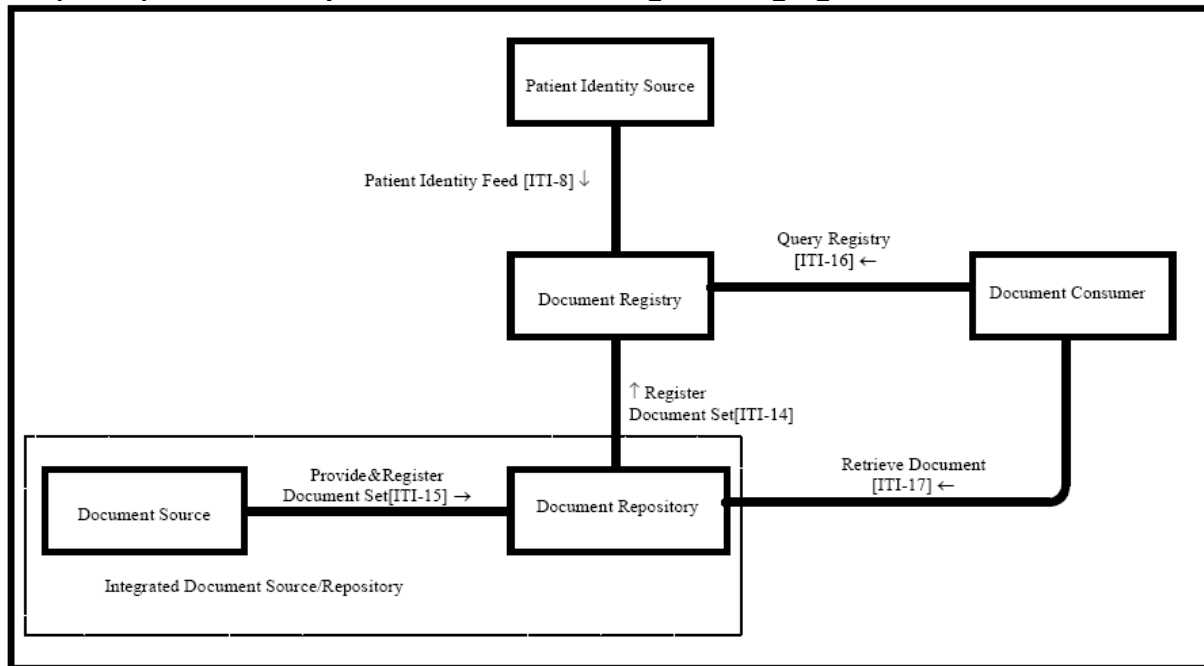


Figure 10.1-1 Cross-Enterprise Document Sharing Diagram

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Course of Treatment Consult

4.1. (XDS-I) An emergency physician orders an imaging examination for a patient at his hospital. After reviewing the preliminary report the ER physician decides to consult a surgical specialist at the regional hospital for advice on a course of action. For this, the surgical specialist accesses the images and preliminary report and reviews them in order to propose, on the phone, a course of action for the patient. The patient identifier is the BSN for the consulting specialist.

Clinical Consult

4.2. (XDS-I) A general practitioner performs a routine imaging referral, reviews the imaging report and chooses to send the patient for evaluation by a specialist (e.g. an oncologist). The specialist needs access to both the imaging report and full image set. In some cases the specialist may wish to do specialized processing/viewing of the images. The BSN is the patient identifier for the consulting specialist.

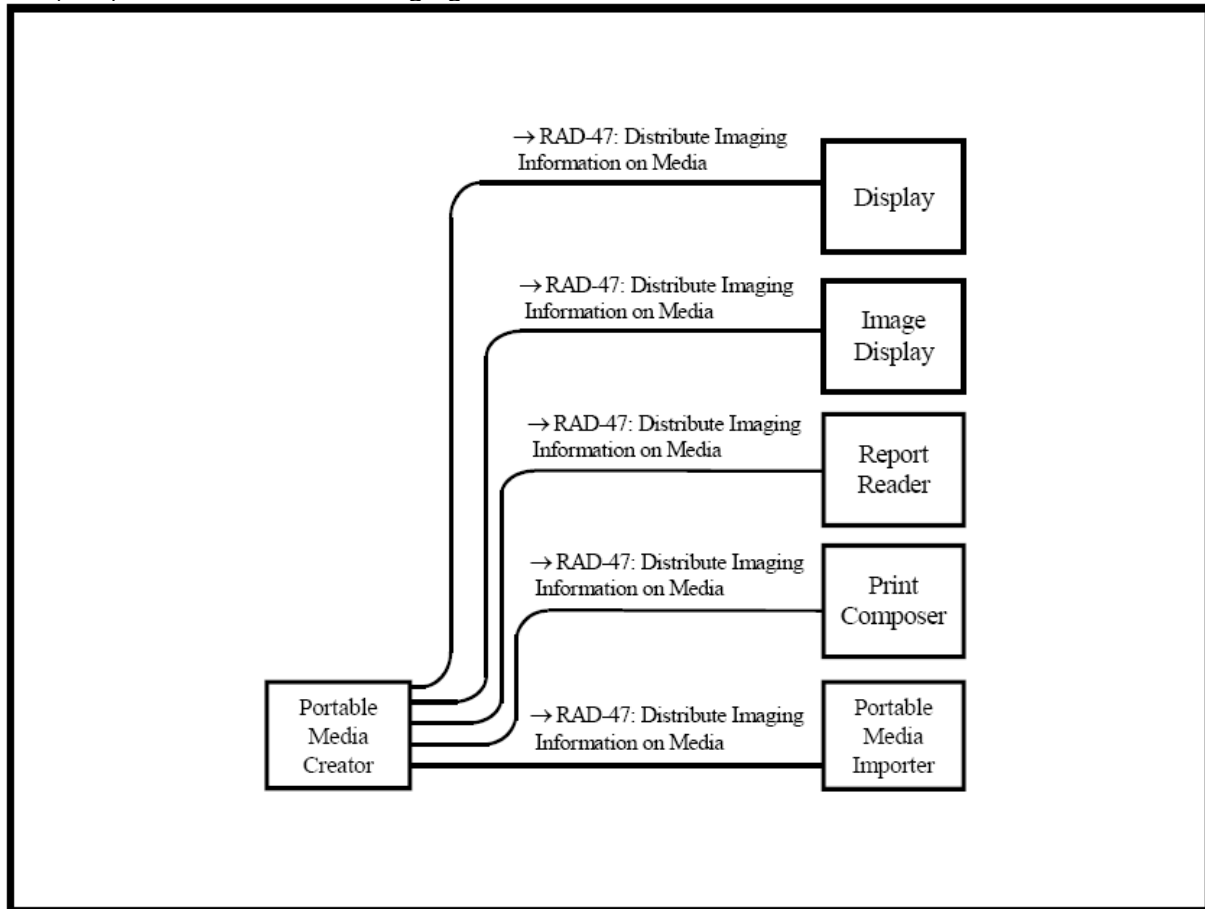
General imaging record access

4.3. (XDS-I) A patient relocates or decides to change her physician. The new physician needs to retrieve relevant information from the patient record, review its content, including recent labs and imaging studies. A similar situation occurs when a patient is admitted for an emergency and timely access to the patient's past information is required, including prior imaging studies. The BSN is the patient identifier for the new physician.

4.4. (XDS-I) Post/send the DICOM objects available at the hospital to the central registry (LSP?) (eRadiologie). The BSN must be the patient identifier.

- 614 4.5. (XDS-I) The patient gets access to his personal electronically medical record through
615 the LSP webportal. DICOM objects are also available. The patient identifier is the
616 BSN.
617
- 618 4.6. (XDS-I) Specialist in Hospital A with HIS-A number as leading identifier searches
619 within EMR with integrated XDS registry viewer to a list with several studies
620 performed within several Amsterdam hospitals. Within EMR the searchcriteria is HIS-
621 A numer, however the unique search criteria within registry is BSN
622 4.6.1. Specialist selects a study with BSN in Dicom header (0010-0020). Study is
623 imported into HIS-B PACS.
624 4.6.2. Specialist wants to query and retrieve a certain study from another hospital
625 into his own PACS with correct new ZIS number and BSN.
626 4.6.3. Question: what if patient does not have ZIS number because its a new patient
627 4.6.4. Question: what if patient does have ZIS number because its a new patient
628
- 629 4.7. (XDS-I) BSN number is NOT leading patient identifier in the hospital within the
630 PACS application. So studies will have patient id HIS-A. Studies will be posted at the
631 XDS registry, so BSN number need to the unique identifier within Dicom header.
632 Hospital B imports images into their own PACS, but as this hospital has its own HIS-
633 B number as leading identifier the application should swap the BSN number into HIS-
634 B number in the Dicom header.
635
- 636 4.8. Same case as above but in this case BSN is leading ID in both hospital A and B. In
637 this case a ID swap is not needed.
638
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642 5. (PDI) Portable Data for Imaging



643 **Figure 15.1-1. Portable Data for Imaging Diagram**

644 **Patient/Referring Physician Viewing**

645 5.1. (PDI) Diagnostic and therapeutic imaging data, such as images and reports, is
646 received on media potentially serving multiple use cases. The patient or the referring
647 physician can view the data, either with a viewer application residing on the same
648 media or using a web browser. This data is not necessarily intended as a basis for
649 diagnostic or therapeutic processes, and may just be informative data. For security
650 and privacy reasons, media given to a patient would not contain data of other
651 patients. The patient identifier is the BSN.
652

653 **Healthcare Enterprise Interchange**

654 5.2. (PDI) One or more patients' data, such as images, reports or complete studies, is
655 received on media to enable a diagnostic or therapeutic care process. Media data
656 are imported at a different site, generally for the purpose of a "second read import" or
657 "reference import". The patient identifier is the BSN on the CD/DVD media but with
658 the import of the media is on the internally patient identifier.
659

660 5.3. (PDI) Media data is used to enable diagnostic or therapeutic processes in
661 environments without a reliable network connection. The volume of data can be very
662 large and may contain image data, post-processing results and reports. In the
663 operating room, the surgical staff receives the media and reads its contents using
664 advanced viewing capabilities, which may include manipulating or processing
665 images. The patient identifier is the BSN.
666

- 667
668 5.4. (PDI) Burning CD or DVD with DICOM objects from a DICOM archive for another
669 hospital. The patient identifier is the BSN.
670
671 5.5. (PDI) Burning CD or DVD with DICOM objects from a modality for another hospital.
672 The patient identifier is the BSN.
673
674 5.6. (PDI) Burning CD or DVD with DICOM objects from a DICOM archive. The CD or
675 DVD is uploaded in a separate application within the hospital for an additional
676 operation on the DICOM objects. The additional information is normally for another
677 supplier to produced medical implants as an example. The patient identifier is the
678 BSN.
679
680 5.7. (PDI) Burning CD or DVD with DICOM objects from a modality. The CD or DVD is
681 uploaded in a separate application within the hospital for an additional operation on
682 the DICOM objects. The additional information is normally for another supplier to
683 produced medical implants as an example. The patient identifier is the BSN.
684

685 **Routine imaging referral**

- 686 5.8. (XDS-I)(PDI) A referring physician sends a patient for an exam at an imaging facility.
687 The physician needs prompt access to the resulting imaging report and often to key
688 images or the entire study. The images also can be useful for explaining the situation
689 and treatment options to the patient. The patient identifier is the BSN.
690
691

692 6. (IRWF) Import Reconciliation Workflow

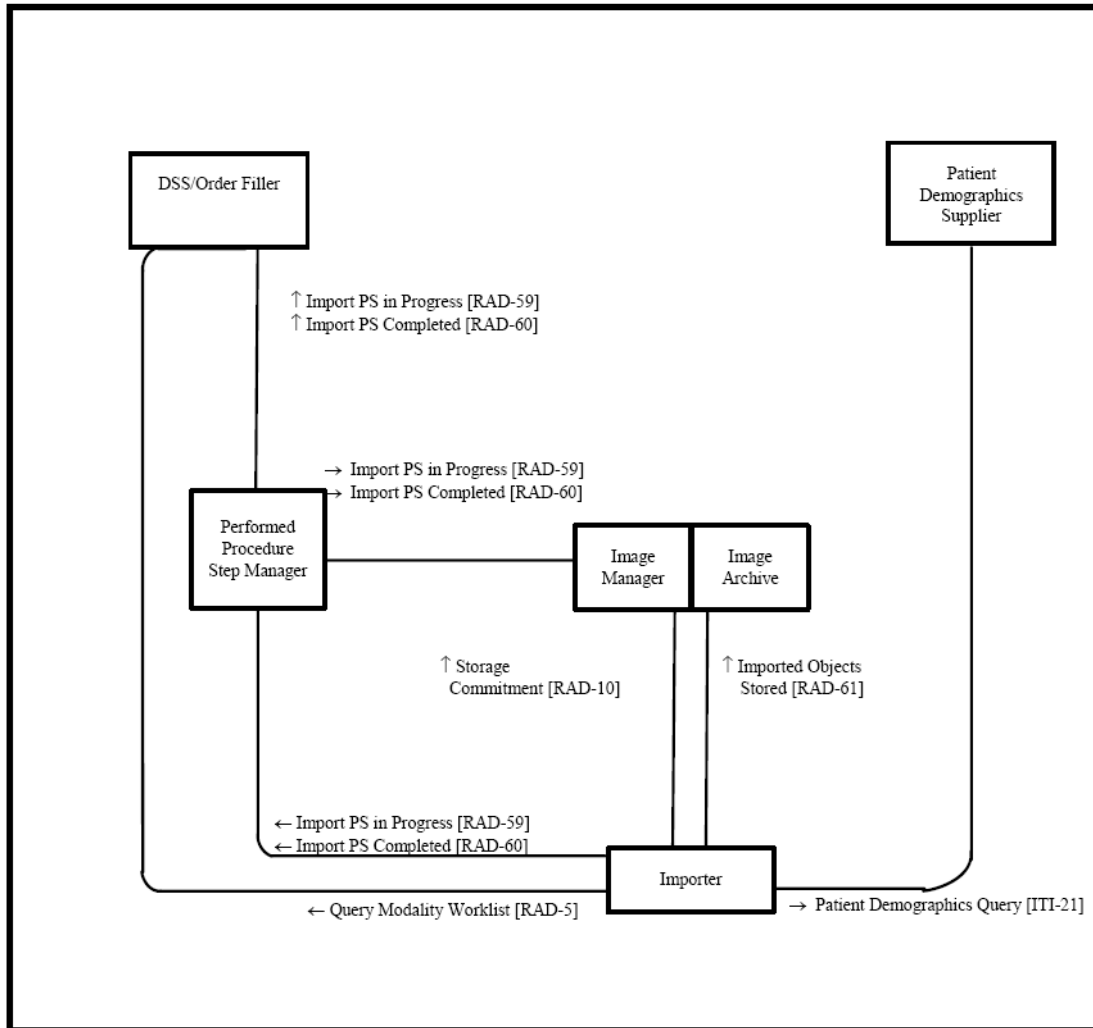


Figure 21.1-1. Import Reconciliation Workflow Diagram

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694

Second Read Import

695 6.1. (IRWF) Media data is imported to the Image Manager/Archive to be read/over read.
696 In order to avoid data conflicts, key patient/study attributes may need to be
697 reconciled with existing local data. Images and related presentation states can be
698 sent to a Print Composer to be printed. The patient identifier is the BSN on the
699 media. The reconciliation of the patient identifier goes from the BSN to the internally
700 identifier.

701
702

Reference Import

703 6.2. (IRWF) Media data is imported to the Image Manager/Archive and/or Report
704 Repository to become part of the patient history. It may be used as “relevant prior”
705 data for future reads. In order to avoid data conflicts, key patient/study attributes may
706 need to be reconciled with existing local data. The patient identifier is the BSN on the
707 media. The reconciliation of the patient identifier goes from the BSN to the internally
708 identifier.

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710

711 6.3. (IRWF) (XDS-I) The DICOM objects will be imported from the XDS registry in the
DICOM archive of a hospital. It is like a unscheduled case of IRWF. The patient

712 identifier has to be the internally patient ID. Normally a XDS registry shout have a
713 PIX feed of the hospital.
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