

ITH icoserve technology for healthcare GmbH

HL7 2.3.1

**CONFORMANCE STATEMENT
icoserve AIM**

**ITH icoserve technology for healthcare GmbH
Innrain 98 | 6020 Innsbruck | Austria
+43 508 648 4100 | www.ith-icoserve.com**

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1 General

1.1 Revision History

Description	Version	Date	Author
tiny corrections (spelling mistakes, restructuring, reformulations, etc.)	3.0.1.1	24.03.2011	Martin Korp
translation to English	3.0.1.0	28.02.2011	Martin Korp
changed visit-behavior of ORU Inbound	3.0.0.1	02.02.2011	Michael Theurl
Habicht version number updated	3.0.0.0	27.12.2010	Michael Theurl
spelling mistakes fixed	2.0.1.1	22.12.2010	Michael Theurl
major revision due to new release Habicht	2.0.1.0	13.12.2010	Michael Theurl

1.2 Abbreviations and Notions

Abbreviation	Description
HL7	Health Level 7
MLLP	Minimal Lower Layer Protocol
AIM	icoserve Advanced Image Management
HL7 element	Refers either to a segment, field, component, subcomponent or a repetition of components.
HL7 message	It consists of a header (MSH) and a data segment. Start and stop characters do not belong to the message since they are part of the used (lower-layer) communication protocol.
message event	Is used to subcategorize message types. The message event is defined in the field MSH 9.2. It is a 3-digit code.
reference pointer	A string which uniquely refers to a document in AIM.
socket	A computer interface which can be addressed by the name (IP address) of the corresponding host and a port number.
start and stop characters	Are used to indicate the start and end point of a HL7 data stream (HL7 message) in case of a socket connection. If the interface uses files to exchange data, the start and stop characters are not needed because the start and end of a message is uniquely defined by the start and end of the transmitted file (in case that each file contains exactly one message).

1.3 References

Document	Version	Date	Author/ Organization
HL7 version 2.3.1 Implementation Guide	2.3.1	November 2000	Health Level Seven, Inc.
IHE Radiology Technical Framework	10.0 (volume 4)	February 2011	IHE International

2 Introduction

This document represents the basis of the HL7 interface implementation in AIM. It describes the layout of the HL7 message types supported by AIM, how they are processed and handled in AIM, as well as the process-workflows in which they occur. In the remainder of the document it is assumed that R (O) is used to indicate that a field or segment is required (optional). Fields and segments which are not mentioned, are ignored and hence not evaluated by AIM. Furthermore, fields which contain subfields that are not specified in full detail are assumed to be evaluated by concatenating the values of all subfields.

2.1 HL7 Version

Version	Supported
2.2	
2.3	
2.3.1	x
2.4	
2.5	
2.5.1	
2.6	

2.2 HL7 Communication

2.2.1 Communication Channel

To communicate with third-party systems, AIM uses TCP/IP sockets based on the message transport protocol MLLP. Thereby, AIM can act either as a transmitter (the connection is established by AIM) or receiver (the connection is established by a third-party system). To exchange messages a permanent connection is used where AIM expects an acknowledgment for each (successfully) transmitted message.

Example (of an acknowledgement):

```
MSH|^~\&|<SendingApplication>|<SendingFacility>|ICO|ICO|20040730142751||ACK|1|P|2.3|
MSA|AA|1|
```

To identify the start and end of a message, the start character 0x0B and the stop character 0x1C 0x0D is used. As character encoding ISO 8859-1 is employed.

2.2.2 Message Syntax

The syntax of messages as well as the escaping of characters follows the guidelines of the HL7 Standard, version 2.3.1.

Delimiter	Character
Segment Terminator	0x0D
Field Separator	
Component Separator	^
Subcomponent Separator	&
Repetition Separator	~
Escape Character	\

2.3 Stable HL7 Segments

In the following the layout of the PID and PV1 segment is described. The structure of these two segments is for all message types identical.

2.3.1 PID Segment (Patient Identification)

Field	Description	Content	Remark	R/O	Length
3	ID List			R	64
5.1	Family Name			R	100
5.2	Given Name				100
5.3	Middle Name				64
5.4	Name Suffix	e.g. JR, III			64
5.5	Name Prefix	e.g. DR			64
5.6	Degree	e.g. MD	added to the content of PID 5.4 (as delimiter a single space is used)		
6	Mother's Maiden Name			O	100
7	Date/Time of Birth			O	11
8	Sex	see table below		R	1
10	Race	e.g. 1002-5		O	6
11.1	Street			O	350
11.3	City				
11.5	Zip Code				
11.6	Country				
13	Phone Number (Home)			O	50
16	Marital Status	see table below		O	1
17	Religion	see table below		O	3
18	Account Number			O	250
19	SSN			O	16
23	Birth Place			O	350
24	Multiple Birth Indicator	see table below		O	1
26	Citizenship	e.g. A		O	50
27	Business/Employment			O	100

Sex (PID8)	Description
F	female
M	male
O	other
U	unknown

Marital Status (PID16)	Description
A	separated
D	divorced
M	married
S	single
W	widowed
X	other

Religion (PID17)	Description
BU	Buddhist
EV	Protestant
IS	Islamic
OB	nonreligious
OG	Greek Orthodox
OS	Serbian Orthodox
RK	Roman Catholic
SO	other
UB	unknown
ZJ	Jehovah's Witness

Multiple Birth Indicator (PID24)	Description
N	no
Y	yes

Example:

PID|||9012105684||Einstein^Albert||19300505|M|||Franz-Plattnerstr.
 B^^Zir1^^6170^A||
 (0512)815471|||RK||4629050530|||0||A

99

2.3.2 PV1 Segment (Patient Visit Segment)

Field	Description	Content	Remark	R/O	Length
2	Patient Class	see table below		R	2
3	Assigned Patient Location			O	80
6	Prior Patient Location			O	80
7	Attending Doctor			O	150
8	Referring Doctor			O	150
9	Consulting Doctor		first doctor should be the family doctor	O	250
10	Hospital Service			O	3
11	Temporary Location			O	80
15	Ambulatory Status			O	2
16	VIP Indicator	see table below		O	2
17	Admitting Doctor			O	150
19	Visit ID			R	32
36	Discharge Disposition	see table below		O	3
37	Discharged to Location			O	25
44	Admit Date/Time		used format: YYYYM-MDDHH24MISS	O	11
45	Discharge Date/Time		used format: YYYYM-MDDHH24MISS	O	11
50	Alternate Visit ID			O	20

R ... required

O ... optional

Patient Class (PV1 2)	Description
A	outpatient
B	obstetrics
E	emergency
I	outpatient
O	inpatient
P	admit
R	recurring patient
S	inpatient

VIP Indicator (PV1 16)	Description
A	general
S	privileged
Z	single occupancy

Discharged (PV1 36)	Disposition	Description
A		internal transfer from a semi-inpatient section (only psychiatry), a rehabilitation section, or a exclusive maintenance area to a general care unit (including intensive care units)
E		discharged to home
H		internal transfer to a semi-inpatient section (only psychiatry)
L		internment
P		internal transfer to a exclusive maintenance area
R		left against medical advice by signing a self-discharge form
S		expired (died)
U		leave of absence
V		discharged/transferred to another hospital
W		left without informing doctors
X		discharged/transferred to a nursing facility

Example:

```
PV1||A|RAXC||15412597||012530^NC Ambulance||RAGC||||104612^  
DR. UNKNOWN|||||||00||||200302151038|
```

3 Incoming ADT Messages

3.1 General Information

The following part of the document describes the transmission of ADT messages from a hospital information system to AIM. In general, ADT messages are used by hospital information systems to transmit patient or visit information (e.g. that a patient has been admitted, discharged, merged or that patient or visit information have changed) to registered applications. In case that AIM receive an ADT message, the information of the message are extracted to manipulate the stored data accordingly.

3.2 ADT Message Structure

Structure
MSH
EVN
PID
[PV1]
[NK1]
[GT1]
[MRG]

3.2.1 MSH Segment (Message Header)

Field	Description	Content	R/O	Length
1	Field Separator		R	1
2	Encoding Characters	^~\&	R	4
9.1	Message Type	ADT	R	6
9.2	Trigger Event	see table below		

R ... required

O ... optional

Trigger Event (MSH 9.2)	Description
A01	ADT/ACK message
A02	ADT/ACK message
A03	ADT/ACK message
A04	ADT/ACK message
A06	ADT/ACK message
A07	ADT/ACK message
A08	ADT/ACK message
A11	ADT/ACK message
A12	ADT/ACK message
A13	ADT/ACK message
A18	ADT/ACK message
A23	ADT/ACK message
A28	ADT/ACK message
A29	ADT/ACK message
A31	ADT/ACK message
A34	ADT/ACK message
A40	ADT/ACK message
A42	ADT/ACK message
A45	ADT/ACK message

Example:

MSH|^~\&|TEST|KIS|ICOSERVE|AIM|20020231113208||ADT^A01|Q12969922T14268470||2.3

3.2.2 EVN Segment (Event Type Segment)

The information provided by this segment are ignored. All important event information are taken from the MSH segment.

3.2.3 MRG Segment (Merge Patient Information)

Field	Description	R/O
1	Prior Patient ID List	R
5	Prior Visit ID	O

Example:

MRG|220126233|||demo_visit01|

3.2.4 NK1 Segment (Next of Kin/Associated Parties)

Field	Description	Content	Remark	R/O	Length
1	Set ID - NK1		is stored but not evaluated	R	100
2	Name			O	250
3	Relationship	see table below		O	4
4	Address			O	350
5	Phone Number			O	50

R ... required

O ... optional

Relationship (NK1 3)	Description
0	other
1	spouse
2	child
3	sibling
4	parent
5	grandparent
6	life partner
7	friend
8	grandchild
9	aunt/uncle
10	self
11	employer

Example:

NK1|1|TEST^INGA|1|MEERSTR. 5^^WATTE^^0312^A|(05224)66666|

3.2.5 GT1 Segment (Guarantor)

Field	Description	Content	R/O	Length
3	Name		R	250
5	Address		O	350
8	Date/Time of Birth	used format: YYYYMMDDHH24MISS	O	11
12	SSN		O	16
16	Employer Name		O	250
17	Employer Address		O	350

R ... required

O ... optional

3.3 Supported ADT Messages

Event	Description	PV1	NK1	GT1	MRG
A01	admit/visit notification (insert patient, insert visit)	R	O	O	-
A02	transfer a patient (update patient, update visit)	R	-	-	-
A03	discharge/end visit (update visit)	R	-	-	-
A04	register a patient (insert patient, insert visit)	R	O	O	-
A06	change an outpatient to an inpatient (update visit); if an MRG segment exists, a new visit is created and merged with the visit stated in the MRG segment	R	O	O	O
A07	change an inpatient to an outpatient (update visit); if an MRG segment exists, a new visit is created and merged with the visit stated in the MRG segment	R	O	O	O
A08	update patient information (update patient, attempt to update visit (the processing of the message is not aborted if the update fails))	R	O	O	-
A11	cancel admit/visit notification (delete visit); cancels A01 and A04 events	R	-	-	-
A12	cancel transfer (update visit); cancels A02 events	R	-	-	-
A13	cancel discharge/end visit (update visit (discharge date is deleted)); cancels A03 events	R	O	O	-
A18	merge patient information (by means of the patient ID)	R	-	-	R
A23	delete a patient record	R	-	-	-
A28	add person information (insert patient)	R	O	O	-
A29	delete person information	R	-	-	-
A31	update person information (update patient)	R	O	O	-
A34	merge patient information - patient ID only (by means of the patient ID); field MRG 1 contains the old patient ID	-	-	-	R
A40	merge patient - internal ID (by means of the patient ID)	O	-	-	R
A42	merge visit - visit number (by means of the visit ID); if necessary, the goal-visit can be created beforehand	O	-	-	R
A45	move visit information - visit number (move visit to another patient, a new visit is not created, the visit ID is not changed); MRG 5 contains the ID of the visit that has to be moved	R	-	-	R

R ... required

O ... optional

4 Incoming ORM Messages

4.1 General Information

Figure 1 shows the components needed to handle orderings as well as work lists without mentioning specific processes.

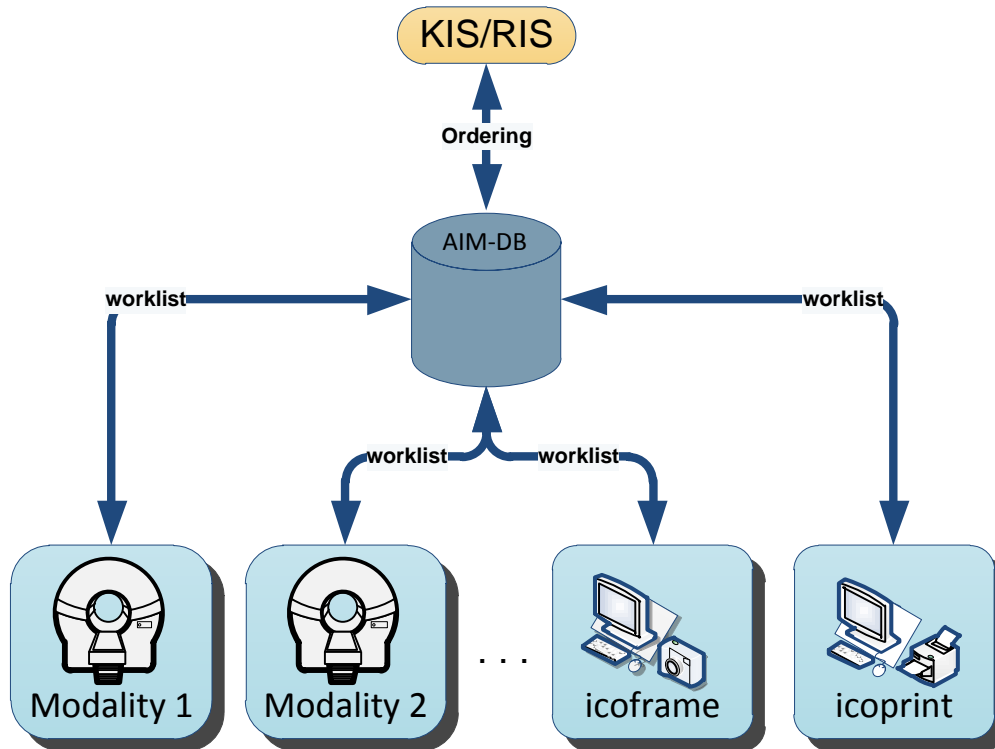


Figure 1: Overview ordering

Figure 2 illustrates the workflow of a single ordering as well as a work list query including all involved processes.

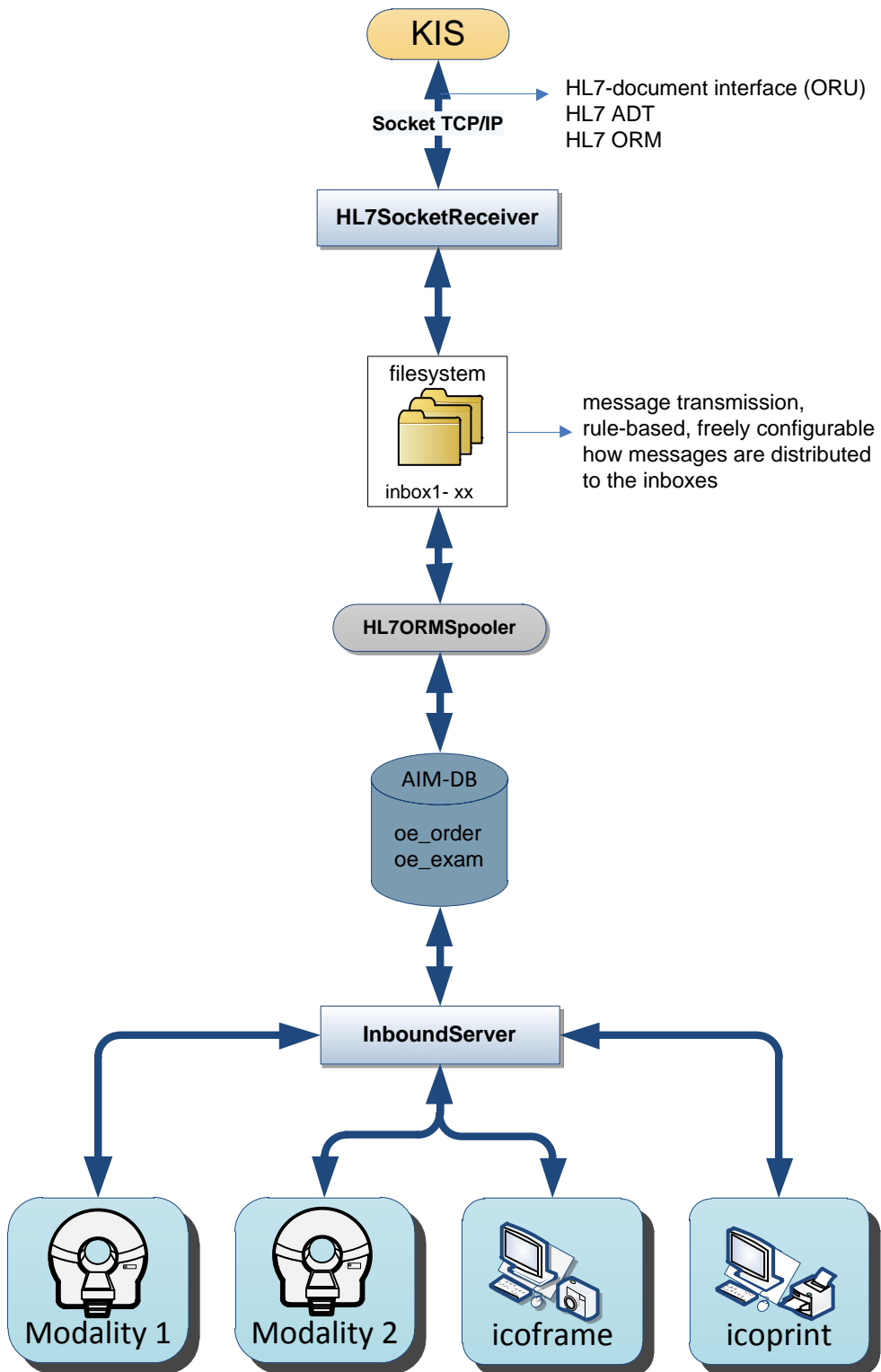


Figure 2: Workflow ordering

Figure 3 illustrates the archiving workflow including all involved processes.

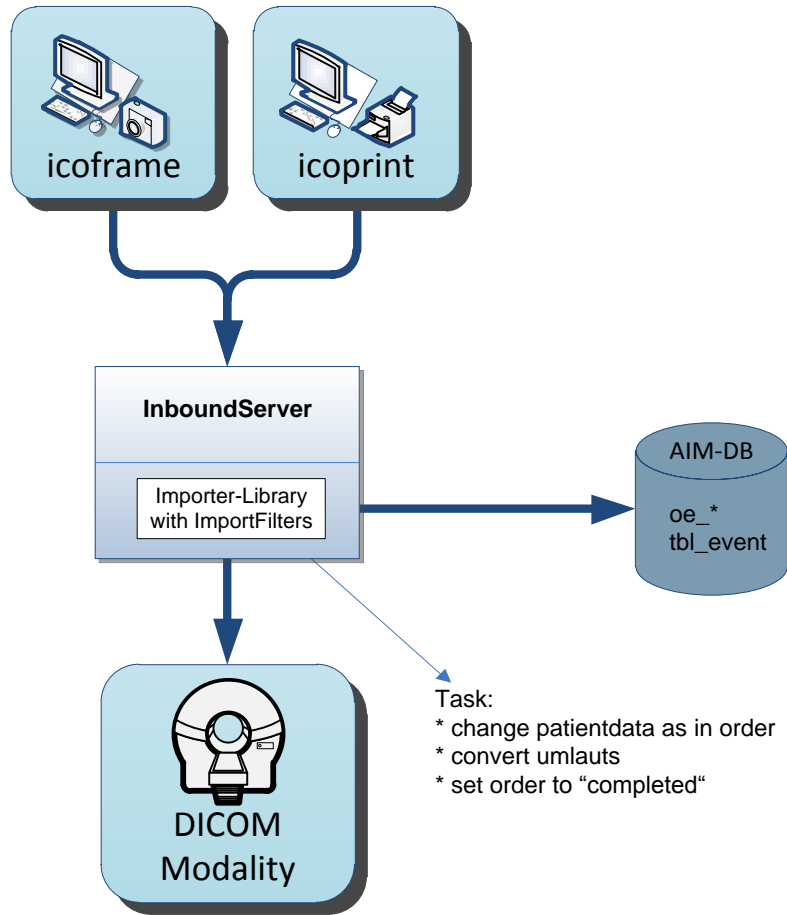


Figure 3: Workflow archiving (studies)

4.2 ORM Message Structure

Each OBR entry corresponds to one work list entry. A HL7 ORM message has the following structure.

Structure
MSH
PID
PV1
{ORC}
{OBR}
{ZDS}

Note that not all HL7 message information are forwarded via DICOM to modalities.

4.2.1 MSH Segment (Message Header)

Field	Description	Content	Comment	R/O	Length
1	Field Separator			R	1
2	Encoding Characters	^^\&		R	4
9.1	Message Type	ORM	particular value for a order message		
9.2	Trigger Event	O01	particular value for a order message	R	6

R ... required

O ... optional

Example:

```
MSH|^~\&|TEST|TESTWARE|ICOSERVE|ICOLINK|20030127085211
||ORM^O01|000020194|P|2.3|
```

4.2.2 ORC Segment (Common Order)

Field	Description	Content	Comment	R/O	Length
1	Order Control	see table below		R	2
2	Placer Order Number		corresponds to the order ID of the ordering application (HIS-ID)	R	128
3	Filler Order Number			O	128
5	Order Status	see table below		O	128
7	Quantity/Timing			O	200
9	Date/Time of Transaction		used format: YYYYMMDDHH24MISS	O	11
10	Entered By			O	255
12	Ordering Provider			O	255
13	Enterer's Location		evaluated by AIM to distinguish between different ORM streams	O	80
14	Call Back Phone Number			O	128
16	Order Control Code Reason			O	2048
17	Entering Organization			O	60
18	Entering Device		responsible AET or AET group	O	255
21	Ordering Facility Name			O	255

R ... required

O ... optional

Order Control (ORC 1)	Description
NW	new order (order status is initialized (ordered))
XO	change order request
CA	cancel order request

Order Status (ORC 5)	Description
O	ordered (activates the corresponding entry in the DICOM work list)
P	processed (removes the corresponding entry from the DICOM work list)

Example:

ORC|NW|000019994|||O|||||||20030127085206|||ABDBLOOD

4.2.3 OBR Segment (Observation Request)

Field	Description	Remark	R/O	Length
1	Set ID - OBR		O	
2	Placer Order Number	corresponds to the order ID of the ordering application (HIS-ID)	R	128
3	Filler Order Number		O	128
4.1	Universal Service ID	ID of the requested observation/test/battery		128
4.2	Universal Service Text	abbreviation and description; the fields 4.2 and 4.3 can be read together	R	128
5	Priority		O	5
12	Danger Code		O	60
13	Relevant Clinical Information		O	300
15	Specimen Source		O	300
16	Ordering Provider		O	120
17	Order Callback Phone Number		O	250
18	Accession Number	AIM automatically generates an ID if this field has not been specified	O	255
19	Placer Field 2		O	60
20	Filler Field 1		O	60
24	Diagnostic Serv Sect ID		O	10
27	Quantity/Timing		O	200
30	Transportation Mode		O	20
31	Reason for Study		O	300
34	Technician		O	200
44	Procedure Code		O	250

R ... required

O ... optional

Example:

OBR|1|200500123||ZMK_XRAY^^Panoramic X-Ray|

4.2.4 ZDS Segment (Movement)

This segment is defined by the IHE Radiology Technical Framework.

Field	Description	Comment	R/O	Length
1.1	Study Instance UID	AIM automatically generates an ID if this field has not been specified	R	255

R ... required

O ... optional

5 Incoming ORU Messages

5.1 General Information

The following part of the document is dedicated to the transmission of ORU messages to archive generic (non DICOM) documents in AIM. In general all possible data can be stored. Each ORU message is used to archive exactly one file. The format of the transmitted file (extension of the file) is specified within each message. In addition, to ensure that AIM can read the transmitted data it is important that one of the following encodings is used:

- HL7-Escaping
- UU-Encoding
- Base64
- BIN-HEX

5.2 ORU Message Structure

Each ORU message has to specify the PID segment. The PV1 segment can but does not have to be defined. The file that should be archived as document (document ID) is contained in the OBX segment. When it is archived in AIM it is automatically linked with the transmitted patient and visit information. In case that a specified patient or visit does not exist, it is created. Note that it is possible to use an order to replace document descriptions.

Structure
MSH
PID
PV1
[ORC]
OBR
OBX

5.2.1 MSH Segment (Message Header)

Field	Description	Content	Remark	R/O	Length
1	Field Separator			R	1
2	Encoding Characters	^^\&		R	4
3	Sending Application		internal unique ID of the sending application	R	
4	Sending Facility		defines the AIM OrgUnit where the received document should be archived; can be evaluated by AIM to distinguish between different ORU streams	R	
9.1	Message Type	ORU	particular value for a order message		
9.2	Trigger Event	R01	particular value for a order message	R	6

R ... required

O ... optional

Example:

```
MSH|^~\&|TESTSender|V9.2.4.000|ICO||200506211535|d8c5503b409b81d6f9b1f06f336decb2|
ORU^R01|99295|P|2.3|
```

5.2.2 ORC Segment (Common Order)

Field	Description	Comment	R/O
3	Filler Order Number	is used as document UID; is accessed by the ShareManager during the creation of new temporary shares	O
10	Entered By	is interpreted as OrgUnit by the ShareManager	O

5.2.3 OBR Segment (Observation Request)

Field	Description	Remark	R/O
2	Accession Number	link to a order	O
3	External File ID	uniquely identifies the transmitted file within the source system; AIM can insert this ID in an outgoing ORU message which transmits a reference pointer required in case of an update or cancelation; the fields Sending Application and external File ID uniquely identify the file which should be updated or removed	O/R
4.1	Document/File Description (First Part)	288719000if no external IDs are used: 4.1+4.2 = document + file description; if external IDs are used: 4.1 = file description	O
4.2	Document/File Description (Second Part)	is evaluated if no external IDs are used (see 4.1)	
4.4	Document ID/Container.Name	depends on configuration 1) based on this unique ID, it is possible to update documents even if no external IDs are used (attention if a document contains more than one file) 2) alternatively an automatic generated ID (generated by AIM) can be used (attention: no updates or cancelations possible) 3) in combination with the Sending Application ID (MSH 3) it can be used as container or document ID (if external IDs are used this field is required)	
4.5	Document Description	if external IDs are used: description of the AIM document or container	
8	Date/Time of Document Creation	AIM stores for each document a time stamp which corresponds either to the value of this field (in that case the semantic of the time stamp (which date/time is stored) is defined by the customer) or the date/time when the document is archived (in that case the time stamp is specified by AIM; this only happens if no date/time is specified by the ORU message); note that the time stamp can be also stored in OBR 7 (see configuration of the HI7OruSpooler)	O
25	Cancelation Status	if external IDs are used: if this field contains value D, all other values in the OBR and OBX segments are ignored and the corresponding document is deleted; a document is uniquely determined by the fields Sending Application and external File ID; for possible values, see table below	O
46.1	Keyword (e.g. document type)	this information can be forwarded with a ORU reference pointer	O
46.2	Keyword (e.g. department)	this information can be forwarded with a ORU reference pointer	
46.3	Keyword (e.g. validation status)	this information can be forwarded with a ORU reference pointer	

Cancelation (OBR 25)	Description
D	Delete

5.2.4 OBX Segment (Observation/Result)

Field	Description	Comment	R/O
3.1	Document Type		R
3.2	File Extension		
5	Document	the data that should be archived	O

R ... required

O ... optional

Examples:

```
OBX|1|ED|Encapsulated Data^RTF|1|e1xydGYxXGFuc2...ICAgIA0KDQo=|||||C|||2005062100000|
OBX|1|ED|Encapsulated Data^PDF|1|JVBERi0xLjINJ...UIRU9GDQ==|||||F|||2005061400000|
```

5.3 Import Behavior

To import a document, AIM uses the patient and visit information specified in the received HL7 message. If AIM already contains the patient and visit defined in the ORU message, the document is imported and allocated to the corresponding patient and visit. If AIM does not contain the specified patient (visit), a new patient (visit) is created before the document is imported. If the HL7 message does not specify a visit, information about the patient specified in the PID segment are used to import the document (at least field PID 3 is checked). In case that the import is of low quality also the family name (PID 5.1), the given name (PID 5.2), the date/time of birth (PID 7), and the sex (PID 8) are checked during the import of a document. In case that AIM contains already a patient with identical information, the document is imported and allocated to the found patient. Note, if a new file is imported to an existing document (identified via Sending Application (MSH 3) and Document ID/Container.Name (OBR 4.4)) then the meta information of the document

- Sending Facility (AIM OrgUnit, MHS 4)
- Document/File Description (OBR 4.1)
- Document Description (OBR 4.5)
- Date/Time of Document Creation (OBR 8)
- Keywords (OBR 46)

are updated according to the values specified in the ORU message. If an import fails, the behavior of AIM depends on whether external IDs are specified or not.

Import Without External IDs

If no external IDs are defined, the corresponding ORU message (including the data that should be archived) is moved to a so called error directory. In that case the message has to be manually checked and corrected by a system administrator.

Import With External IDs

If external IDs are defined, then the corresponding ORU message (including the data that should be archived) is put on a so called black list (identified by the Sending Application (MSH 3) and External File ID (OBR 3)). Now in case that a ORU message arrives which has the same Sending

Application and External File ID as the failed ORU message then it is ignored as long as its external IDs (Sending Application and External File ID) occur on the black list. Note that the failed message has to be manually checked and corrected by a system administrator.

5.4 Update Behavior

Similar as for the import, the update behavior depends on whether external IDs are specified or not.

Update Without External IDs

If no external IDs are used, AIM uses the patient and visit information, the Sending Facility (MSH 4), and the Document ID/Container.Name (OBR 4.4) of the ORU message to identify the AIM document which should be extended or updated. So to ensure that the data of the ORU message is added to the correct AIM document it must be guaranteed that these information are identical with the ones of the designated AIM document. Otherwise a new AIM document is created.

To archive data, AIM constructs a filename which consists of the Patient Name (PID 5.1, PID 5.2), the Document/File Description (OBR 4.1), and the Date/Time of Document Creation (OBR 8) (the file extension is defined via the field OBX 3.2). Now to successfully update a file it is necessary that its filename is equivalent to the one generated by AIM using the values of the ORU message (beside that it is also important that the correct AIM document is identified - see above paragraph). If that is not the case, a new AIM document is created or a new file is added to an existing AIM document. For instance, if two files with different Document/File Descriptions (OBR 4.1) but same AIM document information are archived then both files are stored within the same AIM document. In case this document (examination) is loaded by icoview, the document tree shows an examination with two files.

Note, without using external IDs only files can be updated (one file is replaced by another one). An update of meta information (except keywords (OBR 46)) is not possible. Furthermore if a file is updated via an ORU message which does not specify all keywords, then possibly existing values for the unspecified keywords are deleted.

Update With External IDs

If external IDs are used, AIM concatenates the values of the fields Sending Application (MSH 3) and Document ID/Container.Name (OBR 4.4) to obtain the name of the container which should be updated. The filename is defined via the fields Sending Application (MSH 3) and External File ID (OBR 3) (the file extension is defined via the field OBX 3.2). The decision whether AIM has to import or update a file is based on the content of the fields Sending Application (MSH 3) and External File ID (OBR 3). If there exists a file in AIM which filename is equivalent to the one generated by AIM using the values of the ORU message then the corresponding file as well as its meta information are updated. Concerning meta information, the following attributes can be changed:

- Sending Facility (AIM OrgUnit, MHS 4)
- Document/File Description (OBR 4.1)
- Document Description (OBR 4.5)
- Date/Time of Document Creation (OBR 8)
- Keywords (OBR 46)
- Document (binary, OBX 5)

In case that just the meta information of a file should be updated it is not necessary to add an OBX segment to the ORU message. Furthermore if a file is updated via an ORU message which does not specify all keywords, then possibly existing values for the unspecified keywords are deleted. Note that if the Document ID/Container.Name (OBR 4.4) is generated by AIM then the update

feature is not available. As a consequence, each document is archived as a new document in AIM (can be directly accessed via a HIS using a reference pointer).

5.5 Cancellation Behavior

If no external IDs are specified or the Document ID/Container.Name (OBR 4.4) is generated by AIM then the update cancellation feature is not available. To remove a document it is necessary to set the value of the field OBR 25 to D. The OBX segment does not have to be specified (if it is specified, it is ignored).

Examples:

```
OBR|1|||soma^Sonography          Mamma^^TEST-2546311^Internal      Report
|||200506211535|
OBR|1|||VE11^removing sutural^^TEST-2536962^ Internal Report |||200506141457|
```

6 Outgoing ORU Messages

6.1 General Information

Pictures and documents can be transmitted via ORU messages from AIM to other third-party applications (HIS, RIS, etc.). To avoid large ORU messages, the picture or document is not transmitted directly. Instead of that the third-party system gets, beside some patient information, a reference ID string which can be used (e.g. via a DLL interface) to locate and load the corresponding data. The following part of the document is used to specify the structure of the corresponding ORU messages in full detail.

Note that in general it is possible to transmit DICOM as well as generic documents. Furthermore, the transmission of ORU messages can be restricted to

- certain calling AETs (DICOM documents)
- certain OrgUnits
- data which has a certain quality concerning the patient information (e.g. only data which has been adjusted according to the master patient index)

Figure 4 illustrates the workflow used to transmit a reference pointer from AIM to a HIS.

6.2 ORU Message Structure

Via ORU messages it is possible to transmit reference pointers or to cancel existing references (e.g. if a picture is deleted). If a document is changed, the corresponding references are canceled and retransmitted to communicate the changes (can be configured). A cancellation message differs from the original message due to the values of the fields OBR 25 and OBX 11 (if a reference should be canceled those fields contain value D). In general, the transmitted ORU messages have the following structure.

Structure
MSH
PID
{PV1}
{ORC}
OBR
OBX

6.2.1 MSH Segment (Message Header)

Field	Description	Content	Remark
1	Field Separator		
2	Encoding Characters	^^\&	
3	Sending Application	ICO	
4	Sending Facility	ICO	
5	Receiving Application		
6	Receiving Facility		
7	Date/Time of Message		value is by default specified according to the standard format YYYYMMDDHH24MISS; the format can be configured
8	Checksum		defines a 32-digit MD5 checksum of the content of the ORU message
9.1	Message Type	ORU	particular value for this ORU message
9.2	Trigger Event	R01	particular value for this ORU message
10	Message Control ID	e.g. 41	unique message ID
11	Processing ID	see table below	
12	Version ID	2.3	HL7 version

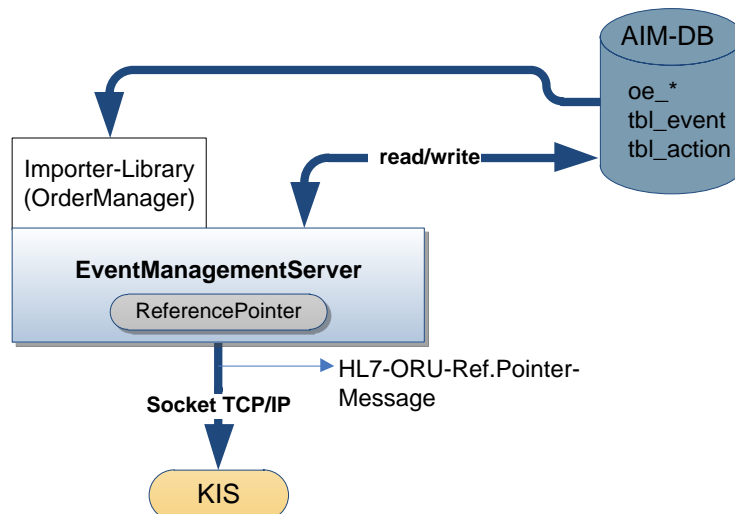


Figure 4: Workflow Reference Pointer

Processing (MSH 11)	ID	Description
P		production
T		training

Example:

```
MSH|^~\&|ICO|ICO|Testapp|Test|20040802110946|bdaf2196adc4bae69d2445587aa40583|
ORU^R01|41|P|2.2|
```

6.2.2 ORC Segment (Common Order)

If order information for a document are available, then these information can be taken into consideration by specifying an additional ORC segment equipped with these information (note that this is the only situation where an additional ORC Segment is specified).

Field	Description	Content	Remark
1	Order Control	OK	
2	Placer Order Number	2004000067-1	
5	Order Status	CM	
18	Entering Device	e.g. 260000	the value of this field corresponds to the Filler Order Number (ORC 2) defined in the corresponding ORM message

Example:

```
ORC|OK|2004000067-1||CM|||||||||||260000|
```

6.2.3 OBR Segment (Observation Request)

Field	Description	Content	Remark
2	Placer Order Number	e.g. 2004000067-1.1	is only stated if an order exists
3	Filler Order Number	e.g. 41	unique number computed by AIM
4.1	Universal Service ID	e.g. ctshoulder	If a corresponding order exists then this field contains the examination code of the order; otherwise a fixed text is stated (can be configured)
4.2	Universal Service Text	e.g. CT - Shoulder	is generated based on the document and order description
8	Observation End Date/Time	e.g. 20040802111139	used format: YYYYMMDDHH24MISS
25	Result Status	see table below	
32	Principal Result Interpreter	e.g. BMG_260000	abbreviation of the analyzing unit
46.1	Keyword (e.g. document type)	e.g. Doctors Letter#Doctors Letter external	can be configured (e.g. two keywords can be combined to one field type, as delimiter # is used)
46.2	Keyword (e.g. department)	e.g. Surgery	can be configured
46.3	Keyword (e.g. validation status)	e.g. final	can be configured

Result (OBR 25)	Status	Description
F		final results
D		delete

Example:

OBR||2004000067-1.1|41|ctshoulder^CT - Shoulder|||20040802111139|||||||||||||F|||||BGM.260000|

6.2.4 OBX Segment (Observation/Result)

Field	Description	Content	Remark
1	Set ID - OBX	1	examination number
2	Value Type	RP	indicates that a reference pointer is transmitted
3.1	Observation ID	e.g. CR, CR/SR, pdf, edi	modality or file extension of the referenced document; if the extension of the corresponding file is unknown or the corresponding document contains more than one file the value unknown is stated; otherwise the extension of the corresponding file is given
3.2	Observation Text	ICO	document description
3.4	Alternative Observation ID	e.g. JPG	document type; in case of a DICOM document the value study is stated; if the extension of the corresponding file is unknown the value unknown is stated; if the corresponding document contains more than one file the value mixed-document-container is specified; otherwise the extension of the corresponding file is given
4	Universal Service ID	1	examination number
5.1	Reference Pointer		it is of the format 1.0:[...]440.22
5.3	Alternative Document ID	e.g. HNA1234567	if the document has been obtained from a third-party system then this field specifies the ID of the document in the corresponding third-party system (in addition to the internal AIM document ID); if the referenced document consist of more than one file, a list of all file IDs is given (separated by the delimiter &, e.g. HNA4711 & HNA4711EDI)
5.5	Number of Files	e.g. 1	at the time when the reference pointer is transmitted
11	Observation Result Status	see table below	
14	Date/Time of the Observation	e.g. 20040802111139	used format: YYYYMMDDHH24MISS
15.1	Producers ID	e.g. NUAA	
15.2	Producer Text	e.g. Nuclear	
15.4	Alternative Producer ID	e.g. 12345	e.g. the ID of the producer in the corresponding third-party system
15.5	Alternative Producer Text	e.g. NUC	further information about the producer

6 OUTGOING ORU MESSAGES

Observation ID (OBR 3.1)	Description

Alternative Observation ID (OBR 3.4)	Description

Status (OBR 11)	Description
F	final results
D	delete

Example:

```
OBX|1|RP|CR^CR-Description^^study|1|
1.0:svsico02:dcm:study:1.3.6.1.4.1.9784.001.1091432440.22^HNA1234567|||||F|||20040802111139|
NUAA^Nuclear^^12345^NUC|
```

7 Declaration of Conformity for 93/42/EEC

7.1 General

CE 0297

icoserve AIM is a medical device, risk class IIa according to 93/42/EEC, appendix IX, rule 10 for clinicalwide acquisition, storage, distribution and diagnosis of medical multimedia data.

7.2 Producer Information



ITH icoserve technology for healthcare GmbH
Innrain 98
A-6020 Innsbruck
Austria

7.3 Production Year



2010

7.4 Reminder



Please note the documentation of each module. Using this medical device requires special training.