CitiusTech

HL7 Message Conformance

Session 3

Version 1.0

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Contents

Special HL7 Protocols (1/8)

Sequence Number Protocol

- For certain types of data transactions between systems the issue of keeping databases synchronized is critical
- Example could be an ancillary system such as lab, which needs to know the locations of all inpatients to route stat results correctly.
- If the lab receives an ADT transaction out of sequence, the census/location information may be incorrect
- HL7 sequence numbering protocol is used to ensure synchronization of databases for receiving and sending systems
- This is done to avoid transactions from happening out of order
- It can very well be prevented by one-to-one acknowledgement, but its primary purpose is to prevent duplicate transactions

Important Note

- A device implementing HL7 messaging need not implement the sequence numbering protocol
- This is because HL7 sequence numbering protocol is an extension and is used on a site or based on the application
- Also, the protocol as provided, allows the implementer to take certain decisions, so two systems that implement HL7 sequence numbering will not necessarily be the same - although the core of sequence numbering should be identical

Special HL7 Protocols (2/8)

- Considering the example of a Hospital sending the messages to the billing system for billing purpose:
  - Messages will have the information such as procedures completed for a particular patient
  - Based on the data received billing system can produce bills
- Initial Conditions
  - Receiving system i.e. billing system will store the sequence number of the most recently accepted transaction and then acknowledge the message by adding the sequence number one greater than the last transaction it accepted in MSA-4 (Expected sequence number)
  - Initiating system i.e. hospital keeps a queue of outgoing transactions indexed by the sequence number
  - Sequence number is a positive(non-zero) integer, incremented by one (by the initiating system) for each successive transaction

Example – Initial Conditions :

1. HL7 message with sequence number “4” to be sent by Hospital to billing system about the procedures completed on Peter Samual:

MSH|^~\&|HIS|JK Hospital|REC_APP|Billing System |20100211073913||DFT^P03|MS90250|P|2.7|**4**|||||
EVN||20100211073913||
PID|||12001||Peter^Samual^^^Mr.||19670824|M|||123 West St.^^Denver^CO^80020^USA||||||
FT1|1|||202635614700||CG|67789|||1||||||^^^^808^^^^LOC||DICTATION||1 |||783933||73630||
PR1|1|CPT|71010||20355628114700|||||||||
DG1|1|ICD9| 01130 | TB of bronchus-unspec ||F|||||||||0| |D

Special HL7 Protocols (3/8)

Example – Initial Conditions :

2. Acknowledgement message sent by billing system to Hospital echoing sequence number "5" in MSH-4:

MSH|^~\&|REC_APP|Billing System |HIS|JK Hospital|20100211073913||ACK|MS90250|P|2.7||||||
MSA|AA|MS90250||**5**

- Reserved sequence number values
  - 0 is reserved for use only while initiating system (re-)starts the link

MSH|^~\&|HIS|JK Hospital|REC_APP|Billing System |20100211073913||DFT^P03|MS90250|P|2.7|**0**|||||

  - -1 is reserved for use only when the initiating system is resynchronizing the link
- When the hospital sends a message with a sequence number of 0 or -1, the segments beyond the MSH need not be present in the message, in case if they are present, all fields can be null
- If the billing system gets a transaction
  - with a 0 (zero) in the sequence number field, it should send back a sequence number one greater than the sequence number of the last transaction it accepted
  - if this value does not exist, it should send back a sequence number of -1

MSH|^~\&|REC_APP|Billing System |HIS|JK Hospital|20100211073913||ACK|MS90250|P|2.7||||||
MSA|AA|MS90250||**-1**

Special HL7 Protocols (4/8)

Continuation messages and segments

- Segment fragmentation/continuation using the **ADD** segment:

  Used within a message to break a long segment into shorter segments within a single HL7 message

Example:

1. Segment “C” can be fragmented within HL7 message as:

   A|1
   B|2
   C|34
   ADD|5|678
   ADD||90
   D|1

   is the same as

   A|1
   B|2
   C|345|678|90
   D|1

Note: The "|" at the end of the first ADD segment is part of the value, while the first "|" of each ADD is not.

Special HL7 Protocols (5/8)

Continuation messages and segments

- Message fragmentation/continuation using the **DSC** segment:

  When a message itself must be fragmented and sent as several HL7 messages, the DSC segment is used

Example:

1. A single logical message may be fragmented into two HL7 messages:

   ---Sender HL7 message (fragment 1)---

   MSH|||||||||1001||2.4|123||..
   A|…
   B|…
   DSC|W4xy

   ---- Sender HL7 message (fragment 2)---
   MSH|||||||||2106||2.4|124|W4xy|
   C|…
   D|…

   Such a sequence is logically the same as the single message:

   MSH|….|2.4|123||..
   A|…
   B|…
   C|…
   D|…

Special HL7 Protocols (6/8)

Continuation messages and segments

- Segment fragmentation across messages:

  When the last segment of a message needs to be fragmented and the message itself needs to be send as several HL7 messages, the ADD and DSC segments are used

Example:

MSH|…|2.4|
ANY|12
ADD
DSC|JR97
--------- (fragment 2)
MSH|…|2.4|JR97
ADD|345

is logically the same as:

MSH|…|2.4
ANY|12345

Special HL7 Protocols (7/8)

HL7 batch protocol

- In certain instances, transferring a batch of HL7 messages is convenient
  For example: A batch of financial posting detail transactions (DFT's) sent from an ancillary to a financial system
- Batch processing involves sending files via the FTP protocol or as email attachments as there is no standard delivery mechanism at present
- The structure of an HL7 batch file is given by the following (using the HL7 abstract message syntax)

```
[FHS]                    (file header segment)
{                        --- BATCH begin
[BHS]                    (batch header segment)
{ [                      --- MESSAGE begin
MSH                      (zero or more HL7
messages)
    ....
    ....
] }                      --- MESSAGE end
[BTS]                    (batch trailer segment)
}                        --- Batch end
[FTS]                    (file trailer segment)
```

Special HL7 Protocols (8/8)

HL7 batch protocol – Example

- A single HL7 messages consists of a group of segments, starting with the MSH segment

```
MSH|^~\&|MESA_0P|SUNFLOWER_H0SPITAL|MESA_0F|LMN_RADIOLOGY|||ORM^001|101104|P1|2.3.1|||||||
PID|||4563O2O^^^ADT1||SMITH^SAM||1998O7O4|M||AI|7214 OXTOWN DR^^ST. LOUIS^MT^63111|
PV1||E|$PATIENT_LOCATIONS||||$ATTENDING_D0T0R$|5101^TOM^TIFFANY^P^^DR|||||||||V1002
```

- A batch messages contains several single HL7 messages (marked by their starting MSH segments)
- However, the batch itself is identified with FHS and BHS batch headers, not MSH segments

```
FHS|^~\&|MESA|XYZ_HOSPITAL|IHIE|IHIE|2O12O7O3O94005||||||
BHS|^~\&|MESA|XYZ_HOSPITAL|IHIE|IHIE|2O12O7O3O94005||||||
MSH|^~\&|MESA_ADT|XYZ_ADMITTING|MESA_IS|SUNFLOWER_HO5PITAL|||ADT^A04|101104|P|2.3.I||||||
EVN||20004211000||||200004210950
PID|||583020^^^ADT1|| SMITH^SAM ||19980704|M||AI|7214 OXTOWN DR^^ST. LOUIS^MT^63111|||||2O-98-17O1|
PV1||E|||||5101^TOM^TIFFANY^P^^DR||||V1002^^^ADT1|||||||||||200004210950||||||
MSH|^~\&|MESA_OP|XYZ_HOSPITAL|MESA_OF|XYZ_RADIOLOGY|||ORM^001|101104|P|2.3.1|||||
P1D|||583020^^^ADT1|| SMITH^SAM ||1998O7O4|M||AI|7214 OXTOWN DR^^ST. LOUIS^MT^63111|||||20-98-1701||
PV1||E|$PATIENT_LOCATION$||||$ATTENDING_DOCTOR$|5101^TOM^TIFFANY^P^^DR|||||||||||V1002^^^ADT1|||||||||
ORC|NW|A1O1Z^MESA_ORDPLC|||||1^once^^^^S||200004210955|^SOUTHWEST^ROUND|2131^ESTRDA^JAIME^P^^DR||31455
OBR|1|A1O1Z^MESA_ORDPLC||P1^Procedure 1^ERL_MESA|||||||||xxx||Radiology^^^^R|2131^ESTRADA^JAIME^P^^DR||
MSH|^~\&|MESA_OF|XYZ_RADIOLOGY|MESA_IM|XYZ_IMAGE_MANAGER|||ORM^OO1|$MESSAGE_CONTROL_ID$|P|2.3.1||||||
PID|||583020^^^ADT1|| SMITH^SAM ||19980704|M||AI|7214 OXTOWN DR^^ST. LOUIS^MT^63111|||||2O-98-17O1|
PV1||E|||||5101^TOM^TIFFANY^P^^DR||||V1002^^^ADT1|||||||||||200004210950||||||
ORC|NW|A1O1Z^MESA_ORDPLC|||||B101Z^MESA_ORDFIL||1^once^^^^S||200004210955|^SOUTHWEST^ROUND|2131^ESTRDA
OBR|1|A1O1Z^MESA_ORDPLC|||||B101Z^MESA_ORDFIL|P1^Procedure1^ERL_MESA^X1^SP Action Item
X1_A1^DSS_MESA|||||||xxx||Radio1ogy^^^^ R|2131^ESTRDA^JAIME^P^^DR||ACCESSION_NUMBER|REQUESTED_PROCEDURE
ZDS|1.2.1^100^App1ication^DICOM
```

FSH and Batch Headers

1st message

2nd message

3rd message

Contents

Message Control Segments

Few of the segments and some of their fields:

BHS – Batch Header Segment	FHS – File Header Segment	NTE – Notes and Comments
Batch Field Separator	File Field Separator	File Field Separator
Batch Encoding Characters	File Encoding Characters	File Encoding Characters
Batch Creation Date/Time	File Creation Date/Time	File Creation Date/Time
Batch Control ID	File Control ID	File Control ID

BTS – Batch Trailer Segment	BTS – Batch Trailer Segment	SFT – Software Segment
Batch Message Count (ST)	File Batch Count	Software Vendor Organization
Batch Comment	File Trailer Comment	Release Number
Batch Totals (NM)		Software Product Name
		Software Install Date

Contents

Conformance using Message Profiles (1/10)

Need for Conformance

- HL7 standard defines the specifications only at a broader level
- Need to define boundary conditions such as optionality and cardinality

HL7 message profile

- Is an unambiguous specification of one or more standard HL7 messages that have been analyzed for a particular use case
- Prescribes a set of precise constraints upon one or more standard HL7 messages
- May have a unique identifier(MSH-21) as well as publish/subscribe topics
- Specifies what data will be passed in a message
- Defines the format in which the data will be passed
- Specifies the acknowledgement responsibilities of the sender and receiver

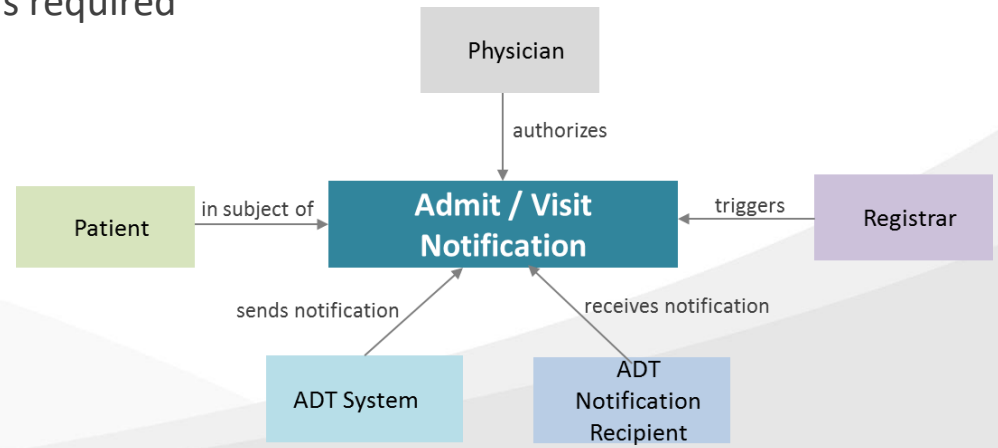
A message profile fully describes a conversation between two or more systems through the combination of the following:

- One use case analysis
- One or more dynamic definitions
- One or more static definitions

Conformance using Message Profiles (2/10)

Use Case Analysis

- Use case analysis may be documented as a use case diagram (supported with text) or just a textual description
- Use case model documents the scope and requirements for an HL7 message profile or set of message profiles.
- Use case model must:
  - Provide a name that clearly and concisely defines the exchange
  - Document the purpose for each message exchange
  - Define the actors, including the sending and receiving applications
  - Define the flow of events between these actors
  - Document the situations in which the exchange of a particular HL7 message profile is required



Conformance using Message Profiles (3/10)

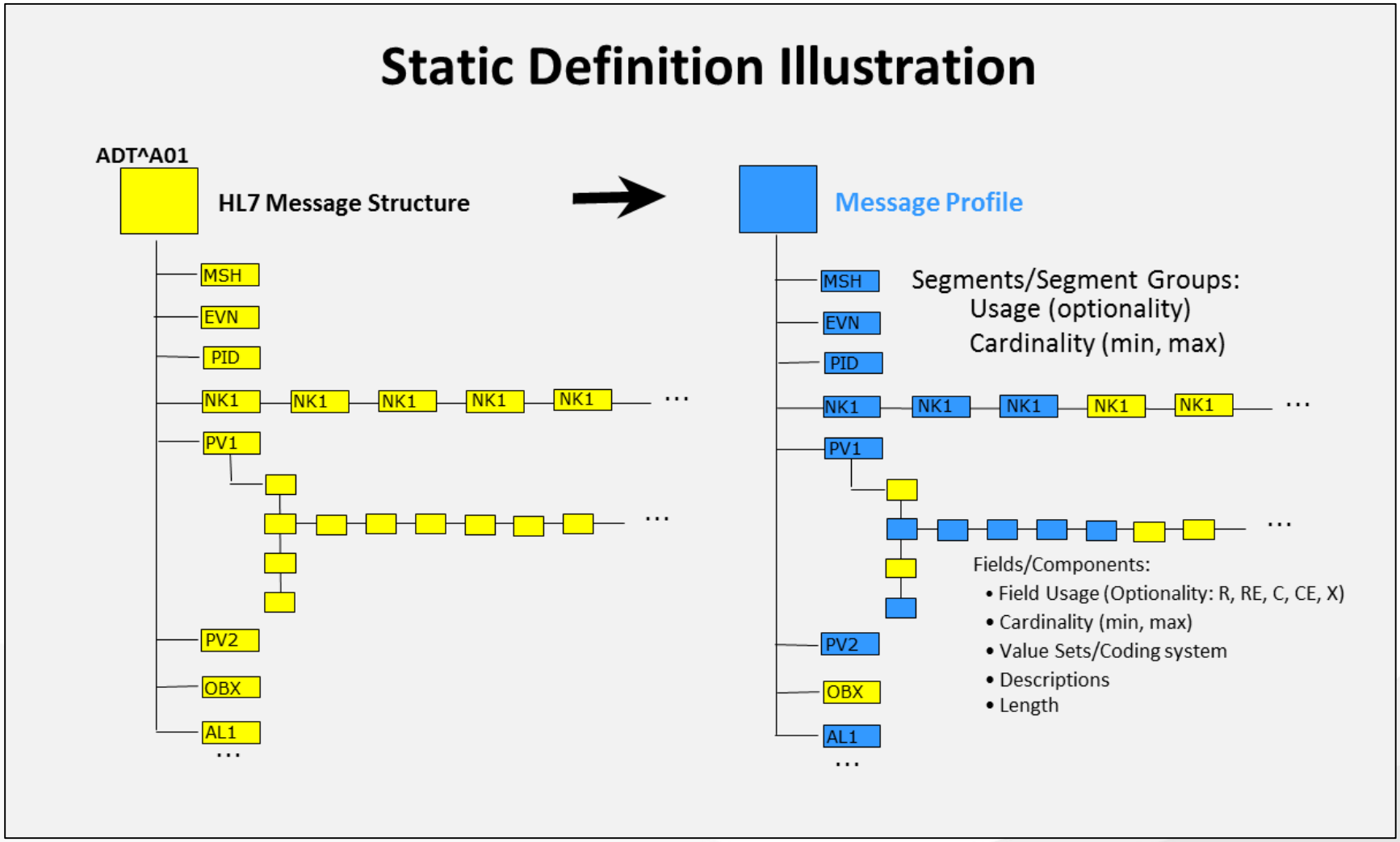
Dynamic definition

- Dynamic definition is an interaction specification for a conversation between 2 or more systems
- Dynamic definition may refer one to many static definitions
- Dynamic definition may include an interaction model in addition to the acknowledgement responsibilities
- Dynamic definition shall identify whether an accept and/or application level acknowledgment is allowed or required
- Dynamic definition defines the conditions under which an accept and/or application level acknowledgment is expected
- For any one static definition there may be one or more dynamic definitions

Static definition

- Static definition is an exhaustive specification for a single message and is normatively expressed in XML
- Static definition is based on a message structure defined in the HL7 Standard
- A complete static definition shall be defined at the message, segment and field levels
- A static definition explicitly defines:
  - Segments, segment groups, fields and components usage rules
  - Cardinalities
  - Value sets and coding systems

Conformance using Message Profiles (4/10)



Conformance using Message Profiles (5/10)

Length

- Length is the number of allowed characters that might be present in a single message field or element.
- Minimum and Maximum definition will apply if the element is populated with a non null value.
- Null information representation ("") is not considered to be a value with applicable length information.
- Length should not be specified for composite elements since the actual min and max lengths will be very difficult to determine.

Truncation Flag

- Truncation flag is a simple boolean value of true/false.
- True – value can be truncated and False - value may not be truncated.
- If truncation is set to false, no other further constraining profile may mark this value as true.
- If the value is fixed to true, other further constraining profiles may mark it as true or false.

Cardinality

- Cardinality defines whether or not an element needs to be populated.
- Controls the number of times an element appears in a message.
- Some elements will always be present (e.g., cardinality [1..1], [1..n]).
- Others may be optional with zero or more occurrences (e.g., cardinality [0..n]).
- Cardinality identifies the minimum and maximum number of occurrences that a message element must have in a conformant message.
- Cardinalities are expressed as a minimum-maximum pair of non-negative integers.
- A conformant message must always contain at least the minimum number of occurrences, and shall not contain more than the maximum number of occurrences.

Conformance using Message Profiles (6/10)

Static Definition

- Minimum and maximum length examples

Value	Description
	For constrainable profile: no length defined, i.e. no requirements on the length are given. Leaving this information empty is not allowed for implementable profiles.
0..0	For withdrawn elements: minimum and maximum set to O.
1..1	Element must have exactly one character.
1..n	Element may have up to n characters.
n..n	Element must have exactly “n” characters.
1..*	Element may have any length.
n..*	Element may have any length which is greater than or equal to “n”, where “n” is greater than or equal to 1.
m..n	Element must have a minimum length of “m” and a maximum length of “n” where “m” is less than or equal to “n” and “m” is greater than or equal to 1.

Conformance using Message Profiles (7/10)

Cardinality		
Value	**Description**	**Valid Usage Codes**
[0..0]	Element never present.	X
[0..1]	Element may be omitted and can have at most, one occurrence.	RE, O, C2, CE
[1..1]	Element must have exactly one occurrence.	R
[0..n]	Element may be omitted or may repeat up to n times.	RE, O, C2, CE
[1..n]	Element must appear at least once, and may repeat up to n times.	R
[0..*]	Element may be omitted or repeat for an unlimited number of times.	RE, O, C2, CE
[1..*]	Element must appear at least once, and may repeat unlimited number of times.	R
[m..n]3	Element must have at least “m” occurrences and may have at most “n” occurrences. Except that in the case where the usage code is RE, the element may also be omitted or have zero occurrences.	R and RE
[m..*]3	Element must have at least “m” occurrences and may have an unlimited number of occurrences. Except that in the case where the usage code is RE, the element may also be omitted or have zero occurrences.	R and RE

- If the usage code is C, then the element must be present if the associated condition predicate evaluates to true
- m must be greater than 1 and n must be greater than or equal to m, the case where m equals 1 is addressed separately

Conformance using Message Profiles (8/10)

Message Profile Example

1 Use Case Model

1.1 Use Case: Admit/Visit Notification

2. Dynamic Interaction Model

3 Dynamic Definition: ADT/ACK (Event A01)

3.1 ADT^A01
3.2 ACK^A01

4 Static Definition: - Message Level - ADT/ACK (event A01)

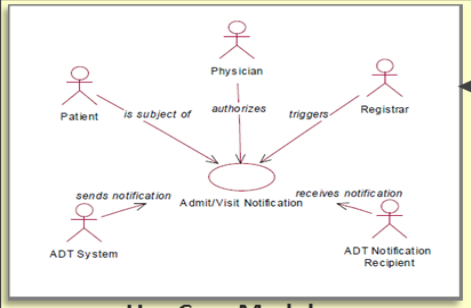
4.1 ADT^A01
4.2 ACK^A01

5 Static Defintiion - Segment Level

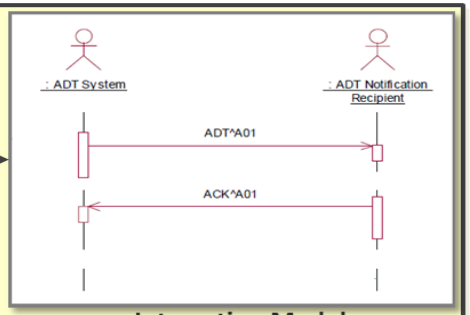
5.1 MSH – Message Header Segment Definition
5.2 EVN – Event Type Segment Definition
5.3 PID (Y) – Patient Demographics Segment Definition
5.4 PD1 – Patient Additional Demographic Segment Definition
5.5 NK1 – Next of kin Segment Definition
5.6 PV1 (2) – Admit Visit Info Segment Definition
5.7 AL1 – Allergy Segment Definition
5.8 MSA – Message Acknowledgment Segment Definition
5.9 ERR – Error Segment Definition

6 Static Definition - Field Level

6.1 Table 0001 – Sex
6.2 Table 0002 – Marital Status
6.3 Table 0003 – Event Type Code
6.4 Table 0004 – Patient Class
6.5 Table 0005 – Race
6.6 Table 0006 – Religion
6.7 Table 0007 – Admission Type
6.8 Table 0008 – Acknowledgement Code
6.9 Table 0009 – Ambulatory Status



Use Case Model



Interaction Model

Segment	ADT Message	Usage	Cardinality	Chapter
MSH	Message Header	R	[1..1]	2
EVN	Event Type	R	[1..1]	3
PID	Patient Identification	R	[1..1]	3
[PD1]	Additional Demographics	X	[0..0]	3
[{ ROL }]	Role	X	[0..0]	12
[{ NK1 }]	Next of Kin / Associated Parties	RE	[0..3]	3
PV1	Patient Visit	R	[1..1]	3
[PV2]	Patient Visit - Additional Info.	RE	[0..1]	3
[{ ROL }]	Role	X	[0..0]	12
[{ DB1 }]	Disability Information	X	[0..0]	3
[{ OBX }]	Observation/Result	X	[0..0]	7
[{ AL1 }]	Allergy Information	RE	[0..*]	3
[{ DG1 }]	Diagnosis Information	X	[0..0]	6
[DRG]	Diagnosis Related Group	X	[0..0]	6
[{		X	[0..0]	
PR1	Procedures	X	[0..0]	6
[{ ROL	Role	X	[0..0]	12
}]				
}]				
[{ GT1 }]	Guarantor	X	[0..0]	6
[{		X	[0..0]	
IN1	Insurance	X	[0..0]	6
[IN2]	Insurance Additional Info.	X	[0..0]	6
[{ IN3	Insurance Additional Info - Cert.	X	[0..0]	6
}]				
[{ ROL	Role	X	[0..0]	12
}]				
}]				
[ACC]	Accident Information	X	[0..0]	6
[UB1]	Universal Bill Information	X	[0..0]	6
[UB2]	Universal Bill 92 Information	X	[0..0]	6
[PDA]	Patient Death and Autopsy	X	[0..0]	3

Static Definition – Message Level

1.1 ADT^A01

The dynamic profile of the ADT^A01 event notification requires that an HL7 Accept Acknowledgement be sent but that no HL7 Application Acknowledgement is sent in response to this ADT^A01 message.

Dynamic Profile Identifier:

{ awg(1) hl7(1) v2-3(5) dynamic-profile(2) accAL-appNE(5) }

1.2 ACK^A01

The dynamic profile of the ACK^A01 acknowledgement requires that neither an HL7 Accept Acknowledgement or an HL7 Application Acknowledgement is sent in response to this ACK^A01 message.

Dynamic Profile Identifier:

{ awg(1) hl7(1) v2-3(5) dynamic-profile(2) accNE-appNE(6) }

Dynamic Definition

Type	Table	Name	Value	Description	Source	Used
AWG suggested	0007	Admission Type			HL7 2.3, AWG, UB92	PV1-4
	0007		A	Accident	HL7	
	0007		E	Emergency	HL7	
	0007		L	Labor and Delivery	HL7	
	0007		R	Routine	HL7	
	0007		ACC	Accident		
	0007		EMR	Emergency		
	0007		LAD	Labor and Delivery		
	0007		NEB	Newborn		
	0007		ROU	Routine		
	0007		OBS	Observation		
	0007		URG	Urgent		
	0007		ELE	Elective		
	0007		REH	Rehabilitation		
	0007		HEL	Helicopter		
	0007		NEP	Newborn Premature		
	0007		NSP	Newborn Sick Premature		
	0007		OCH	Occupational Heath		
	0007		OTI	Outpatient to Inpatient		

Static Definition – Field Level

SEQ	LEN	DT	Usage	Cardinality	TBL#	ITEM#	ELEMENT NAME
1	4	SI	X			00104	Set ID - PID
2	20	CX	RE	[1..1]		00105	Patient ID
3	20	CX	R	[1..*]		00106	Patient Identifier List
4	20	CX	X			00107	Alternate Patient ID - PID
5	48	XPN	R	[1..*]		00108	Patient Name
6	48	XPN	RE	[1..*]		00109	Mother's Maiden Name
7	26	TS	RE			00110	Date/Time of Birth
8	1	IS	RE		0001	00111	Sex
9	48	XPN	X			00112	Patient Alias
10	80	CE	X		0005	00113	Race
11	106	XAD	RE	[1..3]		00114	Patient Address
12	4	IS	X		0289	00115	County Code
13	40	XTN	RE	[1..3]		00116	Phone Number - Home
14	40	XTN	RE	[1..3]		00117	Phone Number - Business
15	60	CE	X		0296	00118	Primary Language
16	80	CE	X		0002	00119	Marital Status
17	80	CE	X		0006	00120	Religion
18	20	CX	X			00121	Patient Account Number
19	16	ST	RE			00122	SSN Number - Patient
20	25	DLN	X			00123	Driver's License Number - Patient
21	20	CX	X			00124	Mother's Identifier
22	80	CE	X		0189	00125	Ethnic Group
23	60	ST	RE			00126	Birth Place
24	1	ID	X		0136	00127	Multiple Birth Indicator
25	2	NM	X			00128	Birth Order
26	80	CE	X		0171	00129	Citizenship
27	60	CE	X		0172	00130	Veterans Military Status
28	80	CE	X		0212	00739	Nationality
29	26	TS	X			00740	Patient Death Date and Time
30	1	ID	X		0136	00741	Patient Death Indicator

Static Definition – Segment Level

Conformance using Message Profiles (9/10)

Profile Types

- HL7 standard profile: Represents HL7 published standard, creation and publication limited to HL7 use
- Constrainable profile: With optional elements which must be further constrained
- Implementation profile: No optional part, fully implementable

This allows vendors/provider to publish generic profiles from which fully constrained implementation profiles can be created.

Conformance using Message Profiles (10/10)

Table 5-7 Observation Segment (OBX)								
SEQ	ELEMENT NAME	Data Type	Usage	Cardinality	LEN	Conditional Predicate	Value Sets	Comment
1	Set ID – OBX	SI	R	[1..1]	1..4			
2	Value Type	ID	R	[1..1]	2..3		HL70125 (constrained)	
3	Observation Identifier	CE	R	[1..1]			NIP003	This indicates what this observation refers to. It poses the question that is answered by OBX-5.
4	Observation Sub-ID	ST	R	[1..1]	1..20		Constrain to positive integers	
5	Observation Value	varies[25]	R	[1..1]			varies	This is the observation value and answers the question posed by OBX-3
6	Units	CE	C(R/O)	[0..1]		If OBX-2(Value Type) is valued "NM" or "SN" Note: If there is not a unit of measure available while the Condition Predicated is true, then the value "NA" SHALL be used in CE.1 and "HL70353" in CE.3.	UCUM	
7	References	ST	O					

Example:

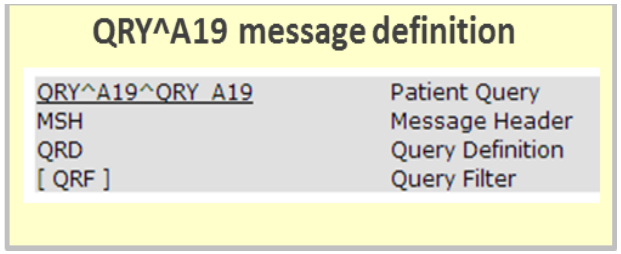
```
OBX|1|CE|64994-7^Eligibility Status^LN|1|V02^Medicaid^HL70064||||||F|||20120113|||VXC40^vaccine
level^CDCPHINVS<CR>
OBX|2|DT|29769-7^VIS presented^LN|2|20120113||||||F|||20120113<CR>
OBX|3|CE|69764-9^Document Type^LN|2|25308869830002641112116^Multivaccine
VIS^cdcgs1vis||||||F|||20120113<CR>
```

Scenario 1 – Query/ Result

Example – Query/ Result

Query for demographics data

- An application determines the need for ADT data about a patient and sends a query to the ADT system
- The query for patient demographics data (i.e. a QRY^A19 query message with an ADR^A19 response) is the query that is most often used internationally




```
MSH|^~\&|KIS||CommServer||200811111017||QRY^A19||P|2.2|
QRD|200811111016|R|I|Q1004|||1^RD|10000437363|DEM|||
```

- The message shown above is a query message (QRY) for a patients' demographics data (DEM) based on the patient ID "10000437363“
- The query has to be dealt with immediately (I) by the receiving application
- The response message may contain a maximum of 1 record (1^RD), the data is to be sent as structured data (R), not in the form of text

Scenario 1 – Query/ Result

An example of a response message is shown below:

```
MSH|^~\&|KIS||CommServer||200811111017||QRY^A19||P|2.2|
QRD|200811111016|R|I|Q1004|||1^RD|10000437363|MSH|^~\&|CommServer||KIS||200811111017||ADR^A19||P|2.2
MSA|AA
QRD|200811111016|R|I|Q1004|||1^RD|10000437363|DEM
PID|||10000437363|508003|Bauer^Fritz^^^||19631101|M|||Mercedesstr 12^^Bergheim^^68123^D|||||M|
NK1|1|Bauer^Karin|Ehefrau
PV1||S|CHI1^2W^1^CHI|R||||20 56 344^Antonius^ Markus^^^Dr.med.^^^Königstr. 112^69939^Haarheim/M.
  ^06146^61011|20 56 344^Antonius^Markus^^^Dr.med.^^^Königstr. 112^69939^Haarheim/M.^06146^
  61011|N|||||||||9800703||K|||||||||||||||||||||200311110928
DG1|1||355.9^355.9 Neuropathie onA^I9|||EL|||||||||1
DG1|2||386.-^386.- Schwindel^I9|||EL|||||||||2
DG1|3||087.9^087.9 Borreliose^I9|||EL|||||||||3
PR1|1||1-502.6^1-502.6 Biopsie durch Inzision am Unterschenkel^ICPM||20031107|P
PR1|2||5-940^5-940 Operationslagerung^ICPM|||P
PR1|3||5-900^5-900 Einfache Wiederherstellung der Kontinuität an Haut und Unterhaut^ICPM|||P
IN1|1|0||NAK|Innenstr. 52 ^^Hannover^^30014|||||||207714 ||10035|Bauer^Fritz||19631101|
  Mercedesstr 12^^Bergheim^^68123DEM|||
```

Definition of Response message

ADR^A19^ADR_A19	ADT Response
MSH	Message Header
MSA	Message Acknowledgment
[ERR]	Error
[QAK]	Query Acknowledgment
QRD	Query Definition
[QRF]	Query Filter
{	
PID	Patient Identification
[{ ROL }]	Role
[{ NK1 }]	Next of Kin / Associated Parties
PV1	Patient Visit
[PV2]	Patient Visit - Additional Info.
[{ ROL }]	Role
[{ OBX }]	Observation/Result
[{ AL1 }]	Allergy Information
[{ DG1 }]	Diagnosis Information
[DRG]	Diagnosis Related Group
[{	
PR1	Procedures
[{ ROL }]	Role
}]	
[{ GT1 }]	Guarantor
[{	
IN1	Insurance
[IN2]	Insurance Additional Info.
[{ ROL }]	Role
}]	
[ACC]	Accident Information
}	

Scenario 2 – HL7 ORU Result Message (Observation Result)

- The HL7 ORU-R01 message transmits observations and results from the producing system/filler i.e. LIS, EKG system) to the ordering system/placer (i.e. HIS, physician office application)
- It may also be used to transmit result data from the producing system to a medical record archival system, or to another system not part of the original order process
- Types of observations reported in the ORU-R01 message include:
  - Clinical lab results
  - Imaging study reports
  - EKG pulmonary function study results
  - Patient condition or other data (i.e. vital signs, symptoms, allergies, notes, etc.)
- The HL7 OBR segment is used in all ORU messages as a report header, and contains important information about the order being fulfilled (i.e. order number, request date/time, observation date/time, ordering provider, etc.)
- This segment is part of a group that can be used more than once for each observation result that is reported in the message

Scenario 2 – HL7 ORU Result Message (Observation Result)

- The HL7 OBX segment transmits the actual clinical observation results as a single observation or observation fragment
- OBX segments can also be used more than once in the message, and may be followed by one or more NTE segments to provide additional notes and comments about the observation
- ORU-R01 message would look like this (each OBR segment is shown in green, each OBX segment is shown in red):

```
MSH|^~\&|LCS|LCA|LIS|TEST9999|199807311532||ORU^R01|3629|P|2.2
PID|2|2161348462|20809880170|1614614|20809880170^TESTPAT||19760924|M|||^^^^
00000-0000||||||86427531^^^03|SSN# HERE
ORC|NW|8642753100012^LIS|20809880170^LCS|||||19980727000000|||HAVILAND
OBR|1|8642753100012^LIS|20809880170^LCS|008342^UPPER RESPIRATORY
CULTURE^L|||19980727175800||||||SS#634748641 CH14885 SRC:THROA
SRC:PENI|19980727000000||||||20809880170||19980730041800||BN|F
OBX|1|ST|008342^UPPER RESPIRATORY CULTURE^L||FINALREPORT|||||N|F||| 19980729160500|BN
ORC|NW|8642753100012^LIS|20809880170^LCS|||||19980727000000|||HAVILAND
OBR|2|8642753100012^LIS|20809880170^LCS|997602^.^L|||19980727175800||||G|||
19980727000000||||||20809880170||19980730041800|||F|997602|||008342
OBX|2|CE|997231^RESULT 1^L||M415|||||N|F|||19980729160500|BN
NTE|1|L|MORAXELLA (BRANHAMELLA) CATARRHALIS
NTE|2|L| HEAVY GROWTH
NTE|3|L| BETA LACTAMASE POSITIVE
OBX|3|CE|997232^RESULT 2^L||MR105|||||N|F|||19980729160500|BN
NTE|1|L|ROUTINE RESPIRATORY FLORA
```

Next Steps

HL7 V3.0 and CDA

- After successful completion of this course participants can go for HL7 V3.0 and CDA certifications

Interface engines

- Get an understanding of how HL7 messages are transferred and interpreted using interface engine like Mirth, Rhapsody, Cloverleaf etc.

Thank You

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