IHE International

Integrating the Healthcare Enterprise

Laboratory
Technical Framework

10

Volume 2
(LAB TF-2)
Transactions

Contents:

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1 Introduction

1.1 Overview of IHE

Integrating the Healthcare Enterprise (IHE) is an initiative designed to stimulate the integration of the information systems that support modern healthcare institutions. Its fundamental objective is to ensure that in the care of patients all required information for medical decisions is both correct and available to healthcare professionals. The IHE initiative is both a process and a forum for encouraging integration efforts. It defines a technical framework for the implementation of established interoperability standards to achieve specific clinical goals. It includes a rigorous testing process for the implementation of this framework, organizes educational sessions, exhibits at major meetings of medical professionals to demonstrate the benefits of this framework and encourage its adoption by industry and users.

The approach employed in the IHE initiative is to support the use of existing standards, e.g HL7, ASTM, DICOM, ISO, IETF, OASIS, CLSI and others as appropriate, rather than to define new standards. IHE profiles further constrain configuration choices where necessary in these standards to ensure that they can be used in their respective domains in an integrated manner between different actors. When clarifications or extensions to existing standards are necessary, IHE refers recommendations to the relevant standards bodies.

1.2 Overview of the Laboratory Technical Framework

1.2.1 Production

This document, the Laboratory Technical Framework (LAB TF), defines specific implementations of established standards to achieve integration goals of clinical laboratories with other components of a healthcare enterprise or with a broader community of healthcare providers, hereafter called a healthcare community.

This document is updated annually, following a period of public review, and maintained regularly through the identification and correction of errata. The current version, rev. 2.1 Final Text, specifies the IHE transactions defined and implemented as of August 2008.The latest version of the document is always available via the Internet at www.ihe.net/Technical Framework, www.ihe-europe.fr, www.gmsih.fr/IHE

It has been produced with the help of the following organizations:

GMSIH (Groupement pour la Modernisation du Système d'Information Hospitalier)

JAHIS (Japanese Association of Healthcare Information Systems Industry)

IHE-J (IHE Japan)

SFIL (Société Française d'Informatique de Laboratoire)

HL7 and its affiliate organizations

RSNA (Radiological Society of North America)

1.2.2 How the Laboratory Technical Framework is organized

The IHE Laboratory Technical Framework identifies a subset of the functional components of the healthcare enterprise or healthcare community, called IHE actors, and specifies their interactions in

440 terms of a set of coordinated, standards-based transactions. It describes this body of transactions in progressively greater depth, and is organized in 5 volumes:

- **Volume 1** of the Laboratory Technical Framework (LAB TF-1) provides a high-level view of IHE functionality, showing the transactions organized into functional units called integration profiles that highlight their capacity to address specific integration requirements for clinical purposes.

- The present volume, **Volume 2** of the Laboratory Technical Framework (LAB TF-2) provides a detailed technical description of each message-based transaction and of its messages.

- **Volume 3** of the Laboratory Technical Framework (LAB TF-3) provides a detailed technical description of each document-based transaction, its persistent content and binding.

- **Volume 4** of the Laboratory Technical Framework (LAB TF-4) provides a subset of LOINC
450 (Logical Observations Identifiers, Names and Codes) usable in all profiles of this Laboratory Technical Framework.

- **Volume 5** of the Laboratory Technical Framework (LAB TF-5) will be dedicated to national extensions that some countries may wish to build on top of this Laboratory Technical Framework.

1.3 Audience

The intended audience of this document is:
- Technical staff of vendors participating in the IHE initiative
- IT managers of healthcare institutions and healthcare communities.
- Experts involved in standards development
- Anyone interested in the technical aspects of integrating healthcare information systems.

460 ## 1.4 Relationship to Standards

The IHE Laboratory Technical Framework identifies functional components of a distributed healthcare environment (referred to as IHE actors), solely from the point of view of their interactions in the healthcare enterprise. At its current level of development, it defines a coordinated set of transactions based on HL7, IETF, ISO, CLSI, OASIS and W3C standards. As the scope of the IHE initiative expands, transactions based on other international standards may be included as required.

In some cases, IHE recommends selection of specific options supported by these standards; however, IHE does not introduce technical choices that contradict conformance to these standards. If errors in or extensions to existing standards are identified, IHE's policy is to report them to the appropriate standards bodies for resolution within their conformance and standards evolution strategy.

470 IHE is therefore an implementation framework, not a standard. Conformance claims for products must still be made in direct reference to specific standards. In addition, vendors who have implemented IHE integration capabilities in their products may publish IHE Integration Statements to communicate their products' capabilities. Vendors publishing IHE Integration Statements accept full responsibility for their content. By comparing the IHE Integration Statements from different products, a user familiar with the IHE concepts of actors and integration profiles can determine the level of integration between them.

1.5 Relationship to Real-world architectures

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The IHE Actors and transactions are abstractions of the real-world healthcare information system environment. While some of the transactions are traditionally performed by specific product categories (e.g. Hospital Information System, Electronic Patient Record, Clinical Information System, Laboratory Information System, Laboratory Automation System, analyzer, robotic transportation system and other pre and post-analytic process equipment), the IHE Laboratory Technical Framework intentionally avoids associating functions or actors with such product categories. For each actor, the IHE Laboratory Technical Framework defines only those functions associated with integrating information systems. The IHE definition of an actor should therefore not be taken as the complete definition of any product that might implement it, nor should the framework itself be taken to comprehensively describe the architecture of a healthcare information system.

1.6 Scope of Changes Introduced in the Current Year

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The IHE Technical Framework is updated annually to reflect new profiles, corrections and new transactions.

The main changes introduced by this revision 2.1 Final Text are the following:

- Refined descriptions of segments ORC, SAC, TQ1, OBX, SPM (see sections 3.5 to 3.9)
- Microbiology reporting rules (see section 3.11 and example in section 19.5)
- Option "Report Fac-simile For Order Group" (see sections 4, 6 and example in section 19.4)
- HL7 Ack, and MSA, ERR segments descriptions externalized to ITI TF-2:Appendix C
- Support of HL7 v2.5.1 (see OBX segment description in section 3.9)
- Cleanup of all examples messages in section 19

1.7 Comments

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IHE International welcomes comments on this document and the IHE initiative. They should be directed to the cochairs of the IHE Laboratory Committee, namely:

François Macary   Nobuyuki Chiba

francois.macary@gmsih.eu   chiban@alice.aandt.co.jp

1.8 Copyright Permissions

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1.9 IHE Technical Framework Development and Maintenance Process

The IHE Laboratory Technical Framework is being continuously extended and maintained by the IHE Laboratory Technical committee. The development and maintenance process of the Framework follows a number of principles to ensure stability of the specification so that both vendors and users may use it reliably in specifying, developing and acquiring systems with IHE integration capabilities.

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The first of these principles is that any extensions, clarifications and corrections to the Technical Framework must maintain backward compatibility with previous versions of the framework in order to maintain interoperability with systems that have implemented IHE Actors and Integration Profiles defined there.

1.10 Glossary

See Glossary section in Volume 1: LAB TF-1:1.11

2 Conventions

2.1 Technical Framework Cross-references

When references are made to another section within a Technical Framework volume, a section number is used by itself. When references are made to other volumes or to a Technical Framework in another domain, the following format is used:

530 <domain designator> TF-<volume number>: <section number>, where

<domain designator> is a short designator for the IHE domain (ITI = IT Infrastructure, PCC = Patient Care Coordination, LAB = Laboratory)

<volume number> is the applicable volume within the given Technical Framework (e.g., 1, 2, 3),

<section number> is the applicable section number.

For example: ITI TF-1: 3.1 refers to Section 3.1 in volume 1 of the IHE IT Infrastructure.

When references are made to Transaction numbers in the Technical Framework, the following format is used:

[<domain designator>-<transaction number>], where

<transaction number> is the transaction number within the specified domain. For example: [LAB-1]
540 refers to Transaction 1 from the IHE Laboratory Technical Framework, [ITI-30] refers to Transaction 30 from the IT Infrastructure Technical Framework.

2.2 The generic IHE Transaction Model

Transaction descriptions are provided in Section 3. In each transaction description, the actors, the roles they play, and the transactions between them are presented as use cases.

The generic IHE transaction description includes the following components:

- Scope: a brief description of the transaction.

- Use case roles: textual definitions of the actors and their roles, with a simple diagram relating them, e.g.:
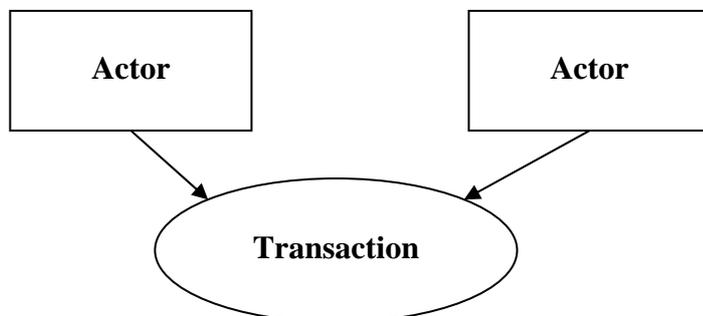
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- *Referenced Standards*: the standards (stating the specific parts, chapters or sections thereof) to be used for the transaction.

- *Interaction Diagram*: a graphical depiction of the actors and messages that support the transaction, with related processing within an Actor shown as a rectangle and time progressing downward, similar to:
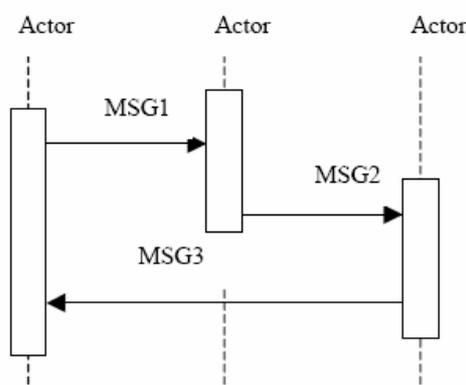
The interaction diagrams used in the IHE Laboratory Technical Framework are modeled after those described in Grady Booch, James Rumbaugh, and Ivar Jacobson, *The Unified Modeling Language User Guide*, ISBN 0-201-57168-4. Simple acknowledgment messages are often omitted from the diagrams for brevity. One or more messages may be required to satisfy a transaction. Each message is represented as an arrow starting from the Actor initiating the message.

- *Message definitions*: descriptions of each message involved in the transaction, the events that trigger the message, its semantics, and the actions that the message triggers in the receiver.

2.3 HL7 Profiling Conventions

The messages used by each transaction are described in this document using static definitions of "HL7 constrainable message profiles". Refer to HL7 v2.5 section 2.12.6. The static definition of each message is represented within tables. At the message level, a table represents the message structure and its definition in terms of segments. At the segment level, a table details one segment and its definition in terms of fields.

2.3.1 Static Definition - Message Level

The table describing a message contains 5 columns:

- *Segment*: gives the segment name, and places the segment within the hierarchy of the HL7message structure. Segments or segment groups not required appear between square brackets. Repeatable segments or segment groups appear between braces.

- *Meaning*: Meaning of the segment as defined by HL7

- *Usage*: Coded usage of the segment, as defined by this static definition built for the context of this particular transaction within IHE Laboratory Technical Framework. The coded values used in this document are:

  R: Required: A compliant sending application shall populate all "R" elements with a non-empty value. A compliant receiving application shall process (save/print/archive/etc.) or ignore the information conveyed by required elements. A compliant receiving application shall not raise an error due to the presence of a required element, but may raise an error due to the absence of a required element.

RE: Required if available. The element may be missing from the message, but shall be sent by the sending application if there is relevant data. A conformant sending application shall be capable of providing all "RE" elements. If the conformant sending application knows the required values for the element, then it shall send that element. If the conformant sending application does not know the required values, then that element may be omitted. Receiving applications will be expected to process (save/print/archive/etc.) or ignore data contained in the element, but shall be able to successfully process the message if the element is omitted (no error message should be generated if the element is missing).

O: Optional. The usage for this field within IHE Laboratory Technical Framework has not been defined yet

C: Conditional. This usage has an associated condition predicate. (See HL7 v2.5 section 2.12.6.6 "Condition Predicate").
If the predicate is satisfied: A compliant sending application shall always send the element. A compliant receiving application shall process or ignore data in the element. It may raise an error if the element is not present.
If the predicate is NOT satisfied: A compliant sending application shall NOT send the element. A compliant receiving application shall NOT raise an error if the condition predicate is false and the element is not present, though it may raise an error if the element IS present.

X: Not supported. For conformant sending applications, the element will not be sent. Conformant receiving applications may ignore the element if it is sent, or may raise an application error.

- Cardinality: Within square brackets, minimum and maximum number of occurrences authorized for this segment, in this static definition of the message, built for the context of this particular transaction within IHE Laboratory Technical Framework.

- HL7 chapter: Reference of the HL7 v2.5 chapter that describes this segment.

Simplification:

For a better readability of the table, the usage "X" is not shown <u>at the message level</u>: if a segment is "not supported" by an IHE profile, it simply doesn't appear in the table representing the message structure.

Table 3.2-1: Example: Initial segments of a message description

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin	O	[0..1]	
PID	Patient Identification	R	[1..1]	3
[	--- PATIENT VISIT begin	RE	[0..1]	
PV1	Patient Visit	R	[1..1]	3

2.3.2 Static Definition - Segment Level

The table describing a segment and its definition in terms of fields contains 7 columns :

- **SEQ**: Position (sequence) of the field within the segment.
- **LEN**: Maximum length of the field

- **DT**: Field Data Type

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- **Usage**: Usage of the field in this particular context of IHE Laboratory Technical Framework. Same coded values as in the message level: R, RE, C, O, X
- **Cardinality**: Minimum and maximum number of occurrences for the field in this particular context of IHE Laboratory Technical Framework. Same meaning as in the message level.
- **TBL#**: Table reference (for fields using a set of defined values)
- **ITEM#**: HL7 unique reference for this field
- **Element Name**: Name of the field.

Simplification :

For a better readability of the table, the usage "O" is not shown <u>at the segment level</u>: Optional fields do not appear in the tables. The number in the first column SEQ is the only item of information that provides the exact position of a field within this segment.

Table 3.2-2: Example: The MSH segment description

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	1	ST	R	[1..1]		00001	Field Separator
2	4	ST	R	[1..1]		00002	Encoding characters
3	227	HD	R	[1..1]	0361	00003	Sending Application
…							

2.4 HL7 Implementation Notes

2.4.1 Network Guidelines

The IHE Laboratory Technical Framework makes these recommendations:

Applications shall use the Minimal Lower Layer Protocol (MLLP) defined in appendix C of the HL7 Implementation Guide.

An application that wants to send a message (initiate a transaction) will initiate a network connection (if one does not already exist) to start the transaction. The receiver application will respond with an acknowledgement or response to query but will not initiate new transactions on this network connection.

2.4.2 Message Granularity

A message is generated from one trigger event in the real world. Therefore a message is related to one single business object:

A LAB-1, LAB-2 or LAB3 message is related to one Order or to one Order Group.

A LAB-4 or LAB-5 message is related to one Work Order.

A LAB-21, LAB-22, LAB-23 or LAB-26 message is related to one Work Order Step.

2.4.3 Empty and Nullified Fields

According to HL7 standard, if the value of a field is not present, the receiver shall not change corresponding data in its database. However, if the sender defines the field value to be the explicit NULL value (i.e. two double quotes ""), it shall cause removal of any values for that field in the receiver's database. This convention is fully applied by the IHE Laboratory Technical Framework.

2.4.4 Acknowledgement Modes

The Laboratory Technical Framework applies thoroughly the acknowledgement rules and syntax as defined in **ITI TF-2: C.2.3**. Implementers are referred to this **section C.2.3 in Appendix C of ITI TF volume 2** for all details regarding the usage of the MSA segment in acknowledgement messages (that is ACK, ORL and RSP messages), as well as the usage of the ERR segment.

For the IHE Laboratory Technical Framework, applications that receive HL7 messages shall send acknowledgements using the HL7 original acknowledgement mode as defined in HL7 v2.5 chapter 2, 2.9.2. The enhanced acknowledgement rules are not supported.

An OML message shall be acknowledged by one single ORL message. An OUL or an ORU message shall be acknowledged by one single ACK message. These acknowledgements are application-level acknowledgements (i.e. not transport acknowledgements) and must be generated by the receiving application after it has parsed the message and processed its content.

The receiving application shall automatically generate the application-level acknowledgement messages without waiting for human approval of the contents of the message that was received.

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2.4.5 IHE Laboratory Technical Framework Acknowledgement Policies

From a transactional viewpoint a MLLP (Minimal Lower Layer Protocol) network connection is *unidirectional*. Event-triggered messages flow in one direction and acknowledgement messages related to those event-triggered messages flow in the other direction.

670   The acknowledgement message to an event-triggered message shall be sent *immediately* to the sender on the same MLLP connection that carried the event-triggered message. The receiver of an event-triggered message should assume that the sending application is blocking and send an application-level acknowledgement as soon as possible.

It may take the receiving system a while (seconds, minutes) to acknowledge a message. If the MLLP connection is broken whilst the sending application is still waiting for an acknowledgement, the sending application shall initiate a new MLLP connection and resend the message.

The acknowledgement message is an application-level acknowledgement. (Note: HL7 commit/accept
680   acknowledgement messages shall not be used). The application acknowledgement shall only be created by an application that is able to examine a message at the semantic / business-proces level. Intermediate message brokers do not have this capacity and therefore shall not be used to generate the contents of application acknowledgements.
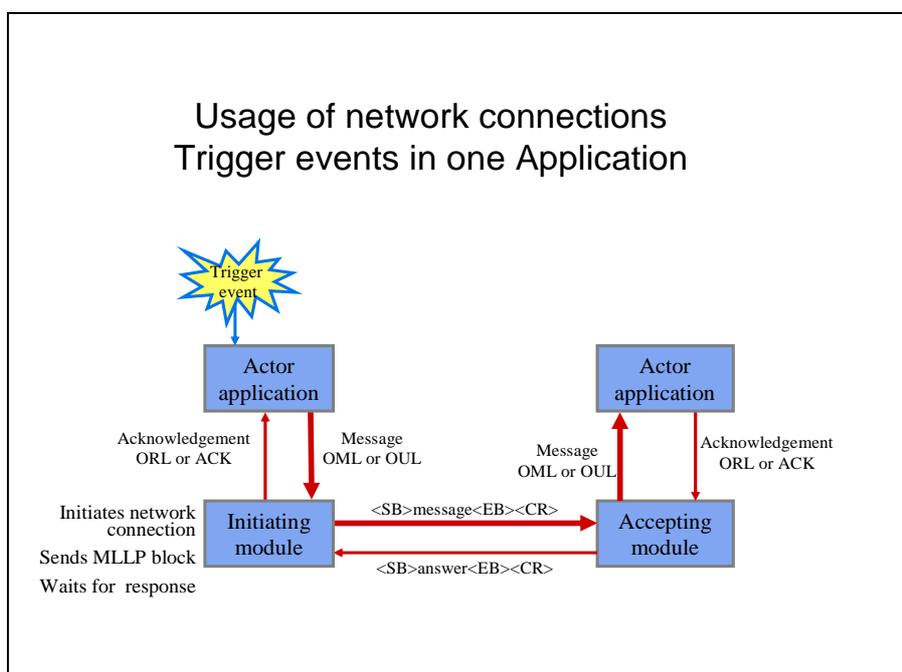
Transactions between 2 applications which contain trigger events on both sides (such as LAB-1) require at least two network connections between the Actors, one for each direction:

Usage of network connections
Trigger events in both Applications
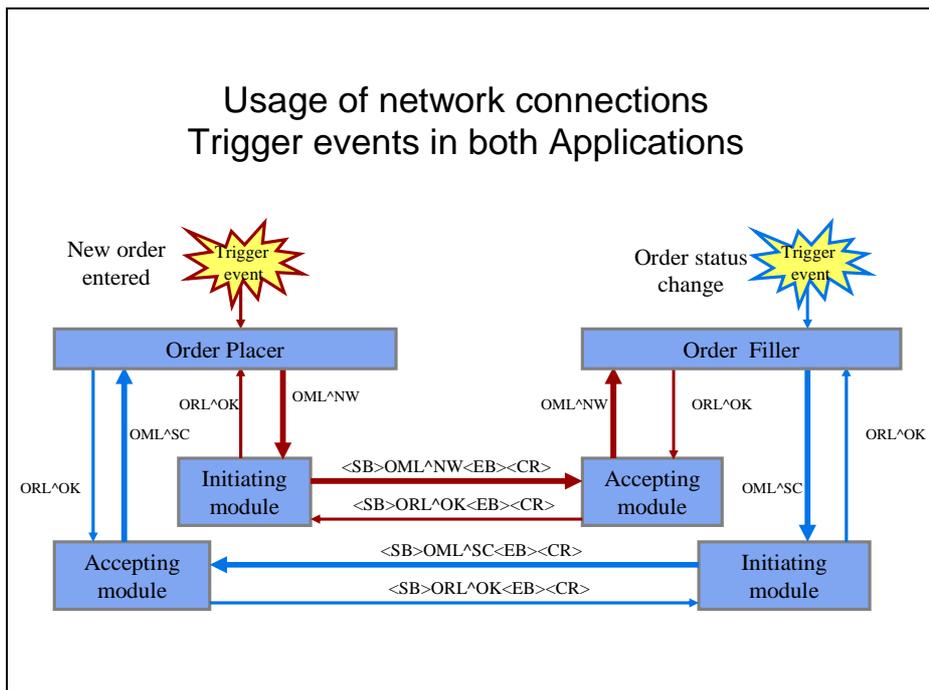
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2.4.6 HL7 Data Types

This section describes the IHE constraints on some HL7 data types.

2.4.6.1 CX – Extended Composite ID with Check Digit

The constraints below particurarly apply to the Patient Identifiers (PID segment).

SEQ	LEN	DT	Usage	CARD	TBL#	COMPONENT NAME
1	15	ST	R	[1..1]		ID Number
2	1	ST	O	[0..1]		Check Digit
3	3	ID	O	[0..1]	0061	Check Digit Scheme
4	227	HD	R	[1..1]	0363	Assigning Authority
5	5	ID	RE	[0..1]	0203	Identifier Type Code
6	227	HD	O	[0..1]		Assigning Facility
7	8	DT	O	[0..1]		Effective Date
8	8	DT	O	[0..1]		Expiration Date
9	705	CWE	O	[0..1]		Assigning Jurisdiction
10	705	CWE	O	[0..1]		Assigning Agency or Department

The data type has been constrained because the IHE Framework regards the Assigning Authority and the Identifier Type Code as essential components.

2.4.6.2 EI – Entity Identifier

The constraints below particularly apply to the following fields: placer group number, placer order number, filler order number and specimen number.

SEQ	LEN	DT	Usage	CARD	TBL#	COMPONENT NAME
1	16	ST	R	[1..1]		Entity Identifier
2	20	IS	C	[0..1]	0363	Namespace ID
3	199	ST	C	[0..1]		Universal ID
4	6	ID	C	[0..1]	0301	Universal ID Type

Component 1 is required. Either component 2 or both components 3 and 4 are required. Components 2, 3 and 4 may be all present.

The EI is appropriate for machine or software generated identifiers. The generated identifier goes in the first component. The remaining components, 2 through 4, are known as the assigning authority; they can also identify the machine/system responsible for generating the identifier in component 1.

Example 1: AB12345^RiversideHospital

Example 2: AB12345^^1.2.840.45.67^ISO

Example 3: AB12345^RiversideHospital^1.2.840.45.67^ISO

IHE restrains the length of the first component to 16 characters. National extensions can extend this length up to a maximum of 199.

IHE recommends to fill component 2 "Namespace ID" in all cases. Particularly when there are several concurrent assigning authorities within the healthcare enterprise, this Namespace ID will indicate which assigning authority provided this number.

This happens for instance, when there are several Order Placer actors within the enterprise, each one assigning placer order numbers and placer group numbers.

Example 4: Placer order number and placer group number assigned by two different Order Placer actors .

720   In message 1: `ORC|NW|`<mark>`9876543^Nephro`</mark>`||`<mark style="background:magenta">`777^Nephro`</mark>`|`...

In message 2: `ORC|SC|`<mark>`9876543^Urology`</mark>`||`<mark style="background:magenta">`555^Urology`</mark>` |`...

This also commonly happens when there are several Order Filler actors within the enterprise, each one assigning its own filler order numbers and specimen numbers.

Example 6: Filler order number and specimen number assigned by the Order Filler actor operated by the clinical laboratory of cytology.

     `SPM|1|`<mark style="background:cyan">`45611^Cytology`</mark>`|`...
     `...`
     `OBR|1|`<mark style="background:lime">`456^Cytology`</mark>`|`...

2.4.6.3 EIP – Entity Identifier Pair

730   HL7 Component Table - EIP – Entity Identifier Pair

SEQ	LEN	DT	Usage	CARD	TBL#	COMPONENT NAME
1	427	EI	C	[0..1]		Placer Assigned Identifier
2	427	EI	C	[0..1]		Filler Assigned Identifier

The IHE LAB-TF uses this data type for identifying specimens (see SPM-2 and SPM-3 in SPM segment static definition).

Condition predicate for EIP-1:

In the context of transactions LAB-1, LAB-2, LAB-3, the first sub-component is populated with the specimen ID assigned by the Order Placer Actor, if available.

In the context of transactions LAB-4 and LAB-5, the first sub-component is populated with the specimen ID assigned by an Actor preceding the Automation Manager in the workflow, if available.

740 In the context of transactions LAB-21, LAB-22, LAB-23, LAB-26 (in LDA profile), the first sub-component is populated with the specimen ID assigned by an Actor preceding the Laboratory Device, if available.

In the context of transactions LAB-61 and LAB-62, the first sub-component is populated with the specimen ID assigned by the Label Information Provider Actor.

Condition predicate for EIP-2:

In the context of transactions LAB-1, LAB-2, LAB-3, the second sub-component is populated with the specimen ID assigned by the Order Filler Actor, if available.

In the context of transactions LAB-4 and LAB-5, the second sub-component is populated with the specimen ID assigned by the Automation Manager or by a Laboratory Device, if available.

750 In the context of transactions LAB-21, LAB-22, LAB-23, LAB-26 (in LDA profile), the second sub-component is populated with the specimen ID assigned by a Laboratory Device, if available.

In the context of transactions LAB-61 and LAB-62, the second sub-component is never populated.

2.4.6.4 HD – Hierarchic Designator

SEQ	LEN	DT	Usage	CARD	TBL#	COMPONENT NAME
1	20	IS	R	[1..1]	0300	Namespace ID
2	199	ST	C			Universal ID
3	6	ID	C		0301	Universal ID Type

This Integration Profile requires that a field of Data Type HD be populated with:

- Either the first component "Namespace ID" alone, which in this case contains a local identifier of the object.

- Or with all three components, "Namespace ID" containing the name of the object, "Universal ID" containing its universal OID, and "Universal ID Type" containing the value **ISO**.

760   This data type is particularly used in this technical framework to identify facilities, applications and assigning authorities: sending and receiving applications, sending and receiving facilities, last update facility, assigning authority of an identifier, etc.

3 Common HL7 Message Segments for IHE LAB TF

This section describes the common message segments used by the transactions LAB-1, LAB-2, LAB-3, LAB-4, LAB-5.

Each table represents a segment. Below the table are commented only the fields for which IHE Laboratory Technical Framework brings some precision on usage. The optional fields are not shown in the table, unless they require a particular comment within the context of the IHE Framework.

770 ## 3.1 MSH - Message Header Segment

HL7 v2.5: chapter 2 (2.15 Message control)

This segment defines the intent, source, destination, and some specifics of the syntax of a message.

Table 3.1-1 : MSH - Message Header

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	1	SI	R	[1..1]		00001	Field Separator
2	4	ST	R	[1..1]		00002	Encoding Characters
3	227	HD	R	[1..1]		00003	Sending Application
4	227	HD	R	[1..1]		00004	Sending Facility
5	227	HD	R	[1..1]		00005	Receiving Application
6	227	HD	R	[1..1]		00006	Receiving Facility
7	26	TS	R	[1..1]		00007	Date/Time of Message
8	40	ST	X	[0..0]		00008	Security
9	15	MSG	R	[1..1]		00009	Message Type
10	20	ST	R	[1..1]		00010	Message Control Id
11	3	PT	R	[1..1]		00011	Processing Id
12	60	VID	R	[1..1]		00012	Version ID
14	180	ST	X	[0..0]		00014	Continuation Pointer
15	2	ID	X	[0..0]	0155	00015	Accept Acknowledgement Type
16	2	ID	X	[0..0]	0155	00016	Application Acknowledgement Type
17	3	ID	RE	[1..1]	0399	00017	Country Code
18	16	ID	C	[0..1]	0211	00692	Character Set
19	250	CE	RE	[1..1]		00693	Principal Language of Message
20	20	ID	C	[0..1]	0356	01317	Alternate Character Set Handling Scheme
21	427	EI	RE	[0..*]		01598	Message Profile Identifier

MSH-1 Field Separator, required: The IHE Laboratory Technical Framework requires that applications support HL7-recommended value that is | (ASCII 124).

MSH-2 Encoding Characters, required: This field contains the four characters in the following order: the component separator, repetition separator, escape character, and subcomponent separator. The IHE Laboratory Technical Framework requires that applications support HL7-recommended 780 values ^~\& (ASCII 94, 126, 92, and 38, respectively).

MSH-4 Sending Facility (HD), required:

Components: <Namespace ID (IS)> ^ <Universal ID (ST)> ^ <Universal ID Type (ID)>

The IHE Laboratory Technical Framework requires that this field be populated with:

First component (required): Namespace ID. The name of the organizational entity responsible for the sending application.

Second component (optional): The URI (OID) of the organizational entity responsible for the sending application.

Third component (optional): The type of identification URI provided in the second component of this field. The codification of these three components is entirely site-defined. It may be detailed in the national extensions of this framework.

MSH-6 Receiving Facility (HD), required:

Components: <Namespace ID (IS)> ^ <Universal ID (ST)> ^ <Universal ID Type (ID)>

The IHE Laboratory Technical Framework requires that this field be populated with:

First component (required): Namespace ID. The name of the organizational entity responsible for the receiving application.

Second component (optional): The URI (e.g. OID) of the organizational entity responsible for the receiving application.

Third component (optional): The type of identification URI provided in the second component of this field. The codification of these three components is entirely site-defined. It may be detailed in the national extensions of this framework.

MSH-9 Message Type (MSG), required:

Components: <Message Code (ID)> ^ <Trigger Event (ID)> ^ <Message Structure (ID)>

Definition: This field contains the message type, trigger event, and the message structure ID for the message. All three components are required.

Its content is defined within each transaction-specific section of this document.

MSH-10 Message Control Id (ST), required:

Definition: This field contains a number or other identifier that uniquely identifies the message. Each message should be given a unique identifier by the sending system. The receiving system will echo this ID back to the sending system in the Message Acknowledgment segment (MSA). The combination of this identifier and the name of the sending application (MSH-3) should be unique across the Healthcare Enterprise.

MSH-11 Processing ID (PT), required:

Components: <Processing ID (ID)> ^ <Processing Mode (ID)>

HL7 definition: This field indicates whether to process a message as defined in HL7 Application (level 7) Processing rules.

This IHE Laboratory Technical Framework mandates only the first component, with permitted values listed in HL7 table 0103 – Processing ID:

HL7 Table 0103: Processing ID

Value	Meaning	Comment
D	Debugging	
P	Production	
T	Training	

820 **MSH-12 Version ID (VID)**, required:

Components: <Version ID (ID)> ^ <Internationalisation Code (CE)> ^ <International Version ID (CE)>

Definition: This field is matched by the receiving system to its own version to be sure the message will be interpreted correctly.

The IHE Laboratory Technical framework requires the first component to be populated with a value starting with the character string "2.5" representing HL7 major release 2.5. Later minor releases of this 2.5, like the current release 2.5.1, are also supported by the Laboratory Technical Framework.

Valid examples: |2.5| |2.5.1|

MSH-15 Accept Acknowledgment Type (ID), not supported: IHE uses only the HL7 original
830 acknowledgement mode.

MSH-16 Application Acknowledgment Type (ID), not supported for the same reason.

MSH-17 Country Code (ID), required if available.

Definition: This field contains the country of origin for the message. The values to be used are those of ISO 3166, with the 3-character (alphabetic form). Refer to HL7 Table 0399 - Country code

Examples of valid values:
JPN = Japan, USA = United States, GBR = United Kingdom, ITA = Italy, FRA = France, NLD = Netherlands.

MSH-18 Character Set (ID), conditional.

Definition: This field contains the character set for the entire message. Refer to HL7 table 0211 -
840 Alternate character sets for valid values.

Examples of valid values:

ASCII: The printable 7-bit ASCII character set.

8859/1: The printable characters from the ISO 8859/1 Character set used by Western Europe. This character set can still be used, but 8859/15 should be used by preference. This character set is the forward-compatible version of 8859/1 and includes new characters such as the Euro currency symbol.

ISO IR87: Code for the Japanese Graphic Character set for information interchange (JIS X 0208-1990).

UNICODE UTF-8: UCS Transformation Format, 8-bit form.

Condition predicate: This field shall only be valued if the message uses a character set other than the
850 7-bit ASCII character set. Though the field is repeatable in HL7, IHE authorizes only one occurrence (i.e. one character set). The character set specified in this field is used for the encoding of all of the characters within the message.

MSH-19 Principal Language of Message (CE), required if available. Coded from ISO 639.

Examples: DE = German, EN = English, ES=Spanish, JA = Japanese, FR = French, NL = Dutch, IT = Italian

MSH-20 Alternate Character Set Handling Scheme (ID), conditional:

HL7 definition: When any alternative character sets are used (as specified in the second or later iterations of MSH-18 character sets), and if any special handling scheme is needed, this component is to specify the scheme used, according to HL7 Table 0356- Alternate character set handling scheme as
860 defined below:

HL7 Table 0356 - Alternate character set handling scheme

Value	Description	Comment
ISO 2022-1994	This standard is titled "Information Technology - Character Code Structure and Extension Technique". .	This standard specifies an escape sequence from basic one byte character set to specified other character set, and vice versa. The escape sequence explicitly specifies what alternate character set to be evoked. Note that in this mode, the actual ASCII escape character is used as defined in the referenced ISO document. As noted in 1.7.1, escape sequences to/from alternate character set should occur within HL7 delimiters. In other words, HL7 delimiters are basic one byte characters only, and just before and just after delimiters, character encoding status should be the basic one byte set.
2.3	The character set switching mode specified in HL7 2.5, section2.7.2, "Escape sequences supporting multiple character sets" and section 2.A.46, "XPN – extended person name".	Note that the escape sequences used in this mode do not use the ASCII "esc" character, as defined in ISO 2022-1994. They are "HL7 escape sequences" as first defined in HL7 2.3, sec. 2.9.2. (Also, note that sections 2.8.28.6.1and 2.9.2 in HL7 2.3 correspond to sections 2.16.93 and 2.7.2 in HL7 2. 5.)
<null>	This is the default, indicating that there is no character set switching occurring in this message.	This is the default.

Condition predicate: This field shall be valued for messages using more than one character set.

Example of HL7 messages in Japan:

MSH-21 Message Profile Identifier (EI), Required if available.

For IHE Laboratory Technical Framework, this field shall only be valued in the messages for which a Message Profile has been officially defined and identified. When multiple message profiles are listed in this field they should be (vendor specific, country specific) constraints of the IHE Laboratory Profile. Note that the overriding of IHE Laboratory Profile constraints is only allowed in national extensions to this framework.

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3.2 NTE - Notes and Comment Segment

HL7 v2.5 : chapter 2 (2.15 Message control)

This segment is used for sending notes and comments.

The IHE Laboratory Technical Framework limits the use of this segment to only one purpose: To comment the observations and the orders. Therefore, in the messages of this Integration Profile, NTE segments appear only below OBR or OBX segments.

Information that can be coded in OBX segments or OBR segments shall not be sent in a NTE segment.

Table 3.3-1: NTE - Notes and Comment segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	4	SI	R	[1..1]		00096	Set ID – NTE
2	8	ID	RE	[0..1]		00097	Source of Comment
3	65536	FT	RE	[0..1]		00098	Comment
4	250	CE	RE	[0..1]		01318	Comment Type

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NTE-1 Set ID - NTE (SI), required.

NTE-2 Source of Comment (ID), required but may be empty.

IHE Laboratory Technical Framework populates this field with one of these values:

Table 3.3-2 : Source of Comment

Value	Meaning	Comment
L	Order Filler is the source of the comment	
P	Order Placer is the source of the comment	
A	Automation Manager is the source of the comment	
O	Other system is the source of the comment	

NTE-3 Comment (FT), required but may be empty: This field contains the text of the comment. This text may be formatted. In order to delete an existing comment, the field shall contain empty quotation marks: " " .

Comment text of identical type and source shall be included in the same occurrence of an NTE segment, and not be split over multiple segments.

890 **NTE-4 Comment Type (CE)**, required if known.

The IHE Laboratory Technical Framework populates this field with one of these values:

Table 3.3-3 : Comment Type

Value	Meaning	Comment
I	Internal remark, that shall not be sent outside of the laboratory	Used between Automation Manager and Order Filler. Shall not be sent to the Order Result Tracker
C	Comment addressed to medical staff and physician,	Should be sent to the Order Result Tracker or the Order Placer, but should not be showed to the patient
P	Comment addressed to medical staff and physician, may be showed to the patient	Should be sent to the Order Result Tracker or the Order Placer, and may appear on the result report addressed to the patient.

3.3 PID - Patient Identification Segment

HL7 v2.5 : chapter 3 (3.4.2)

The PID segment is used by all applications as the primary means of communicating patient identification information. This segment contains permanent patient identifying and demographic information that, for the most part, is not likely to change frequently.

Table 3.4-1 : PID - Patient Identification segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	4	SI	O	[1..1]		00104	Set ID - PID
2	20	CX	X	[0..1]		00105	Patient ID
3	250	CX	R	[1..*]		00106	Patient Identifier List
4	20	CX	X	[0..1]		00107	Alternate Patient ID - PID
5	250	XPN	R	[1..*]		00108	Patient Name
6	250	XPN	O	[0..1]		00109	Mother's Maiden Name
7	26	TS	RE	[0..1]		00110	Date/Time of Birth
8	1	IS	R	[1..1]	0001	00111	Administrative Sex
9	250	XPN	X	[0..1]		00112	Patient Alias
10	250	CE	RE	[0..1]	0005	00113	Race
11	250	XAD	RE	[0..*]		00114	Patient Address
12	4	IS	X	[0..1]	0289	00115	County Code
13	250	XTN	O	[0..*]		00116	Phone Number - Home
14	250	XTN	O	[0..*]		00117	Phone Number - Business
15	250	CE	O	[0..1]	0296	00118	Primary Language
16	250	CE	O	[0..1]	0002	00119	Marital Status
17	250	CE	O	[0..1]	0006	00120	Religion
18	250	CX	RE	[0..1]		00121	Patient Account Number
19	16	ST	X	[0..1]		00122	SSN Number - Patient
20	25	DLN	X	[0..1]		00123	Driver's License Number - Patient
21	250	CX	O	[0..*]		00124	Mother's Identifier
22	250	CE	O	[0..1]	0189	00125	Ethnic Group
23	250	ST	O	[0..1]		00126	Birth Place
24	1	ID	O	[0..1]	0136	00127	Multiple Birth Indicator
25	2	NM	O	[0..1]		00128	Birth Order
26	250	CE	O	[0..1]	0171	00129	Citizenship
27	250	CE	O	[0..1]	0172	00130	Veterans Military Status
28	250	CE	X	[0..0]	0212	00739	Nationality
29	26	TS	O	[0..1]		00740	Patient Death Date and Time
30	1	ID	O	[0..1]	0136	00741	Patient Death Indicator
31	1	ID	RE	[0..1]	0136	01535	Identity Unknown Indicator
32	20	IS	RE	[0..1]	0445	01536	Identity Reliability Code
35	250	CE	C	[0..1]	0446	01539	Species Code
36	250	CE	C	[0..1]	0447	01540	Breed Code

900   The specific usage of these fields, especially those fields with usage " O " (optional) in the table above, is explained in the national extensions.

PID-7: if the exact date of birth is not known, the second component of this field can be used to describe the degree of precision of the information entered in the first component.

PID-18: The use of the Patient Account Number may be related to the Visit Number (PV1-19). Generally, one of both fields will be filled. Additional requirements for these fields may be documented in Regional or National appendices to the IHE Laboratory Technical Framework.

PID-35, PID-36:

Condition predicate: shall be used if the test subject is a non-human living subject.

3.4 PV1 - Patient Visit Segment

HL7 v2.5: chapter 3 (3.4.3)

910   The PV1 segment is used by Registration/Patient Administration applications to communicate information on an account or visit-specific basis.

Table 3.5-1: PV1 - Patient Visit segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
2	1	IS	R	[1..1]	0004	00132	Patient Class
3	80	PL	RE	[0..1]		00133	Assigned Patient Location
9	250	XCN	X	[0..0]	0010	00139	Consulting Doctor
19	250	CX	RE	[0..1]		00149	Visit Number
40	1	IS	X	[0..0]	0116	00170	Bed Status
51	1	IS	C	[0..1]	0326	01226	Visit Indicator
52	250	XCN	X	[0..0]	0010	01274	Other Healthcare Provider

The specific usage of these fields may be elaborated upon in the national extensions.

The use of the Visit Number (PV1-19) may be related to the Patient Account Number (PID-18). Generally, one of both fields will be filled. Additional requirements for these fields may be documented in Regional or National appendices to the IHE Laboratory Technical Framework.

Field PV1-51 shall be valued with value 'V' if the field PV1-19 is present. The field may be omitted otherwise.

920   The PV1 segment doesn't entirely cover the data model as defined in this framework. In some countries (especially in Europe), national extensions will define new segment to manage issues like 'functional units'.

The use of the PV1 segment shall be clarified in each national extension.

3.5 ORC Common Order Segment

HL7 v2.5: chapter 4 (4.5.1). The ORC and OBR segments contain a number of duplicate fields. The Laboratory Technical Framework is defined in such a way that fields in the OBR segment will be used in prevalence over their equivalents in ORC. If a field is listed as being optional in ORC, its equivalent in OBR may well be mandatory.

Table 3.5-1 : ORC Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	2	ID	R	[1..1]	0119	00215	Order Control
2	22	EI	C	[0..1]		00216	Placer Order Number
3	22	EI	C	[0..1]		00217	Filler Order Number
4	22	EI	RE	[0..1]		00218	Placer Group Number
5	2	ID	C	[0..1]	0038	00219	Order Status
6	1	ID	O	[0..1]	0121	00220	Response Flag
7	200	TQ	X	[0..0]		00221	Quantity/Timing
8	200	EIP	C	[0..1]		00222	Parent
9	26	TS	R	[1..1]		00223	Date/Time of Transaction
10	250	XCN	RE	[0..*]		00224	Entered By
11	250	XCN	RE	[0..*]		00225	Verified By
12	250	XCN	O	[0..1]		00226	Ordering Provider
13	80	PL	O	[0..1]		00227	Enterer's Location
14	250	XTN	O	[0..2]		00228	Call Back Phone Number
15	26	TS	O	[0..1]		00229	Order Effective Date/Time
16	250	CE	O	[0..1]		00230	Order Control Code Reason
17	250	CE	C	[0..1]		00231	Entering Organization
18	250	CE	O	[0..1]		00232	Entering Device
19	250	XCN	O	[0..*]		00233	Action By
20	250	CE	X	[0..0]	0339	01310	Advanced Beneficiary Notice Code
21	250	XON	O	[0..1]		01311	Ordering Facility Name
22	250	XAD	O	[0..1]		01312	Ordering Facility Address
23	250	XTN	O	[0..1]		01313	Ordering Facility Telephone Number
24	250	XAD	O	[0..1]		01314	Ordering Provider Address
25	250	CWE	X	[0..0]		01473	Order Status Modifier
26	60	CWE	X	[0..0]	0552	01641	Advanced Beneficiary Notice Override Reason
27	26	TS	C	[0..1]		01642	Filler's Expected Availability Date/Time
28	250	CWE	O	[0..1]		00615	Confidentiality Code
29	250	CWE	RE	[0..1]		01643	Order Type
30	250	CNE	O	[0..1]		01644	Enterer Authorization Mode
31	250	CWE	X	[0..1]		02286	Parent Universal Service Identifier

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ORC-1 Order Control (ID), required.

This field may be considered the "trigger event" identifier for orders. Many order control codes are defined in the *HL7 table 0119 – Order Control Codes*. The IHE Laboratory Technical Framework allows only the following subset:

Subset of HL7 table 0119 – Order Control Codes supported by IHE

Value	Description of use
NW	"New Order". Event request in OML message sent by the Order Placer in transaction LAB-1 or in OML message sent by the Order Filler in transaction LAB-4.
OK	"Notification or request accepted". Event notification in OML message. Event acknowledgement in ORL message
UA	"Unable to accept order/service". Event notification in OML message. Event acknowledgement in ORL message sent by the Order Filler in transaction LAB-1 or in ORL message sent by the Automation Manager in transaction LAB-4.
SC	"Status changed". Event notification in OML, ORU and OUL messages
CA	"Cancel order/ service request". Event request in OML message sent by the Order Placer in LAB-1, or by the Order Filler in LAB-4.
CR	"Canceled as requested". Event acknowledgement in ORL message responding to OML (CA)
UC	"Unable to cancel". Event acknowledgement in ORL message responding to OML (CA)
OC	"Order service canceled". Event notification in OML message sent by the Order Filler in transactions LAB-1 and LAB-3.
SN	"Send order/service number". Event request in OML message sent by the Order Filler in transaction LAB-2
NA	"Number assigned". Event acknowledgement in ORL message sent by the Order Placer in LAB-2, responding to OML (SN)
RP	"Order/service replace request". Event request in OML message sent by the Order Placer in transaction LAB-1 or in OML message sent by the Order Filler in transaction LAB-4.
RQ	"Replaced as requested". Event acknowledgement in ORL message responding to OML (RQ)
UM	"Unable to replace". Event acknowledgement in ORL message responding to OML (RQ)
RU	"Replaced unsolicited". Event notification in OML message (LAB-1) and OUL message (LAB-3) sent by the Order Filler.
XO	"Change order/service request". Used by the Order Placer in LAB-1
XR	"Changed as requested". Used by the Order Filler in LAB-1 in response to XO
UX	"Unable to change" Used by the Order Filler in LAB-1 in response to XO
PR	"Previous results with new order/service". Used in LAB-1, LAB-4, LAB-21 and LAB-22 to provide some previous results with the order or work order or wok order step that is requested by the sender.

ORC-2 Placer Order Number (EI), conditional.

The Placer Order Number (ORC-2, OBR-2) is local to the transaction: In transactions LAB-1, LAB-2, LAB-3 it is a number assigned to the Order by the Order Placer Actor. In transactions LAB-4, LAB-5 it is a number assigned to the Work Order by the Order Filler Actor. In transactions LAB-21, LAB-22, LAB-23 it is a number assigned to the WOS (Work Order Step) by the Automation Manager.

Condition predicate: if the field is valued then its value shall match the value of the required field OBR-2. Please refer to section 2.4.6.1 for the details of the data type.

ORC-3 Filler Order Number (EI), conditional.

Condition predicate: if the field is valued then its value shall match the value of the required field OBR-3. Please refer to section 2.4.6.1 for the details of the data type.

ORC-4 Placer Group Number (EI), required if known to the sender.

The Placer Group Number represents an identification of a set of closely related orders, i.e. the whole list of batteries ordered by the placer to the laboratory for one subject. Please refer to section 2.4.6.1 for the details of the data type.

The Placer Group Number (ORC-4) is the same throughout the whole workflow: OP → OF → AM in LSWF profile, AM→ LD in LDA profile. The content of this field belongs to the Order Placer Actor and can only be generated by this Actor. An Order Filler SHALL populate this field only with the number provided by the Order Placer.

In any message from any transaction of the Laboratory Technical Framework, the field ORC-4 must have a constant value (possibly empty) across the ORC segments of the message. In other words, a message on this framework communicates on zero or one Order Group.

ORC-5 Order Status (ID), conditional.

Condition predicate: This field shall be valued in all OML messages sent by the Order Filler. It represents the status of the order. This field shall not be valued in OML messages sent by the Order Placer.

The allowed values for this field within IHE Laboratory Technical Framework are a subset of *HL7 table 0038 - Order Status:*

HL7 table 0038 - Order Status: IHE subset for all transactions

Value	Description	Comment
A	Some, but not all, results available	
CA	Order was canceled	
CM	Order is completed	
IP	In process, unspecified	
SC	In process, scheduled	

Note: For the conditions of use of these values, please read section 3.10 "Correlations of status between ORC, OBR and OBX".

ORC-6 Response Flag (ID), optional.

The Laboratory Technical Framework does not constrain the usage of this field.

ORC-7 Quantity/Timing (TQ), not supported.

The Laboratory Technical Framework does not support this field.

ORC-8 Parent (EIP), conditional.

HL7 definition: This field relates a child to its parent when a parent-child relationship exists.

In this Laboratory Technical Framework this field is used in the context of microbiology orders, in transactions LAB-2 and LAB-3. The Order Filler Actor uses this field to specify the parent order from which a child order was generated on the laboratory side.

Condition predicate: If this field is valued, its content must be the same as the content of OBR-29.

ORC-9   Date/Time of Transaction   (TS), required

HL7 Definition: This field contains the date and time of the event that initiated the current transaction as reflected in ORC-1 Order Control Code. This field is not equivalent to MSH-7 Date and Time of Message that reflects the date/time of the creation of the physical message.

In OML messages "Status changed", this field contains the date/time of the last status change of the unit of work (ORC-5).

ORC-10 Entered By (XCN), optional.

HL7 definition: This field contains the identity of the person who actually keyed the request into the application. Note that this refers to the current transaction as reflected in ORC-1 Order Control Code. It provides an audit trail in case the request is entered incorrectly and the ancillary department needs to clarify the request. By local agreement, either the ID number or name component may be omitted.

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The Laboratory Technical Framework does not constrain the usage of this field.

For a new order placed (ORC-1="NW"), the field specifies the person who typed the order on the Order Placer application.

ORC-11 Verified By (XCN), optional.

HL7 definition: This field contains the identity of the person who verified the accuracy of the entered request. Note that this refers to the current transaction as reflected in ORC-1 Order Control Code. It is used in cases where the request is entered by a technician and needs to be verified by a higher authority (e.g., a nurse). By local agreement, either the ID number or name component may be omitted.

1000 The Laboratory Technical Framework does not constrain the usage of this field.

ORC-12 Ordering Provider (XCN), optional.

HL7 definition: This field contains the identity of the person who is responsible for creating the request (i.e., the ordering physician).

If the field is valued then its value has to match the value of the required field OBR-16.

ORC-13 Enterer's Location (PL), optional.

HL7 definition: This field specifies the location (e.g., nurse station, ancillary service location, clinic, floor) where the person who entered the request was physically located when the order was entered. Note that this refers to the current transaction as reflected in ORC-1 Order Control Code. Only those subcomponents relevant to enterer's location should be valued

1010 (commonly nursing unit; facility; building; floor). The person who entered the request is defined in ORC-10-entered by.

The Laboratory Technical Framework does not further constrain the usage of this field, which contains location, that is geographic data, not organizational data, as opposed to ORC-17.

For a new order placed (ORC-1="NW"), the field specifies the location where this order was typed on the Order Placer application.

ORC-14 Callback Phone Number (XTN), optional.

HL7 definition: This field contains the telephone number to call for clarification of a request or other information regarding the order.

Up to two phone numbers can be stored in this field. If the field is valued then its value has to

1020 match the value of field OBR-17.

ORC-15 Order Effective Date/Time (TS), optional.

HL7 definition: This field contains the date/time that the changes to the request took effect or are supposed to take effect.

If the field is left empty, its value is assumed to be equal to that specified in ORC-9-date/time of transaction or MSH-7-date/time of message if the transaction date/time is empty.

The Laboratory Technical Framework does not constrain the usage of this field.

ORC-16 Order Control Code Reason (CE), optional.

HL7 definition: This field contains the explanation (either in coded or text form) of the reason for the order event described by the order control code (HL7 Table 0119).

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The Laboratory Technical Framework does not constrain the usage of this field.

ORC-17 Entering Organization (CE), conditional.

HL7 definition: This field identifies the organization that the enterer belonged to at the time he/she enters/maintains the order, such as medical group or department. The person who entered the request is defined in ORC-10 -entered by.

IHE Condition predicate:

This field represents the medical organization or team (e.g. the cardiology department) who places a new order.

It should be provided by the Order Placer in OML messages carrying new orders (ORC-1="NW") sent to the Order Filler, over transaction LAB-1.

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It should be propagated by the Order Filler in all messages related to this order, sent to the Automation Manager over transaction LAB-4 as well as to the Order Result Tracker over transaction LAB-3.

ORC-18 Entering Device (CE), optional.

HL7 definition: This field identifies the physical device (terminal, PC) used to enter the order.

The Laboratory Technical Framework does not constrain the usage of this field.

ORC-19 Action By (XCN), optional.

HL7 definition: This field contains the identity of the person who initiated the event represented by the corresponding order control code. For example, if the order control code is CA (cancel order request), this field represents the person who requested the order

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cancellation. This person is typically a care provider but may not always be the same as ORC-12 ordering provider.

The Laboratory Technical Framework does not constrain the usage of this field.

ORC-20 Advanced Beneficiary Notice Code (CE), optional.

HL7 definition: This field indicates the status of the patient's or the patient's representative's consent for responsibility to pay for potentially uninsured services.

The Laboratory Technical Framework does not constrain the usage of this field.

ORC-21 Ordering Facility Name (XON), optional.

HL7 definition: This field contains the name of the facility placing the order.

The facility (hospital, clinic, institution) placing the order shall be represented with at least

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these three components: 1st = Organization name. 7th = Identifier Type Code whith the value "FI", which means "Facility ID" as stated by HL7 table n° 0203. 10th = Organization Identifier.

ORC-22 Ordering Facility Address (XAD), optional.

HL7 definition: This field contains the address of the facility placing the order.

The Laboratory Technical Framework does not constrain the usage of this field.

ORC-23 Ordering Facility Phone Number (XTN), optional.

> HL7 definition: This field contains the telephone number of the facility placing the order.

> The Laboratory Technical Framework does not constrain the usage of this field.

ORC-24 Ordering Provider (XAD), optional.

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> HL7 definition: This field contains the address of the care provider requesting the order.

> The Laboratory Technical Framework does not constrain the usage of this field.

ORC-25 Order Status Modifier (CWE), optional.

> HL7 definition: This field is a modifier or refiner of the ORC-5-Order status field. This field may be used to provide additional levels of specificity or additional information for the defined order status codes. Unlike the Order Status field, which is controlled by an HL7 defined table, this field is a CE data type allowing applications to support an unlimited library of Order Status Modifier codes.

> The Laboratory Technical Framework does not constrain the usage of this field.

ORC-26 Advanced Beneficiary Notice Override Reason (CWE), optional.

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> HL7 definition: This field contains the reason why the patient did not sign an Advanced Beneficiary Notice. The reason may be coded or it may be a free text entry.

> The Laboratory Technical Framework does not constrain the usage of this field.

ORC-27 Fillers Expectable Availability Date/Time (TS), conditional.

> This field contains the date/time when the laboratory results are planned to be available.

> Condition predicate: This field may be valued only in OML messages sent by the Order Filler to the Order Placer.

ORC-28 Confidentiality Code (CWE), optional.

> HL7 definition: This field contains information about the level of security and/or sensitivity surrounding the order (e.g., highly sensitive, not sensitive, sensitive, etc.).

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> The Laboratory Technical Framework does not constrain the usage of this field.

ORC-29 Order Type (CWE), required, may be empty.

> HL7 definition: This field indicates whether the order is to be executed in an inpatient setting or an outpatient setting. If this field is not valued, the system default is assumed. Refer to HL7 Table 0482 – Order Type for suggested values:

HL7 table 0482 - Order Type

Value	Description	Comment
I	Inpatient Order	
O	Outpatient Order	

> Field ORC-29 enables to distinguish between orders related to inpatient activity or outpatient activity, independantly of the real situation of the patient expressed in PV1. This field should be populated if known in messages sent by the Order Placer to the Order Filler, and propagated by the latter to the Automation Manager and to the Order Result Tracker.

1100 **ORC-30 Enterer Authorization Mode (CNE)**, optional.

> HL7 definition: This field indicates the form of authorization a recorder had from the responsible practitioner to create or change an order.

> The Laboratory Technical Framework does not constrain the usage of this field.

ORC-31 Parent Universal Service Identifier (CWE), not supported.

> This field contains the identifier code for the parent order, which caused this observation/test/battery to be performed. Its content is the same as the one of OBR-50

> OBR-31 and OBR-50 will be deprecated in version 2.7 of the standard.

3.6 TQ1 - Timing Quantity Segment

1110 HL7 v2.5: chapter 4 (4.5.4)

Table 3.6-1: TQ1 - Timing Quantity Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
7	26	TS	C	[0..1]		01633	Start date/time
9	250	CWE	R	[1..1]	0485	01635	Priority
12	10	ID	X	[0..0]	0427	01638	Conjunction

This cycle of the IHE Laboratory Technical Framework does not use TQ2 segment, and uses only one occurrence of TQ1 segment.

TQ1-7 Start date/time (TS), conditional

HL7 definition: This field may be specified by the requester, in which case it indicates the earliest date/time at which the services should be started. In many cases, however, the start date/time will be implied or will be defined by other fields in the service request record (e.g., urgency - STAT). In such a case, this field will be empty.

Condition predicate: This field is used in messages from the requester to the filler (Order Placer to
1120 Order Filler in LAB-1, Order Filler to Automation Manager in LAB-4, Autmation Manager to LD in LAB-21 and LAB-22) in cases where the requester wants to enforce a starting date/time for the execution of the ordered tests.

TQ1-9 Priority (CWE), required

This field defines the priority of the order. The values authorized by the IHE Laboratory Technical Framework are this subset of HL7 table 0485 - Priority codes:

HL7 table 0485 - Priority codes

Value	Description	Comment
S	Stat	With highest priority
A	ASAP	Fill after S orders
R	Routine	Default
P	Preop	
C	Callback	
T	Timing critical	A request implying that it is critical to come as close as possible to the requested time, e.g., for a trough anti-microbial level.

Transactions LAB-1, LAB-2 and LAB-3 restrict the usage to the first 6 values: S, A, R, P, C, T

TQ1-12 Conjunction (ID), not supported

This field is conditional in HL7: It has to be valued only in case there is more than one TQ1 segment.
As this IHE Framework restricts TQ1 to one single occurrence this field shall never be valued.

3.7 SPM - Specimen Segment

HL7 v2.5: chapter 7 (7.4.3)

Table 3.7-1: SPM - Specimen Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	4	SI	R	[1..1]		01754	Set ID – SPM
2	80	EIP	C	[0..1]		01755	Specimen ID
3	80	EIP	RE	[0..1]		01756	Specimen Parent IDs
4	250	CWE	R	[1..1]	0487	01900	Specimen Type
5	250	CWE	X	[0..0]	0541	01757	Specimen Type Modifier
6	250	CWE	O	[0..*]	0371	01758	Specimen Additives
7	250	CWE	RE	[0..1]	0488	01759	Specimen Collection Method
8	250	CWE	C	[0..1]		01901	Specimen Source Site
9	250	CWE	C	[0..*]	0542	01760	Specimen Source Site Modifier
10	250	CWE	O	[0..1]	0543	01761	Specimen Collection Site
11	250	CWE	RE	[0..*]	0369	01762	Specimen Role
12	20	CQ	X	[0..0]		01902	Specimen Collection Amount
13	6	NM	X	[0..0]		01763	Grouped Specimen Count
14	250	ST	O	[0..1]		01764	Specimen Description
15	250	CWE	O	[0..*]	0376	01908	Specimen Handling Code
16	250	CWE	RE	[0..1]	0489	01903	Specimen Risk Code
17	26	DR	RE	[0..1]		01765	Specimen Collection Date/Time
18	26	TS	C	[0..1]		00248	Specimen Received Date/Time
19	26	TS	O	[0..1]		01904	Specimen Expiration Date/Time
20	1	ID	C	[0..1]	0136	01766	Specimen Availability
21	250	CWE	C	[0..*]	0490	01767	Specimen Reject Reason
22	250	CWE	O	[0..1]	0491	01768	Specimen Quality
23	250	CWE	O	[0..1]	0492	01769	Specimen Appropriateness
24	250	CWE	O	[0..*]	0493	01770	Specimen Condition
25	20	CQ	O	[0..1]		01771	Specimen Current Quantity
26	4	NM	RE	[0..1]		01772	Number of Specimen Containers
27	250	CWE	O	[0..1]		01773	Container Type
28	250	CWE	O	[0..1]	0544	01774	Container Condition
29	250	CWE	O	[0..1]	0494	01175	Specimen Child Role

SPM-1   Set ID – SPM (SI), required

This field is used to identify SPM segment instances in messages where the SPM segment repeats. For the first (or only) occurrence of the segment, the sequence number is |1|; for the second occurrence, the sequence number is |2|; etc.

SPM-2   Specimen ID   (EIP), conditional.

This field contains a unique identifier or pair of unique identifiers for the specimen, enterprise-wide.

Condition predicate: This field shall be populated in OML messages of transaction LAB-1, in the context of the use case "Externally placed order with identified specimens" defined in volume 1.

This field is required in OML messages of the LAB-2 transaction. It may also be used in transaction LAB-3. This field is required if known (RE) in transactions LAB-4 and LAB-5. Refer to section 2.4.6.1 for the details of the data type.

SPM-3   Specimen Parent ID   (EIP), required if available.

This field contains the identifier for the parent specimen, from which the specimen described by the segment instance has been extracted. Please refer to section 2.4.6.1 for the details of the data type.

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The IHE Laboratory Technical Framework does not admit pooling of specimens; therefore the maximum cardinality for the parent specimen is 1.

SPM-4   Specimen Type   (CWE), required.

This field describes the precise nature of the entity that will be the source material for the observations. Valid coding systems for this field include HL7 table 0487 listed below, SNOMED CT, or any national coding scheme.

HL7 Table 0487

Value	Description	Comment
ABS	Abscess	
AMN	Amniotic fluid	
ASP	Aspirate	
BIFL	Bile fluid	
BLDA	Blood arterial	
BBL	Blood bag	
BLDC	Blood capillary	
BPU	Blood product unit	
BLDV	Blood venous	
BON	Bone	
BRO	Bronchial	
BRN	Burn	
CALC	Calculus (=Stone)	
CDM	Cardiac muscle	
CNL	Cannula	
CTP	Catheter tip	
CSF	Cerebral spinal fluid	
CVM	Cervical mucus	
CVX	Cervix	
COL	Colostrum	
BLDCO	Cord blood	
CNJT	Conjunctiva	
CUR	Curettage	
CYST	Cyst	
DIAF	Dialysis fluid	
DOSE	Dose med or substance	
DRN	Drain	
DUFL	Duodenal fluid	
EAR	Ear	
EARW	Ear wax (cerumen)	
ELT	Electrode	
ENDC	Endocardium	
ENDM	Endometrium	
EYE	Eye	
EXG	Exhaled gas (=breath)	
FLT	Filter	
FIST	Fistula	
FLU	Body fluid, unsp	
GAS	Gas	
GAST	Gastric fluid/contents	
GEN	Genital	
GENC	Genital cervix	
GENL	Genital lochia	
GENV	Genital vaginal	
HAR	Hair	
IHG	Inhaled Gas	

Value	Description	Comment
IT	Intubation tube	
ISLT	Isolate	
LAM	Lamella	
LN	Line	
LNA	Line arterial	
LNV	Line venous	
LIQ	Liquid NOS	
MAR	Marrow	
MEC	Meconium	
MBLD	Menstrual blood	
MLK	Milk	
MILK	Breast milk	
NAIL	Nail	
NOS	Nose (nasal passage)	
ORH	Other	
PAFL	Pancreatic fluid	
PRT	Peritoneal fluid /ascites	
PLC	Placenta	
PLAS	Plasma	
PLB	Plasma bag	
PLR	Pleural fluid (thoracentesis fld)	
PPP	Platelet poor plasma	
PRP	Platelet rich plasma	
PUS	Pus	
RT	Route of medicine	
SAL	Saliva	
SMN	Seminal fluid	
SER	Serum	
SKN	Skin	
SKM	Skeletal muscle	
SPRM	Spermatozoa	
SPT	Sputum	
SPTC	Sputum - coughed	
SPTT	Sputum - tracheal aspirate	
STL	Stool = Fecal	
SWT	Sweat	
SNV	Synovial fluid (Joint fluid)	
TEAR	Tears	
THRT	Throat	
TISS	Tissue	
TISG	Tissue gall bladder	
TLGI	Tissue large intestine	
TLNG	Tissue lung	
TISPL	Tissue placenta	
TSMI	Tissue small intestine	
TISU	Tissue ulcer	
TUB	Tube NOS	
ULC	Ulcer	
UMB	Umbilical blood	
UMED	Unknown medicine	
URTH	Urethra	
UR	Urine	
URC	Urine clean catch	
URT	Urine catheter	
URNS	Urine sediment	
USUB	Unknown substance	
VITF	Vitreous Fluid	
VOM	Vomitus	
BLD	Whole blood	
BDY	Whole body	
WAT	Water	
WICK	Wick	
WND	Wound	
WNDA	Wound abscess	
WNDE	Wound exudate	
WNDD	Wound drainage	

SPM-5 Specimen Type Modifier (CWE), not supported

This field contains modifying or qualifying description(s) about the specimen type whenever the vocabulary used in SPM-4 lacks of precision.

The IHE Laboratory Framework precludes the use of SPM-5 and recommends to use field SPM-4 only, to characterize the type of material subject of investigation, using an appropriate vocabulary such as HL7 table 0487, or a more precise one if needed.

SPM-6 Specimen Additives (CWE), optional, repeatable.

HL7 definition: This field identifies any additives introduced to the specimen before or at the time of collection. These additives may be introduced in order to preserve, maintain or enhance the particular nature or component of the specimen.

The IHE Laboratory Technical Framework has not constrained the usage of this field yet, other than adopting HL7 table 0371 for valid values:

HL7 Table 0371 – Additive/Preservative

Value	Description	Comment
F10	10% Formalin	Tissue preservative
C32	3.2% Citrate	Blue top tube
C38	3.8% Citrate	Blue top tube
HCL6	6N HCL	24 HR Urine Additive
ACDA	ACD Solution A	Yellow top tube
ACDB	ACD Solution B	Yellow top tube
ACET	Acetic Acid	Urine preservative
AMIES	Amies transport medium	Protozoa
HEPA	Ammonium heparin	Green top tube
BACTM	Bacterial Transport medium	Microbiological culture
BOR	Borate Boric Acid	24HR Urine Additive
BOUIN	Bouin's solution	Tissue
BF10	Buffered 10% formalin	Tissue
WEST	Buffered Citrate (Westergren Sedimentation Rate)	Black top tube
BSKM	Buffered skim milk	Viral isolation
CARS	Carson's Modified 10% formalin	Tissue
CARY	Cary Blair Medium	Stool Cultures
CHLTM	Chlamydia transport medium	Chlamydia culture
CTAD	CTAD (this should be spelled out if not universally understood)	Blue top tube
ENT	Enteric bacteria transport medium	Bacterial culture
ENT+	Enteric plus	Stool Cultures
JKM	Jones Kendrick Medium	Bordetella pertussis
KARN	Karnovsky's fixative	Tissue
LIA	Lithium iodoacetate	Gray top tube
HEPL	Lithium/Li Heparin	Green top tube
M4	M4	Microbiological culture
M4RT	M4-RT	Microbiological culture
M5	M5	Microbiological culture
MICHTM	Michel's transport medium	IF tests
MMDTM	MMD transport medium	Immunofluorescence
HNO3	Nitric Acid	Urine
NONE	None	Red or Pink top tube
PAGE	Pages's Saline	Acanthaoemba
PHENOL	Phenol	24 Hr Urine Additive
KOX	Potassium Oxalate	Gray top tube
EDTK	Potassium/K EDTA	Deprecated. Replaced by EDTK15 and EDTK75
EDTK15	Potassium/K EDTA 15%	Purple top tube
EDTK75	Potassium/K EDTA 7.5%	Purple top tube
PVA	PVA (polyvinylalcohol)	O&P
RLM	Reagan Lowe Medium	Bordetella pertussis cultures
SST	Serum Separator Tube (Polymer Gel)	'Tiger' Top tube
SILICA	Siliceous earth, 12 mg	Gray top tube
NAF	Sodium Fluoride	Gray top tube
FL100	Sodium Fluoride, 100mg	Urine
FL10	Sodium Fluoride, 10mg	Urine
NAPS	Sodium polyanethol sulfonate 0.35% in 0.85% sodium chloride	Yellow (Blood Culture)

HEPN	Sodium/Na Heparin	Green top tube
EDTN	Sodium/Na EDTA	Dark Blue top tube
SPS	SPS(this should be spelled out if not universally understood)	Anticoagulant w/o bacteriocidal properties
STUTM	Stuart transport medium	Bacterial culture
THROM	Thrombin	Orange or Grey/Yellow (STAT Chem)
FDP	Thrombin NIH; soybean trypsin inhibitor (Fibrin Degradation Products)	Dark Blue top tube
THYMOL	Thymol	24 Hr Urine Additive
THYO	Thyoglycollate broth	Bacterial Isolation
TOLU	Toluene	24 Hr Urine Additive
URETM	Ureaplasma transport medium	Ureaplasma culture
VIRTM	Viral Transport medium	Virus cultures

SPM-7   Specimen Collection Method   (CWE), required if available.

This field describes the procedure or process by which the specimen was collected. Valid coding systems for this field include HL7 table 0488 listed below, SNOMED CT, or any national coding scheme.

HL7 Table 0488 – Specimen Collection Method

Value	Description	Comment
FNA	Aspiration, Fine Needle	
PNA	Aterial puncture	
BIO	Biopsy	
BCAE	Blood Culture, Aerobic Bottle	
BCAN	Blood Culture, Anaerobic Bottle	
BCPD	Blood Culture, Pediatric Bottle	
CAP	Capillary Specimen	
CATH	Catheterized	
EPLA	Environmental, Plate	
ESWA	Environmental, Swab	
LNA	Line, Arterial	
CVP	Line, CVP	
LNV	Line, Venous	
MARTL	Martin-Lewis Agar	
ML11	Mod. Martin-Lewis Agar	
PACE	Pace, Gen-Probe	
PIN	Pinworm Prep	
KOFFP	Plate, Cough	
MLP	Plate, Martin-Lewis	
NYP	Plate, New York City	
TMP	Plate, Thayer-Martin	
ANP	Plates, Anaerobic	
BAP	Plates, Blood Agar	
PRIME	Pump Prime	
PUMP	Pump Specimen	
QC5	Quality Control For Micro	
SCLP	Scalp, Fetal Vein	
SCRAPS	Scrapings	
SHA	Shaving	
SWA	Swab	
SWD	Swab, Dacron tipped	
WOOD	Swab, Wooden Shaft	
TMOT	Transport Media,	
TMAN	Transport Media, Anaerobic	
TMCH	Transport Media, Chalamydia	
TMM4	Transport Media, M4	
TMMY	Transport Media, Mycoplasma	
TMPV	Transport Media, PVA	
TMSC	Transport Media, Stool Culture	
TMUP	Transport Media, Ureaplasma	
TMVI	Transport Media, Viral	
VENIP	Venipuncture	

SPM-8   Specimen Source Site   (CWE), conditional.

Condition predicate: This field should be populated by the placer in microbiology, when the specimen source site is known. Example: "EAR".

SPM-9   Specimen Source Site Modifier   (CWE), conditional, repeatable.

Condition predicate: This field should be populated by the placer in microbiology, when the specimen source site modifier is known. Example: "LEFT" when the specimen has been collected from the left ear. More than one source site modifier maybe populated.

SPM-10   Specimen Collection Site   (CWE), optional.

HL7 definition: This field differs from SPM-8-Specimen Source Site in those cases where the source site must be approached via a particular site (e.g., anatomic location). For example, in the case where a liver biopsy is obtained via a percutaneous needle, the collection site would be the point of entry of the needle. For venous blood collected from the left radial vein, the collection site could be "antecubital fossa".

The IHE Laboratory Technical Framework leaves the usage of this field optional, with no pre-specified vocabulary. HL7 user defined Table 0453 does not suggest any values.

SPM-11   Specimen Role   (CWE), required if known by the sender, repeatable.

The allowed values are listed in HL7 user defined table 0369, complemented by IHE:

HL7 User-defined Table 0369 – Specimen Role

Value	Description	Comment
B	Blind Sample	
C	Calibrator, used for initial setting of calibration	
E	Electronic QC, used with manufactured reference providing signals that simulate QC results	
F	Specimen used for testing proficiency of the organization performing the testing (Filler)	
G	Group (where a specimen consists of multiple individual elements that are not individually identified)	
L	Pool (aliquots of individual specimens combined to form a single specimen representing all of the components.)	
O	Specimen used for testing Operator Proficiency	
P	Patient (human or other species)	
Q	Control specimen	
R	Replicate	
V	Verifying Calibrator, used for periodic calibration checks	
PSN	Human patient	added by IHE LAB TF, taken from HL7 V3 vocab
ANM	Animal	added by IHE LAB TF, taken from HL7 V3 vocab
MIC	Microorganism	added by IHE LAB TF, taken from HL7 V3 vocab
PLNT	Plant	added by IHE LAB TF, taken from HL7 V3 vocab
MAT	Material, non-living subject	added by IHE LAB TF, taken from HL7 V3 vocab

Restricted value sets:

Transactions LAB-1, LAB-2 and LAB-3 deal with orders and results basically related to specimens collected from a patient and in some cases specimens collected from a non-person or even non-living subject (suspected rabid fox, spoiled water, rotten meat, isolated microorganism…) Therefore in these transactions, the only valid values are: "P" (patient, human or not), "PSN" (human patient), "ANM" (animal), "MIC" (microorganism subject), "PLNT" (vegetable subject), "MAT" (non-living subject e.g. air, water, instrument, food…)

Transactions LAB-4 and LAB-5 use the same value set as LAB-1, LAB-2 and LAB-3, plus one extra value: "Q" (control specimen) used on Work Orders and results related to quality control specimens.

The other transactions of the Laboratory Technical Framework using the SPM segment use the values in the table above, with no particular restriction.

SPM-12 Specimen Collection Amount (CQ), not supported.

HL7 definition: This field specifies the volume (quantity and units) of the collected specimen. The field has two components: `<Quantity (NM)>^<Units (CE)>`

1210   The IHE Laboratory Technical Framework in its current release does not use this field.

In particular, the volume of a 24 hour urine specimen is carried in the OML message placing the Order (or the Work Order) as an observation in itself, using one or two OBX segments, as in the example below:

```
SPM|2|654_2^chemistry||UR||||||P||||||200310060735|200310060821||Y||||||1
OBX|1|NM|13362-9^URINE COLLECTION DURATION^LN||24|Hr|||||F|||200309060735
OBX|2|NM|19153-6^URINE SPECIMEN VOLUME^LN||980|ml|||||F|||200309060735
```

SPM-13 Grouped Specimen Count (NM), not supported.

The IHE Laboratory Technical Framework in its current release does not use this field, since none of its Transaction deals with grouped specimens.

1220   **SPM-14 Specimen Description (ST)**, optional.

HL7 definition: This is a text field that allows additional information specifically about the specimen to be sent in the message.

The IHE Laboratory Technical Framework has not constrained the usage of this field yet.

SPM-15 Specimen Handling Code (CWE), optional, repeatable.

HL7 definition: This field describes how the specimen and/or container need to be handled from the time of collection through the initiation of testing.

IHE Laboratory usage: This field may be used in messages placing an Order (in LAB-1) or a Work Order (in LAB-4) or a Work Order Step (in LAB-21 and LAB-22) as well as in messages carrying labeling instructions (in LAB-61 and LAB-62).

1230   The allowed values are listed in HL7 user defined table 0369, complemented by IHE:

HL7 User-defined Table 0376 – Specimen Handling Code

Code	Description	Comment/Usage Note/Definition
C37	Body temperature	Critical to keep at body temperature: 36 - 38° C.
AMB	Ambient temperature	Keep at ambient (room) temperature, approximately 22 ± 2 degrees C. Accidental refrigeration or freezing is of little consequence
CAMB	Critical ambient temperature	Critical ambient – must not be refrigerated or frozen.
REF	Refrigerated temperature	Keep at refrigerated temperature: 4-8° C. Accidental warming or freezing is of little consequence
CREF	Critical refrigerated temperature	Critical refrigerated – must not be allowed to freeze or warm until immediately prior to testing
FRZ	Frozen temperature	Keep at frozen temperature: -4° C. Accidental thawing is of little consequence
CFRZ	Critical frozen temperature	Critical frozen – must not be allowed to thaw until immediately prior to testing
DFRZ	Deep frozen	Deep frozen: -16 to -20° C.
UFRZ	Ultra frozen	Ultra cold frozen: ~ -75 to -85° C. (ultra cold freezer is typically at temperature of dry ice).
NTR	Liquid nitrogen	Keep in liquid nitrogen.
PRTL	Protect from light	Protect from light (e.g., wrap in aluminum foil).
CATM	Protect from air	Critical. Do not expose to atmosphere. Do not uncap.
DRY	Dry	Keep in a dry environment.
PSO	No shock	Protect from shock.
PSA	Do not shake	Do not shake.
UPR	Upright	Keep upright. Do not turn upside down.
MTLF	Metal Free	Container is free of heavy metals including lead.

SPM-16 Specimen Risk Code (CWE), required if available.

This field contains any known or suspected specimen hazards.

Condition predicate: This field shall be populated if known in OML messages sent by the Order Placer, within transaction LAB-1, and OML messages sent by the Order Filler within transactions LAB-2 and LAB-4. The allowed values are given by HL7 user-defined table 0489:

HL7 User-defined Table 0489 – Risk Codes

Code	Description	Comment/Usage Note/Definition
BIO	Biological	The dangers associated with normal biological materials. I.e. potential risk of unknown infections. Routine biological materials from living subjects.
COR	Corrosive	Material is corrosive and may cause severe injury to skin, mucous membranes and eyes. Avoid any unprotected contact.
ESC	Escape Risk	The entity is at risk for escaping from containment or control.
AGG	Aggressive	A danger that can be associated with certain living subjects, including humans.
IFL	MaterialDangerInflammable	Material is highly inflammable and in certain mixtures (with air) may lead to explosions. Keep away from fire, sparks and excessive heat.
EXP	Explosive	Material is an explosive mixture. Keep away from fire, sparks, and heat.
INF	MaterialDangerInfectious	Material known to be infectious with human pathogenic microorganisms. Those who handle this material must take precautions for their protection.
BHZ	Biohazard	Material contains microorganisms that are an environmental hazard. Must be handled with special care.
INJ	Injury Hazard	Material is solid and sharp (e.g., cannulas.) Dispose in hard container.
POI	Poison	Material is poisonous to humans and/or animals. Special care must be taken to avoid incorporation, even of small amounts.
RAD	Radioactive	Material is a source for ionizing radiation and must be handled with special care to avoid injury of those who handle it and to avoid environmental hazards.

SPM-17   Specimen Collection Date/Time   (DR), required if available.

Definition: The date and time when the specimen was acquired from the source. The use of the Date Range data type allows for description of specimens collected over a period of time, for example, 24-hour urine collection. For specimens collected at a point in time, only the first component (start date/time) will be populated

SPM-18   Specimen Received Date/Time   (TS), conditional.

The time that the specimen is received at the laboratory.

Condition predicate: This field shall be populated in OML messages sent by the Order Filler, within transactions LAB-1 (all use cases), LAB-2 and LAB-3, if the specimen has been received by the laboratory. In other words this field is RE for the Order Filler actor in both transactions LAB-1, LAB-2 and LAB-3.

SPM-19   Specimen Expiration Date/Time   (TS), optional.

HL7 definition: This field is the date and time the specimen can no longer be used for the purpose implied by the order.

The IHE Laboratory Technical Framework has not constrained the usage of this field yet.

SPM-20   Specimen Availability   (ID), conditional.

This describes whether the specimen, as it exists, is currently available to use in an analysis. The two authorized values are "Y" (yes) or "N" (no).

Condition predicate: This field shall be populated in messages sent by the Order Filler, within transactions LAB-1, LAB-2 and LAB-3. The value 'N' indicates either that the laboratory hasn't received the specimen yet, or that it has rejected the received specimen.

1260   The value of this field can be implicitly derived from ORC-5 (e.g. ORC-5 = 'IP' implicitly means that the specimen has arrived, otherwise the test could not be in progress).

SPM-21   Specimen Reject Reason   (CWE), conditional, repeatable.

This field describes one or more reasons the specimen is rejected for the ordered batteries.

Condition predicate: This field shall be populated whenever the laboratory rejects a specimen, .in OML messages sent by the Order Filler in transaction LAB-1, as well as in ORU or OUL messages sent by the Order Filler in transaction LAB-3.

HL7 Table 0490 lists valid values:

HL7 Table 0490 - Specimen Reject Reason

Value	Description	Comment
EX	Expired	
QS	Quantity not sufficient	
RB	broken container	
RC	Clotting	
RD	missing collection date	
R	missing patient ID number	
RE	missing patient name	
RH	Hemolysis	
RI	Identification problem	
RL	Improper labeling	
RM	labeling	
RN	contamination	
RP	missing phlebotomist ID	
RR	improper storage	
RS	name misspelling	

SPM-22   Specimen Quality   (CWE), optional.

1270   HL7 definition: The degree or grade of excellence of the specimen at receipt. The filler populates this attribute.

The IHE Laboratory Technical Framework has not constrained the usage of this field yet.

SPM-23   Specimen Appropriateness   (CWE), optional.

HL7 Definition: The suitability of the specimen for the particular planned use as determined by the filler.

The IHE Laboratory Technical Framework has not constrained the usage of this field yet.

SPM-24   Specimen Condition   (CWE), optional, repeatable.

HL7 definition: A mode or state of being that describes the nature of the specimen.

The IHE Laboratory Technical Framework has not constrained the usage of this field yet.

1280 **SPM-25   Specimen Current Quantity   (CQ)**, optional.

HL7 definition: This attributes contains the amount of specimen that currently exists or is available for use in further testing.

The IHE Laboratory Technical Framework has not constrained the usage of this field yet.

SPM-26   Number of Specimen Containers   (NM), required if available.

HL7 Definition: This field identifies the number of containers for a given specimen. For sample receipt verification purposes; may be different from the total number of specimens that accompany the order.

Example: One 24 Hr urine specimen collected in two bottles.

SPM-27   Container Type (CWE), optional.

1290   The container(s) on or in which a specimen is transported.

The IHE Laboratory Technical Framework does not constrain the usage of this field yet, nor provides any preferred vocabulary for it. This can be done in national extensions of this framework.

SPM-28   Container Condition (CWE), optional.

HL7 definition: This attributes contains the amount of specimen that currently exists or is available for use in further testing.

The IHE Laboratory Technical Framework does not constrain the usage of this field yet, nor provides any preferred vocabulary for it..

SPM-29   Specimen Current Quantity (CWE), optional.

1300   HL7 definition: This attributes contains the amount of specimen that currently exists or is available for use in further testing.

The IHE Laboratory Technical Framework does not constrain the usage of this field yet.

3.8 SAC Container Detail Segment

HL7 v2.5: chapter 13

The IHE Laboratory Technical Framework uses some of the fields of the SAC segment listed below. It allows all other fields to be optionally used, except those superseded by fields of the SPM segment.

Table 3.8-1 : SAC Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
3	80	EI	R	[1..1]		01331	Container Identifier
4	80	EI	C	[0..1]		01332	Primary (parent) Container Identifier
6	300	SPS	X	[0..0]		00249	Specimen Source
10	80	EI	O	[0..1]		01337	Carrier Identifier
11	80	NA	O	[0..1]		01338	Position in Carrier
13	80	EI	O	[0..1]		01340	Tray Identifier
14	80	NA	O	[0..1]		01341	Position in Tray
15	250	CE	O	[0..*]		01342	Location

1310 **SAC-3 – Container Identifier (EI)**, required.

> SAC-3 field identifies the container. This field is the container's identifier assigned by the corresponding equipment. A container may contain the primary (original) specimen or an aliquot (secondary sample) of that specimen. For primary sample this field contains Primary Container ID; for bar-coded aliquot samples this field contains Aliquot Container ID.

SAC-4 – Primary (parent) Container Identifier (EI), conditional.

> Condition predicate: This field is used only in transactions LAB-4 and LAB-5, LAB-21, LAB-22, LAB-23, LAB-26, LAB-61 and LAB-62 when dealing with an aliquoted specimen. In that case, SAC-3 and SAC-4 are used simultaneously as described below:

> If SAC-4 field is filled in, it identifies the primary container from which this specimen came.
1320 For primary samples this field is empty; for aliquot samples this field should contain the identifier of primary container.

SAC-6 – Specimen Source (SPS), not supported.

> This field is superseded by the SPM segment.

SAC-10 – Carrier Identifier (EI), optional.

> HL7 definition: This field identifies the carrier. It is the ID (e.g., number or bar code) of the carrier where the container (e.g., tube) is located.

> The IHE Laboratory Technical Framework has not constrained the usage of this field yet.

SAC-11 – Position in Carrier (NA), optional.

> Components: <Value1 (NM)> ^ <Value2 (NM)> ^ <Value3 (NM)> ^ <Value4 (NM)> ^ < ()>

1330 HL7 definition: This field identifies the position of the container in the carrier (e.g., 1…3…). The sub-components allow, if necessary, to transfer multiple axis information, e.g., 2-dimensional carrier (X^Y).

> The IHE Laboratory Technical Framework has not constrained the usage of this field yet.

SAC-13 – Tray Identifier (EI), optional.

HL7 definition: This field identifies the tray identifier (e.g., a number of a tray or a bar code on the tray), where the container carrier is located.

The IHE Laboratory Technical Framework has not constrained the usage of this field yet.

SAC-14 – Position in Tray (NA), optional.

```
Components: <Value1 (NM)> ^ <Value2 (NM)> ^ <Value3 (NM)> ^ <Value4 (NM)> ^ < ()>
```

1340   HL7 definition: This field identifies the position of the carrier in the tray. The sub-components allow, if necessary, to transfer multiple axis information, e.g., 2-dimensional tray (X^Y).

The IHE Laboratory Technical Framework has not constrained the usage of this field yet.

SAC-15 – Location (CE), optional.

HL7 definition: This field is the physical location that the specimen was at the time that the transaction was initiated. The location description can vary with the LAS. For example, it can be an X,Y,Z coordinate in a storage system; a refrigerator number and drawer number where the container-carrier-tray is located; or it can be the name of the institution and the laboratory which owns the container currently. The repeating of this field allows for hierarchical representation of location (lowest level first), e.g., shelf number, refrigerator storage id, lab
1350   name, institution name, etc.

The IHE Laboratory Technical Framework has not constrained the usage of this field yet.

3.9 OBX - Observation/Result Segment

HL7 v2.5.1: chapter 7 (7.4.2)

Table 3.9-1 : OBX Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	4	SI	R	[1..1]		00569	Set ID – OBX
2	2	ID	C	[0..1]	0125	00570	Value Type
3	250	CE	R	[1..1]		00571	Observation Identifier
4	20	ST	C	[0..1]		00572	Observation Sub-ID
5	99999	Varies	C	[0..1]		00573	Observation Value
6	250	CE	C	[0..1]		00574	Units
7	60	ST	RE	[0..1]		00575	References Range
8	5	IS	RE	[0..1]	0078	00576	Abnormal Flags
9	5	NM	X	[0..0]		00577	Probability
10	2	ID	X	[0..0]	0080	00578	Nature of Abnormal Test
11	1	ID	R	[1..1]	0085	00579	Observation Result Status
12	26	TS	X	[0..0]		00580	Effective Date of Reference Range
13	20	ST	C	[0..1]		00581	User Defined Access Checks
14	26	TS	RE	[0..1]		00582	Date/Time of the Observation
15	250	CE	RE	[0..1]		00583	Producer's ID
16	250	XCN	RE	[0..1]		00584	Responsible Observer
17	250	CE	C	[0..1]		00936	Observation Method
18	22	EI	X	[0..0]		01479	Equipment Instance Identifier
19	26	TS	RE	[0..1]		01480	Date/Time of the Analysis
20							Reserved by HL7 for future use
21							Reserved by HL7 for future use
22							Reserved by HL7 for future use
23	567	XON	C	[0..1]		02283	Performing Organization Name
24	631	XAD	O	[0..1]		02284	Performing Organization Address
25	3002	XCN	O	[0..1]		02285	Performing Organization Director Name

OBX-1 Set ID - OBX (SI), **required**.

This field contains the sequence number of the OBX.

OBX-2 Value Type (ID), conditional.

Condition predicate: This field shall be valued if OBX-5 (Observation Value) is populated. The Value Type field should be filled according to HL7 Version 2.5 standard (table 0125). For example, if the result is ">300" the Value Type "SN" (Structured Numeric) SHALL be used instead of the "ST" (String) value type that was used in previous versions of HL7. See the details and the examples in the HL7 V2.5 (7.4.2). For an observation that consists of a time measurement (e.g. bleeding time) the TM Value Type is preferred to NM but this is not made mandatory.

OBX-3 Observation Identifier (CE), required

The usage of LOINC(r) test codes for the identification of tests is strongly recommended. Details of this free vocabulary can be found at http://www.loinc.org .

1370 The first and third sub-fields "Identifier", and "Name of Coding System" are required in all transactions. The value of the "Name of Coding System" in the case of LOINC is "LN".

In transaction LAB-3 the second sub-field "Text" is mandatory, which allows the Order Result Tracker to manage the results without the help of Test Master File.

The last three sub-fields are optional in all transactions.

OBX-4 Observation Sub-ID (ST), conditional.

HL7 Definition: This field is used to distinguish between multiple OBX segments with the same observation ID organized under one OBR.

Condition predicate:

This field is required in two situations:

1380 a) In a result message (ORU or OUL) when the OBR segment reports the results of a microbiology culture, then the Observation Sub-ID of each related OBX segment must be populated.

b) In an order (OML) or result (ORU, OUL) message carrying observations, if under an OBR, there is more than one observation for the same Observation Identifier (OBX-3), then these multiple observations must value OBX-4 so that each OBX segment have a unique combination of OBX-3 (Observation Identifier) and OBX-4 (Observation Sub-ID) values.

In all other situations this field is optional.

1390 Note: For usage of this field in microbiology see section 3.11 "Microbiology Reporting Rules" and the microbiology example in section 19.5)

OBX-5 Observation Value (varies), conditional.

Condition predicate: This field is required unless the Observation Result Status field (OBX-11) is valued either with "D", or "I" or "X". The Observation Value field shall be valued according to the definition made in Chapter 7 of HL7 2.5 version.

OBX-6 Units (CE), conditional.

This field in required if the Value Type field (OBX-2) is valued either with "NM", or "SN". If valued, this field should identify SI or SI-derived units only.

OBX-7 References Range (ST), required if available.

1400 This field should be valued as described in HL7 V2.5 for all observations for which it is relevant. The References range that figures in this field is supposed to be related to age and sex of the patient or to other parameters such as number of weeks of pregnancy when applicable, which makes the OBX-10 field (nature of abnormal test) unnecessary.

OBX-8 Abnormal Flags (IS), required if available.

This field is required when applicable. This field is not repeatable in the IHE Laboratory Framework. Among the possible values listed for this field in HL7 table 0078, the actors of IHE Laboratory Technical Framework should support the following values:

HL7 table 0078

Value	Description	Comment
L	Below low normal	
H	Above high normal	

Value	Description	Comment
LL	Below lower panic limits	
HH	Above upper panic limits	
N	Normal (applies to non-numeric results)	
A	Abnormal (applies to non-numeric results)	
AA	Very abnormal (applies to non-numeric units, analogous to panic limits for numeric units)	
Null	No range defined, or normal ranges don't apply	
S	Susceptible. Indicates for microbiology susceptibilities only.	
R	Resistant. Indicates for microbiology susceptibilities only.	
I	Intermediate. Indicates for microbiology susceptibilities only.	
MS	Moderately susceptible. Indicates for microbiology susceptibilities only.	
VS	Very susceptible. Indicates for microbiology susceptibilities only.	

1410
The S, R, I, MS and VS values shall be used to indicate the interpreted result of susceptibilities in microbiology, in case the value field (OBX-5) contains a numeric value that represents the MIC (Minimum Inhibitive Concentration). In case the order filler only reports the interpreted result for susceptibilities, the S, R, I, MS and VS value could be filled in the value field (OBX-5) with a Value Type (OBX-2) set to "ST".

Note: For reporting antimicrobial suceptibilities in microbiology see section 3.11 "Microbiology Reporting Rules" and the microbiology example in section 19.5)

OBX-11 Observation Result Status (ID), required.

This field should be filled according to HL7 Table 0085 described in Chapter 7 of HL7. In this version of the Laboratory Technical Version, the possible values for this field are a subset of this
1420   table:

HL7 Table 0085

Value	Description	Comment
O	Order detail description only (no result)	This can be used in LAB-3 to provide the Order Result Tracker with the list of individual tests that will be performed
I	Specimen in lab; results pending	This can be used in LAB-3 to provide the Order Result Tracker with the list of individual tests that are being performed
D	Deletes the OBX record	This status should be used when the sender (Order Filler in LAB-3 and LAB-4, Automation Manager in LAB-5) wants to cancel a false result transmitted in a former message, in the situation where the right result is still pending. The result should NEVER be shown to clinical users.
R	Results entered – not verified	In LAB-5: not technically validated. In LAB-3: not clinically validated.
P	Preliminary results	In LAB-5: result technically validated but can still change In LAB-3: result clinically validated but can still change
F	Final results; Can only be changed with a corrected result.	Can only be changed with a corrected result. In LAB-1 and LAB-3, a final result is clinically validated. In LAB-5, a final result is technically validated.
C	Record coming over is a correction and thus replaces a final result	This status may be used only after an 'F' or a 'C' status.
X	Results cannot be obtained for this observation	Tests that have this status have to be shown to the user.

Note: For the conditions of use of these values, please read section 3.10 "Correlations of status between ORC, OBR and OBX".

OBX-12 Effective Date of Reference Range (TS)

Since the Reference range given by the order filler is the one that applies to the Observation result taking into account other parameters such as patient age or sex; there is no need to manage the present field. The Order Result Tracker should store the observation result and its associated reference range. In case the Order Result Tracker offers the capability to compare results of the same observation over different requests, it should then associate each result with its associated reference range.

OBX-13 User Defined Access Checks (ST), conditional.

Condition predicate: In transaction LAB-3, the Order Filler should value this field with a "P" when it wants to inform the Order Result Tracker of restricted access on some results to privileged users.

OBX-14 Date/Time of the Observation (TS), required if available.

This field should be valued when the OBX-5 field (Value field) is also valued. In very exceptional case this information may be unknown by the Order Filler (case the test is transmitted in a reference lab and observation date and time is not returned together with the result), this field can be null and the Order Result Tracker should not generate an error.

In all cases, the observation date-time is the physiologically relevant date-time or the closest approximation to that date-time. For tests performed on specimens, which is the case in the Laboratory Technical Framework, the relevant date-time is the specimen's collection date-time.

OBX-15 Producer's ID (CE), required if available.

This field is required in case the observation was not produced by the sending organization.

OBX-16 Responsible Observer (XCN), required if available.

This field is required when the observation result status (OBX-11) is valued with "D" or "R" or "P" or "F" or "C" or "X" and the Producer's ID field is not valued. It should contain the identity of the observer that causes the change of the observation result status. Only the first component (ID number) of this field is necessary, provided that it is possible to retrieve the full identity of responsible person in the Order Filler system with only this ID number.

OBX-17 Observation Method (CE), conditional.

Condition predicate: This field is required when the value of the result may be dependant of the Observation Method and the Observation Identifier does not permit to identify the Method. With some Observation Identifiers such as LOINC(r) Codes, the identifier also identifies the Method, in which case this field does not need to be valued.

OBX-18 Equipment Instance Identifier (EI), not supported.

HL7 definition: This field identifies the Equipment Instance (e.g., Analyzer, Analyzer module, group of Analyzers,...) responsible for the production of the observation. This is the identifier from an institution's master list of equipment, where the institution is specified by the namespace ID or if it is blank, then by the "Producer's ID" (OBX-15).

This field is not used by the Laboratory Technical Framework since this framework does not require the maintenance of an institution's master list of equipments.

OBX-19 Date/Time of the Analysis (TS), required if available.

HL7 definition: This field is used to transfer the time stamp associated with generation of the analytical result by the instrument specified in Equipment Instance Identifier (see above).

This field should be valued when the OBX-5 field (Value field) is also valued. It represents the effective date-time the test was performed on the analyzer or on the manual workbench.

OBX-23 Performing Organization Name (XON), conditional

This field has been added by release 2.5.1 of HL7. It specifies the laboratory that produced the test result described in this OBX segment. When this field is null, the receiving system assumes that the observations were produced by the sending organization.

Condition predicate: This field shall be valued in transaction LAB-3 when the test result carried by this OBX is produced by an outside laboratory, subcontracting a part of the order. In that case, this field shall be populated with the name of the subcontractor laboratory.

OBX-24 Performing Organization Address (XAD), optional

This field has been added by release 2.5.1 of HL7. It specifies the address of the laboratory that produced the test result described in this OBX segment.

This field may be valued in transaction LAB-3 when the test result carried by this OBX is produced by an outside laboratory, subcontracting a part of the order. If populated the field carries the address of the subcontractor laboratory.

The IHE Laboratory Technical Framework does not constrain the usage further than this. Some national extensions of this Technical Framework (for example the US extension to deal with a CLIA amendment) may enforce this field to be valued whenever OBX-23 is valued.

OBX-25 Performing Organization Director Name (XCN), optional

This field has been added by release 2.5.1 of HL7. It specifies the director of the laboratory that produced the test result described in this OBX segment.

This field may be valued in transaction LAB-3 when the test result carried by this OBX is produced by an outside laboratory, subcontracting a part of the order. If populated the field carries the director's name of the subcontractor laboratory.

The IHE Laboratory Technical Framework does not constrain the usage further than this. Some national extensions of this Technical Framework (for example the US extension to deal with a CLIA amendment) may enforce this field to be valued whenever OBX-23 is valued.

3.10 Correlations of Status between ORC, OBR, OBX

3.10.1 Semantics of the Main Status Code Associations

In HL7 version 2.5 a change in the status of an observation is identified by a combination of the Trigger Event field contained in segment MSH, the ORC-5 (Filler Order status) field, the OBR-25 (Order Result Status) field and the OBX.11 (Observation Result Status) field. OBX-11 contains the status of an individual test, OBR-25 the status of the entire order.

Summary of the 3 relevant reference tables:

Order Table 0038 (ORC-5)	Request Table 0123 (OBR-25)	Result Table 0085 (OBX-11)	Description (combined from 3 tables)
	O	O	Order received; specimen not yet received. Order detail description only (OBX contains no result). This value should only be used in ORL event acknowledgment messages. It should not be used in OML messages.
SC	S		No results available; procedure scheduled, but not done. The specimen may not have arrived at the laboratory. No OBX is present
IP	I	I	In process; The specimen is available in the laboratory; results are pending; the procedure is incomplete
		D	Deletes the OBX record
A	R	R	(Some) results entered -- not yet verified
A	P	P	(Some) preliminary verified results: (technically validated in LAB-5, clinically validated in LAB-3). The final results are not yet obtained
CM	F	F	Final results; results stored and verified : (technically validated in LAB-5, clinically validated in LAB-3). Can only be changed with a corrected result.
(CM)	C	C	Record coming over is a correction and thus replaces a final result
CA	X	X	(OBX) Results cannot be obtained for this observation. (ORC/OBR) No results available; Order canceled.

1500 **Notes:**

The status codes used in ORC-5 are less 'atomic' than those used in OBR-25/OBX-11. If there is no direct 'semantic match' the ORC-5 column lists the closest equivalent between braces.

The table shown above contains a description of the semantics of the code values used by these fields. Please note that this table does not identify all possible relationships of the various status fields. The relationship between the various status fields are described below.

3.10.2 Status Transition Diagrams

3.10.2.1 ORC-5: Order Status

The status fields of an order and the associated result express the status of the order and result as they
1510   are processed and finalized. The transition of the coded values used in the status fields is shown
below:
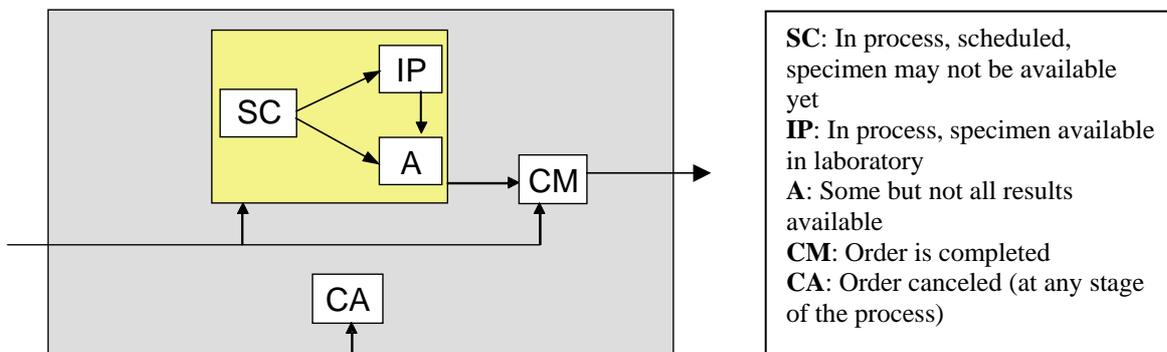
Figure 3.10-1: The ORC-5 status transition diagram

The status diagram in figure 3.12.2.1-1 above shows that, during normal processing, the initial status
code in ORC-5 will be SC, IP, A or CM. If the status code equals SC, the next status code could be
IP, A, CM or SC. If the status code equals IP, the next status code could be A, CM or IP. The special
status codes CA (order was canceled) may occur at any stage of processing.

1520   ### 3.10.2.2 OBR-25: Order Result Status
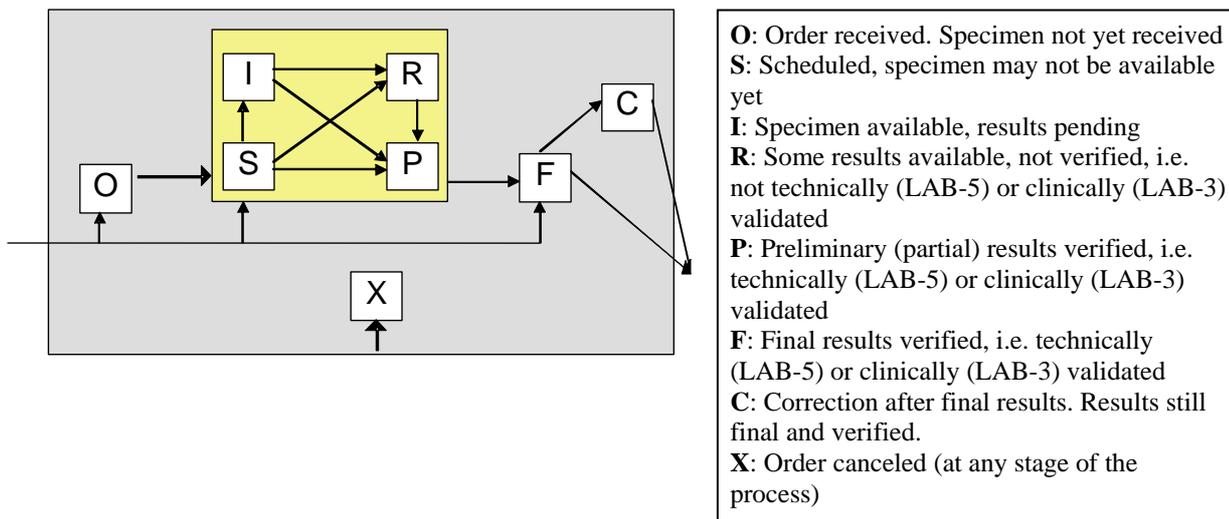
Figure 3.10-2: The OBR-25 status transition diagram

The status diagram in figure 3.12.2.2-1 above shows that, during normal processing, the initial status
code in OBR-25 will be O, F, or one of the four codes shown in the center block. If the status code
equals S, the next status code could be either I, R, P, F or S. If the status code equals P, the next status
code could be either F or P. If the status code equals F, the next status could be either F or C. The
1530   special status code X (order canceled) may occur at any stage of processing.

3.10.2.3 OBX-11: Obsevation Result Status

O: Order detail description only. No result
I: Specimen in lab, results pending
R: Result entered, not verified, i.e. not technically (LAB-5) or clinically (LAB-3) validated
P: Preliminary (partial) result verified, i.e. technically (LAB-5) or clinically (LAB-3) validated
F: Final result verified, i.e. technically (LAB-5) or clinically (LAB-3) validated
C: Correction after final result. Result still final and verified.
X: Result cannot be obtained for this observation
D: Deletes the OBX record

Figure 3.10-3: The OBX-11 status transition diagram

The status diagram in figure 3.10.2.3-1 above shows that, during normal processing, the initial status code in OBX-11 will be O, F, or one of the three codes shown in the center block. If the status code equals I, the next status code could be either I, R, P or F. If the status code equals P, the next status code could be either F or P.

The special status codes X (Result cannot be obtained for this observation) and D may occur at any stage of processing.

3.10.3 Relationship between the 3 Status Fields

The relationship between the 3 status fields is stated by the following rules:

1. The status as contained in the OBR-25 field cannot be "higher/more finalized" than the "lowest" status of any of the related individual tests (as contained in OBX-11). For example: OBR-25 can only be 'F' (Final) when all related OBX-11 fields contain 'F'.

2. The status of the order as defined by the Order Fulfiller cannot be "higher/more finalized" than the status of the related request (as contained in OBR-25). For example: ORC-5 can only be 'CM' (Complete) when the related OBR-25 field contains 'F' (Final) or 'C' (Corrected).

3. For the purposes of determining which status is "higher/more finalized", any OBX-11 status code value equal to X or D, and any OBR-25 status code value equal to X should be compared as if the value was F.

3.11 Microbiology Reporting Rules

This section explains how messages carrying microbiology results shall be structured in transactions LAB-3, LAB-5 and LAB-23 of this IHE Laboratory Technical Framework.

The requirements expressed in this section are aligned with Appendix A of the "*INTEROPERABLE LABORATORY RESULT REPORTING TO EHR (US REALM)*" Implementation Guide published by HL7 (*www.hl7.org*). These requirements on messages carrying microbiology results apply to the following exchanges:

- from analyzer to LAS (transaction LAB-23)
- from LAS to LIS (transaction LAB-5)
- from LIS to CIS/EMR in intra-hospital workflow (transaction LAB-3).

3.11.1 Principle

The effective reporting of culture results and antimicrobial sensitivities requires that data across different OBR segments and OBX segments be appropriately associated (for example, to associate the correct antimicrobial sensitivity with the correct cultured organism when multiple organisms have grown). HL7 v2.5.1 provides specific mechanisms to represent such associations, which must be used when reporting culture and sensitivity results.

3.11.2 Culture Results

Culture results typically report the identity of cultured organisms and (sometimes) quantify the degree to which such organisms appear in the cultured specimen. Such results shall be reported as described below.

3.11.2.1 Definition

A "culture" is any microbiological test in which infectious organisms are identified and characterized by allowing the organisms present in a specimen to reproduce in predetermined media in laboratory. The cultured organisms may be bacteria, viruses, or parasites. The results of any such test must be reported according to the specification below.

3.11.2.2 An Example

The following example shows the preliminary results of a sputum culture that identified Staphylococcus aureus and Beta hemolytic Streptococcus A.

```
MSH|...
PID|...
ORC|SC|||REQ885|A
OBR|1|ORD885-04A3X|5788475-04333^^05D0642827^L-CL|5863^Spt Routine
    Cult^99Lab^5863^Spt Routine Cult^99Lab|||20070114||||L|||||
    G48482^Good^Robert^^^^^^^^^^UPIN||||||200701181430-0800|||P<cr>

  OBX|1|CE|11475-1^MICROORGANISM IDENTIFIED^LN¹|1|
    3092008^Staphylococcus aureus^SCT³|||A|||P|...<cr>
  OBX|2|SN|564-5^COLONY COUNT^LN|1²|^10000^-^90000|||A|||P|...<cr>
  OBX|3|CE|11475-1^MICROORGANISM IDENTIFIED^LN¹|2¹|412643004^Beta
    hemolytic Streptococcus A^SCT³|||A|||P|...<cr>
  OBX|4|SN|564-5^COLONY COUNT^LN|2²|<^1000|||A|||P|...<cr>
```

Superscript 1: OBX-3 Observation Identifier
Superscript 2: OBX-4 Observation Sub-ID
Superscript 3: OBX-5 Observation Value

1590   **Figure 3.11-1 Example of Culture Results**

3.11.2.3 OBX-3 Observation Identifier

For OBX segments in which a cultured organism is identified, an appropriate LOINC® code must be used, i.e., a code with the LOINC® component value of "MICROORGANISM IDENTIFIED" . There are approximately 175 such LOINC® codes in version 2.15 of the LOINC® terminology, varying with respect to the method of culture and the specimen type.

The above example shows two organisms identified, reported with the LOINC® code 11475-1 in OBX-3.

For OBX segments in which the colony count of a cultured organism is reported, an appropriate LOINC® code must be used, i.e., a code with the component value of "COLONY COUNT". There are approximately 10 such LOINC® codes in version 2.15 of the LOINC® terminology.

The above example shows two colonies counted, reported with the LOINC® code 564-5 in OBX-3.

3.11.2.4 OBX-4 Observation Sub-ID

Each OBX segment that reports a culture result must have the Observation Sub-ID field populated. OBX segments that contain information pertaining to the same identified microorganism must be "grouped" via the same value in the Observation Sub-ID field. For example, the first two OBX segments in the example above contain information pertaining to the Staphylococcus Aureus organism identified in the sputum sample (in this case, the identity of that organism and its colony count). These OBX segments, therefore, both have the Observation Sub-ID value of "1". The second two OBX segments contain information pertaining to the Beta-hemolytic Streptococcus A organism, and both have the Observation Sub-ID value of "2".

Note 1: Even if only one OBX segment appears for each identified organism, the Observation Sub-ID field must be populated in these OBX segments, because the value of the Observation Sub-ID field is used to reference the appropriate OBX segment in subsequent reporting of antimicrobial sensitivities. Even in the case that only a single OBX segment is used to report a culture result, the Observation Sub-ID field must be populated, for the

same reason.   For example, if only one organism had been identified in the example above and no colony counts had been reported, the Observation Sub-ID field would still need to contain the value "1".

1620

Note 2:   Within any OBR segment, the OBX segments must be sequenced such that they are grouped by their Observation Sub-ID values. For example, in the culture result shown above, the OBX segments with the Observation Sub-ID value "1" all appear before the OBX segments with the Observation Sub-ID value "2".

Note 3:   When the results of a specific culture are sent more than once (for example, as a preliminary result and later as a final result), the combination of OBX-3 (Observation Identifier) and OBX-4 (Observation Sub-ID) values for the identified organisms must be the same in each result message that is sent. This consistency allows the receiving system to correctly update the identified organisms as they are revised by the sending system. The example below shows the preliminary and the (subsequently sent) final values of a sputum culture, with the OBX-3 (Observation Identifier) and OBX-4 (Observation Sub-ID) values maintained correctly.

Culture Result Message

```
MSH|...
PID|...
ORC|SC|||REQ885|A
OBR|1|ORD885-04A3X|5788475-04333^^05D0642827^L-CL|5863^Spt Routine
    Cult^99Lab|||20070114||||L|||||G48482^Good^Robert^^^^^^^^^UPIN|
    |||||200701181430-0800|||P<cr>
 6 OBX|1|CE|11475-1^MICROORGANISM IDENTIFIED^LN|1|
     59206002^Gram-positive coccus^SCT|||A|||P|...<cr>
  OBX|2|CE|11475-1^MICROORGANISM IDENTIFIED^LN|2|56415008^Klebsiella
     pneumoniae^SCT|||A|||P|...<cr>
```

↓

Culture Result Message

```
MSH|...
PID|...
ORC|SC|||REQ885|CM
OBR|1|ORD885-04A3X|5788475-04333^^05D0642827^L-CL|5863^Spt Routine
    Cult^99Lab|||20070114||||L|||||G48482^Good^Robert^^^^^^^^^UPIN|
    |||||200701181430-0800|||F<cr>
 6 OBX|1|CE|11475-1^MICROORGANISM IDENTIFIED^LN|1|
     3092008^Staphylococcus aureus^SCT|||A|||F|...<cr>
  OBX|2|SN|564-5^COLONY COUNT^LN|1|^10000^-^90000|||A|||F|...<cr>
  OBX|3|CE|11475-1^MICROORGANISM IDENTIFIED^LN|2|56415008^Klebsiella
     pneumoniae^SCT[3]|||A|||F|...<cr>
  OBX|4|SN|564-5^COLONY COUNT^LN|2|<^1000|||A|||F|...<cr>
```

1630   **Figure 3.11-2 Example of Successive Culture Results Messages**

3.11.2.5 OBX-5 Observation Value

The value of each organism identified by a culture must be represented by a coded entity (CE data type). Use of a standard coding system, such as SNOMED CT, will enable important reporting and decision-support capabilities for infectious diseases. When SNOMED codes are used, the SNOMED CT concept ID should appear in the first component of OBX-5 and the coding system designator "SCT" should appear in the third component. The second component should be populated with an accurate text description of the organism identified, typically the preferred display term as assigned by the SNOMED CT terminology. Regardless of the coding system used, the first three components of OBX-5 must be populated with the code, text description, and coding-system designator, respectively.

> Note 1: Use of the SNOMED CT terminology is most useful for encoding the Observation Value in the OBX that identifies an organism (e.g., the first and third OBX segments in the sample message above). The Observation Value for colony counts or other observations related to the culture may be represented in any reasonable way chosen by the laboratory.

3.11.3 Antimicrobial Sensitivities Results

Antimicrobial sensitivity (or susceptibility) results report the sensitivity of cultured microorganisms to specific antibiotics, a standard part of medical microbiology and critical to the treatment of infectious diseases. The reporting of such tests in a uniformly structured and coded manner allows EHR systems to assist in the selection or assessment of antibiotic therapies, thereby promoting effective care and patient safety.

Such tests shall be reported as described in this section.

3.11.3.1 Definition

An antimicrobial sensitivity test is any test that assesses the susceptibility of a microorganism previously identified via culture to one or more specific antibiotic medications. The results of such a test may indicate, for example, that the microorganism is "susceptible," "moderately susceptible," or "resistant" to a specific antibiotic.

3.11.3.2 An Example

The following example shows the final results of a sputum culture that identified Staphylococcus aureus and Beta hemolytic Streptococcus A, and the results of subsequent sensitivity testing on these organisms with respect to the antimicrobials Ampicillin and Amoxicillin/Clavulanate.

Note that the sensitivity tests were performed as "reflex tests," i.e., they were initiated by the laboratory in response to the positive culture results.

This example is a message ORU^R01 of transaction LAB-3, assuming that transaction LAB-2 has been used in the meantime to obtain a Placer Order Number for the sensitivity test orders.

Culture Results with two isolates identified

```
MSH|...
PID|...
ORC|SC|||REQ885|CM
OBR|1|ORD885-04A3X¹|5788475-04333^^05D0642827^L-CL²|5863^Spt Routine
    Cult^99Lab|||20070114||||L|||||
    G48482^Good^Robert^^^^^^^^^UPIN||||||200701181430-0800|||F<cr>
  OBX|1|CE|11475-1^MICROORGANISM IDENTIFIED^LN|1|
      3092008^Staphylococcus aureus^SCT|||A|||F|...<cr>
  OBX|2|SN|564-5^COLONY COUNT^LN|1|^10000^-^90000|||A|||F|...<cr>
  OBX|3|CE|11475-1^MICROORGANISM IDENTIFIED^LN|2|
      412643004^Beta hemolytic Streptococcus A^SCT|||A|||F|...<cr>
  OBX|4|SN|564-5^COLONY COUNT^LN|2|<^1000|||A|||F|...<cr>
```

Sensitivity Result on isolate 1 (reflex test)

```
ORC|SC|||REQ885|CM
OBR|2|ORD885-04A4Y¹|5788475-04334^^05D0642827^L-CL²|6402^Bacterial Susc
    Panel Islt^99Lab|||20070114||||G|||||
    G48482^Good^Robert^^^^^^^^^UPIN||||||200701181430-0800|||F|
    11475-1&MICROORGANISM IDENTIFIED&LN^1^
    Staphylococcus aureus³|||
    ORD885-04A3X^5788475-04333&&05D0642827&L-CL⁴<cr>
  OBX|1|NM|28-1^Ampicillin^LN⁶|1|32|ug/mL||R⁷|||F|…<cr>
  OBX|2|NM|20-8^Amoxicillin+Clavulanate^LN⁵|1|2|ug/mL||S⁶|||F|…<cr>
```

Sensitivity Result on isolate 2 (reflex test)

```
ORC|SC|||REQ885|CM
OBR|3| ORD885-04A5Z¹|5788475-04335^^05D0642827^L-CL²|6402^Bacterial Susc
    Panel Islt^99Lab|||20070114||||G|||||
    G48482^Good^Robert^^^^^^^^^UPIN||||||200701181430-0800|||F|
    11475-1&MICROORGANISM IDENTIFIED&LN&783&CultOrg&99Lab^2^
    Beta hemolytic Streptococcus A³|||
    ORD885-04A3X^5788475-04333&&05D0642827&L-CL⁴<cr>
  OBX|1|NM|28-1^Ampicillin^LN⁶|2|2|ug/mL||S⁷|||F|…<cr>
  OBX|2|NM|20-8^Amoxicillin+Clavulanate^LN⁵|2|2|ug/mL||S⁶|||F|…<cr>
```

Superscript 1: OBR-2 Placer Order Number
Superscript 2: OBR-3 Filler Order Number
1670   *Superscript 3: OBR-26 Parent Result*
Superscript 4: OBR-29 Parent
Superscript 5: OBR-50 Parent Universal Service Identifier
Superscript 6: OBX-4 Observation ID
Superscript 7: OBX-8 Abnormal Flags

Figure 3.11-3 Example of complete microbiology reporting, with sensitivity

Note 1: Each Placer Order Number (OBR-2) and each Filler Order Number (OBR-3) in this message is unique, in conformance with this IHE Laboratory Technical Framework. In particular, the order numbers in the sensitivity tests differ from the order numbers of the culture. The laboratory requisition all these orders belong to, is
1680   identified by its Placer Group Number REQ885 in ORC-4.

3.11.3.3 OBR-26 Parent Result

In the OBR segment of a sensitivity result, the value of the Parent Result field references the OBX segment for the identified organism that prompted the sensitivity testing. For example, the value in the Parent Result field of the first sensitivity result above is

11475-1&MICROORGANISM IDENTIFIED&LN&783&CultOrg&99Lab^1^Staphylococcus aureus

which references the Observation ID (OBX-3), Observation Sub-ID (OBX-4), and the text component of the Observation Value (OBX-5.2) of the first OBX segment in the culture result.

The table below shows the correspondence between the components and sub-components of OBR-26 Parent Result field in the sensitivity result and the fields and components of the corresponding OBX segment in the culture result:

Field OBR-26 Parent Result (Sensitivity Result)

Component/Sub-Component in OBR-26	Usage	Referenced Field/Component in Parent OBX Segment
OBR-26.1 (1st component)	R	
OBR-26.1.1 (1st sub-component)	R	OBX-3.1 Observation Identifier.Identifier
OBR-26.1.2 (2nd sub-component)	RE	OBX-3.2 Observation Identifier.Text
OBR-26.1.3 (3rd sub-component)	RE	OBX-3.3 Observation Identifier.Name of Coding System
OBR-26.1.4 (4th sub-component)	RE	OBX-3.1 Observation Identifier.Alt Identifier
OBR-26.1.5 (5th sub-component)	RE	OBX-3.2 Observation Identifier.Alt Text
OBR-26.1.6 (6th sub-component)	RE	OBX-3.3 Observation Identifier.Name of Alt Coding System
OBR-26.2 (2nd component)	R	OBX-4 Observation Sub-ID
OBR-26.3 (3rd component)	R	OBX-5.2 Observation Value.Text

Note 1: Because organisms identified in culture results must be reported as coded entities, one can safely assume that OBX-5.2 of the parent result will be the text representation of a coded entity.

3.11.3.4 OBR-29 Parent

OBR-29 references the values of the Placer Order Number (OBR-2) and the Filler Order Number (OBR-3) in the OBR segment of the culture result that spawned the sensitivity testing. OBR-29 must be populated when reporting the result of any reflex test, including an antimicrobial susceptibility.

In the example above, the value of OBR-29 for both sensitivity results is

ORD885-04A3X^5788475-04333&&05D0642827&L-CL

which reflects the values of OBR-2 and OBR-3 in the preceding culture result:

OBR-2: ORD885-04A3X   OBR-3: 5788475-04333^^05D0642827^L-CL

Referencing the OBR-2 and OBR-3 values of the "parent" culture allows a receiving system to uniquely associate sensitivity results with the culture results that generated them.

The table below shows the usage and semantic of the components of OBR-29 Parent field in the sensitivity result:

Field OBR-29 Parent (EIP)

Component/Sub-Component	Usage
OBR-29.1 Placer assigned identifier (EI) → OBR-2 of culture OBR	R
OBR-29.2 Filler assigned identifier (EI) → OBR-3 of culture OBR	R

3.11.3.5 OBX-3 Observation Identifier

1710   For sensitivity results, the Observation Identifier must be encoded using the LOINC® terminology. Specifically, the value of the observation identifier must be one of the LOINC® codes designated to identify antimicrobials tested within susceptibility panels, i.e. codes with a PROPERTY attribute of "SUSC". The LOINC® coding system includes approximately 1100 such codes, which cover all antimicrobials that are typically assessed in microbiology sensitivity testing.

Sample Values:

1-8^ ACYCLOVIR^LN

12-5^AMIKACIN:MIC^LN

193-3^CLINAMYCIN:MIC^LN

395-4^ PENICILLIN V:MLC^LN

1720   ### 3.11.3.6 OBX-5 Observation Value

For sensitivity results, the Observation Value field may be represented in whatever manner suits the laboratory and is consistent with conventional practice (in particular the MIC value). The uniform coding of the Abnormal Flags field (see below) is more important for the automated processing of sensitivity results.

3.11.3.7 OBX-8 Abnormal Flags

For sensitivity results, the value of the Abnormal Flags field must be one of the following values from Table 0078:

Subset of HL7 Table 0078 for antimicrobial sensitivity

Value	Description
S	Susceptible. Indicates for microbiology susceptibilities only.
R	Resistant. Indicates for microbiology susceptibilities only.
I	Intermediate. Indicates for microbiology susceptibilities only.
MS	Moderately susceptible. Indicates for microbiology susceptibilities only.
VS	Very susceptible. Indicates for microbiology susceptibilities only.

1730

3.12 QAK segment

This segment is used in the response to query messages of these Transactions:

- Query for Label Delivery Instruction [LAB-62]

- Query for Work Order Step [LAB-22]

Table 3.11-1: QAK segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	32	ST	C	[0..1]		00696	Query Tag
2	2	ID	R	[1..1]	0208	00208	Query Response Status
3	250	CE	O	[0..1]	0471	01375	Message Query Name
4	10	NM	O	[0..1]		01434	Hit Count
5	10	NM	O	[0..1]		01622	This payload
6	10	NM	O	[0..1]		01623	Hits remaining

QAK-1 Query Tag: This field in the response message is echoing QPD-2 in the query message.

Condition predicate: QAK-1 shall be valued with the content of QPD-2 received in the query message.

1740 **QAK-2 Quey Response Status**: This mandatory field carries one of these values:

HL7 Table 0208 - Query Response Status

Value	Description	Comment
OK	Data found, no errors (this is the default)	
NF	No data found, no errors	
AE	Application error	
AR	Application reject	

3.13 MFI – Master File Identification Segment

This segment is used by transaction [LAB-51].

Table 3.12-1 MFI – Master File Identification

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	250	CE	R	[1..1]	0175	00658	Master File Identifier
2	180	HD	R	[1..1]		00659	Master File Application Identifier
3	3	ID	R	[1..1]	0178	00660	File-Level Event Code
4	26	TS	O	[0..1]		00661	Entered Date/Time
5	26	TS	R	[1..1]		00662	Effective Date/Time
6	2	ID	R	[1..1]	0179	00663	Response Level Code

MFI-1 Master File Identifier (CE), required, shall contain one of the values:

- OMA (Numerical Observation Master File)

- OMB (Categorical Observation Master File)

- OMD (Calculated Observations Master File)

1750 **MFI-2 Master File Application Identifier (HD)**, required, contains a code of up to 180 characters which uniquely identifies the application responsible for maintaining this file at a particular site.

The value of this field shall be formatted by concatenating the values below using the "_" (underscore) character as a separator:

- the name of the application that owns the code set. This shall be equal to the value of the field *MSH-3 Sending Application*.

- the type of master file. This shall be equal to the value of the field *MFI-1 Master File Identifier*.

- the language of the (textual descriptions of the) code set. This shall be equal to the value contained in the field *MSH-19 Principal Language of the Message*.

1760 - (optional, if applicable) the version/revision of the code set. The character string used to identify a new version or revision should sort to be alphabetically "later" when compared to any previous versions or revisions.

The resulting identifier will have the form "SENDINGAPP_MFTYPE_LANGUAGE" or "SENDINGAPP_MFTYPE_LANGUAGE_VERSION". The receiver should not attempt to deconstruct this string into its constituent elements; it should use the identifying string in its entirety. With the exception of version/revision all elements are available elsewhere in the message.

Examples include "Lab1_OMA_EN_1.2" or "X-PAS_OMB_FR".

MFI-3 File-Level Event Code (ID), required, shall contain the value REP (replace current version of this master file with the version contained in this message).

1770 **MFI-5 Effective Date/Time (TS)**, required, contains the date/time the Code Set Master expects that the event is to have been completed on the receiving system. The sending system should use the current date/time as a default. The Code Set Consumer shall process the event as soon as possible if the value of this field is in the past. If the value of this field is at some point in the future, then the Code Set Consumer shall process the event *before* that time.

MFI-6 Response Level Code (ID), required, shall contain the value ER. The acceptance status of the individual master file entries is only to be reported in case of an error. Since the IHE Laboratory Technical Framework uses the HL7 original acknowledgment mode, all MFA segments must be returned via the application-level acknowledgment message.

1780 ## 3.14 MFE – Master File Entry Segment

Table 3.13-1 MFE – Master File Entry Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	3	ID	R	[1..1]	0180	00664	Record-Level Event Code
2	20	ST	R	[1..1]		00665	MFN Control ID
3	26	TS	O	[0..1]		00662	Effective Date/Time
4	200	Varies	R	[1..1]		00667	Primary Key Value – MFE
5	3	ID	R	[1..1]	0355	01319	Primary Key Value Type

MFE-1 Record-Level Event Code (ID), required, shall contain the value MAD (add record to master file). Given that the file-level event code is REP, each MFE segment must have a record-level event code of MAD.

MFE-2 MFN Control ID (ST) is required since the response level code is ER. It contains an identifier that uniquely identifies the change to the record.

MFE-4 Primary Key Value – MFE, required, uniquely identifies a record of the code set. The data type of this field is CE (coded element). One unique identifier shall be provided; the last 3 components of the CE data type shall not be valued.

1790   **MFE-5 Primary Key Value Type (ID)**, required, contains the value CE (coded element).

4   Transaction LAB-1: Placer Order Management

4.1   Scope

This transaction is used by the Order Placer to place an Order Group (i.e. a set of Orders to be tested together for a patient) or a standalone Order to the Order Filler. The transaction enables both Order Placer and Order Filler to notify all subsequent changes of status and/or content of each Order to the other side.

An Order contains a battery or a single test requested to a laboratory. The tests are to be performed on one or more in vitro specimens collected from the patient.

An Order accepted by the Order Filler is acknowledged to the Order Placer as scheduled by the laboratory: Order Status ORC-5 = "SC" (scheduled)

When the accurate specimens for this Order are accepted or collected by the laboratory the Order Filler notifies the start of the process to the Order Placer: Order Status ORC-5 = "IP" (in process).

When the first results of an Order are released the Order Filler notifies to the Order Placer the Order Status ORC-5 = "A" (some, but not all, results available).

When all results of an Order are released the Order Filler notifies to the Order Placer the Order Status ORC-5 = "CM" (completed).

Both Order Placer and Order Filler may update or cancel an existing Order. Update consists in replacing the ordered test or battery by another one.

An Order canceled ends with Order Status ORC-5 = "CA" (canceled).

To request an additional battery or test in an existing Order Group the Order Placer places a new Order added to this Order Group.

To generate an additional battery or test in an existing Order Group the Order Filler uses transaction LAB-2, not LAB-1.

In addition, if the "Report Fac-simile For Order Group" option is activated, this transaction MAY include into an Order Group placed, the request for the fac-simile of the report related to that Order Group.

4.2   Use Case Roles
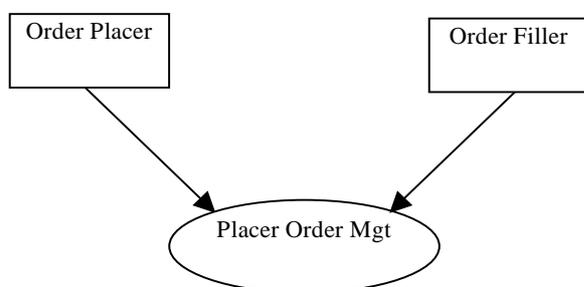
Actor : Order Placer

Roles : Places orders. Updates orders. Cancels orders. Nullifies orders. Receives acceptance or rejection from the Order Filler. Receives Order content and status changes from the Order Filler.

Actor : Order Filler

Roles : Receives orders. Checks the specimens required, and notifies the Order Placer of acceptance or refusal. Receives Order content changes from the Order Placer. Notifies content updates (removed batteries/tests) to the Order Placer. Notifies status changes (scheduled, started, cancelled, completed) to the Order Placer.

4.3 Referenced Standards

HL7 version 2.5:

- Chapter 2: "Control" --> generic segments and data types
- Chapter 3: "ADT" --> PID and PV1 segments
- Chapter 4: "Order Entry" --> OML and ORL messages
- Chapter 7: "Observation Reporting" --> SPM segment
- Chapter 13: "Clinical Laboratory Automation" --> SAC segment

4.4 Interaction Diagrams

Trigger events: In all interactions below, the initiator chooses the best OML message structure appropriate to its orders. The responder SHALL respond with the related ORL message structure:

OML^O21 → ORL^O22
OML^O33 → ORL^O34
OML^O35 → ORL^O36

An OML message shall be responded to with exactly one ORL message.

The Filler Order Number is required in the ORL messages. ORL messages SHALL be created by the Order Filler application, and not by a message broker or a communication system. The message broker (an intermediary between the Order Placer and the Order Filler) has no knowledge of the tests being requested and can't accept/reject these test on behalf of the Order Filler.

Simplification of the message flow when Actors OP and ORT are grouped:

The blue message flows "Order status change" notified by the Order Filler to the Order Placer in the figure below happen only when the Order Placer and the Order Results Tracker are different applications.

Whenever the Order Placer and the Order Results Tracker are grouped in the same application, the Transaction LAB-3 message carrying the status change and possible new results is sufficient to inform that application of the new status of the Order. An "Order status change" message in LAB-1 would be redundant in that case. Therefore, when exchanging with a grouped Order Placer/Order Results Tracker, the Order Filler SHALL NOT send the redundant message "Order Status Change" from Transaction LAB-1. (marked in blue in the figure below)

4.4.1 Normal Process of a Placer Order

The figure below shows the flow of messages in the normal process of a placer order, from placing of the order by the Order Placer, to the "order completed" event notified by the Order Filler.
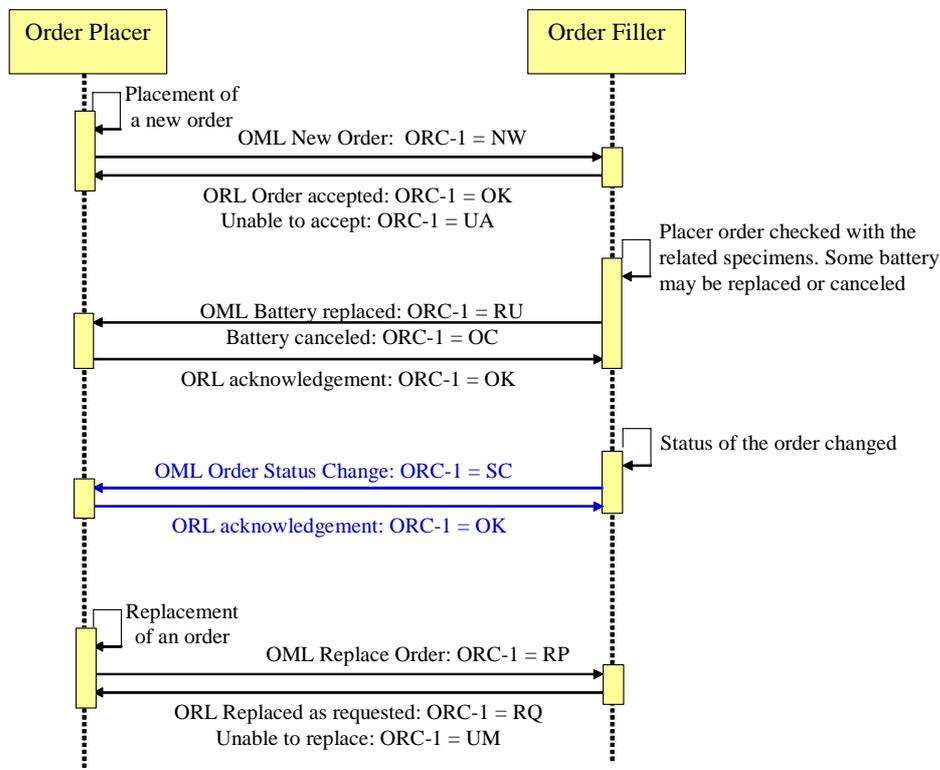
Figure 4.4-1: Normal process of a placer order

4.4.2 Cancellation of an Order by the Order Placer
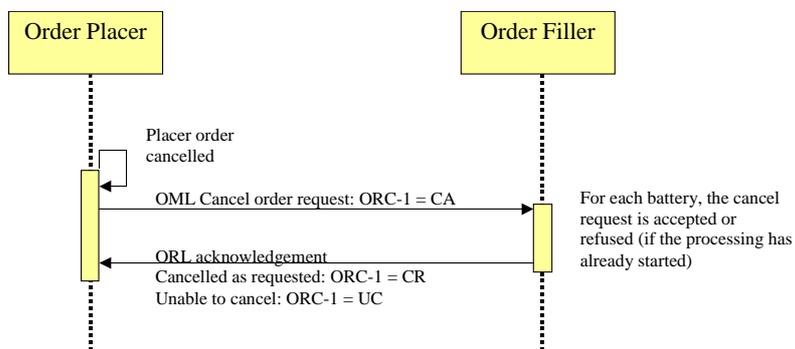
Figure 4.4-2: Cancellation of an order by the Order Placer

The Order Filler accepts the cancellation only if the processing has not started yet, particularly if no work order has been sent to the Automation Manager (through transaction LAB-4).

4.4.3 Cancellation of an Order Initiated by the Order Filler
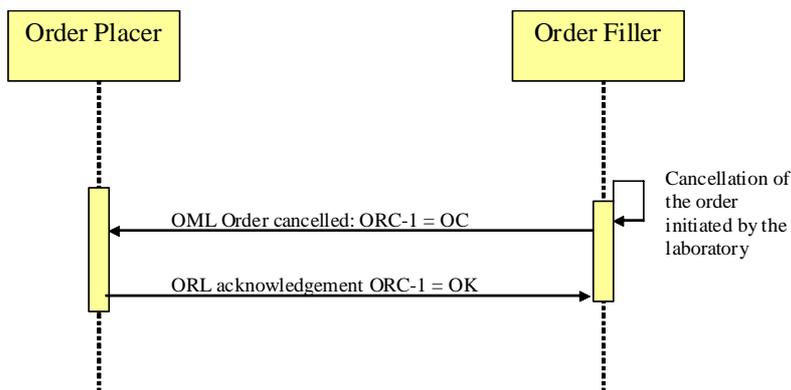
Figure 4.4-3: Cancellation by Order Filler

4.5 Messages Static Definitions

4.5.1 Available HL7 2.5 Structures for OML Message

HL7 v2.5 chapter 4, offers three different message structures for the OML message type :

- OML^O21^OML_O21: **laboratory order message.** This is a battery-centric structure: It contains a list of ordered batteries, a list of specimens underneath each battery, and a list of containers underneath each specimen. This structure implies duplication of specimen/container information whenever two batteries use the same specimen. It is more appropriate for ordering batteries that need several specimens (e.g. creatinine clearance, glucose tolerance test).

- OML^O33^OML_O33: **Laboratory order for multiple orders related to a single specimen**. This is a specimen-centric structure providing for each specimen a list of containers and a list of batteries (ORC/OBR segment groups) using this specimen. The batteries are not related to the containers.

- OML^O35^OML_O35: **Laboratory order for multiple orders related to a single container of a specimen.** This message structure provides for each specimen a list of containers, and for each container the list of batteries that are to be performed on that container. This structure is more appropriate when the ordered batteries are sorted by container.

4.5.2 Restrictions on OML Message for Transaction LAB-1

The Laboratory Technical Framework supports the three message structures defined above, and makes the following restrictions for transaction LAB-1:

- LAB-1 carries all clinical observations provided by the Care Unit, such as allergy, therapy, diagnosis, temperature, urine volume, blood pressure, within observation segments (OBX) that accompany the order. This choice has been made to simplify the building and parsing of the messages. All these specific patient observations are sent in the OML message, in OBX segments.

- LAB-1 restrains timing/quantity to one execution per order. The main reason for this choice is:

  The only operation that would have needed the iteration features provided by the segment TQ1 is the specimen collection. In this Laboratory Integration Profile this operation is not triggered by any message: It is an internal operation performed within the Order Placer actor or the Order Filler actor, depending on the organization. All orders sent to laboratories require one single execution, even the studies based on a temporal series of specimens. For example a serum glucose tolerance study is an atomic order to be performed once, taking into account all the specimens to be tested.

4.5.3 OML^O21 Static Definition

Table 4.5-1: OML^O21 static definition for transaction LAB-1

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin	RE	[0..1]	
PID	Patient Identification	R	[1..1]	3
[PV1]	Patient Visit	RE	[0..1]	3
]	--- PATIENT end			
{	--- ORDER begin	R	[1..*]	
ORC	Common Order (for one battery)	R	[1..1]	4
[TQ1]	Timing Quantity	RE	[0..1]	4
	--- OBSERVATION REQUEST begin	R	[1..1]	
OBR	Observation Request	R	[1..1]	4
{[NTE]}	Notes and Comments	O	[0..*]	2
[{	--- OBSERVATION begin	O	[0..*]	
OBX	Observation Result	R	[1..1]	7
[{NTE}]	Comment of the result	C	[0..*]	2
}]	--- OBSERVATION end			
[{	--- SPECIMEN begin	O	[0..*]	
SPM	Specimen	R	[1..1]	7
[{SAC}]	Container	C	[0..*]	13
}]	--- SPECIMEN end			
[{	--- PRIOR_RESULT begin	O	[0..*]	
PV1	Patient Visit – previous result	R	[1..1]	3
{	--- ORDER_PRIOR begin	R	[1..*]	
ORC	Common Order - previous result	R	[1..1]	4
OBR	Order Detail - previous result	R	[1..1]	4
{[NTE]}	Notes and Comments - previous result	O	[0..*]	2
{	--- OBSERVATION_PRIOR begin	R	[1..*]	
OBX	Observation/Result - previous result	R	[1..1]	7
{[NTE]}	Notes and Comments - previous result	O	[0..*]	2
}	--- OBSERVATION_PRIOR end			
}	--- ORDER_PRIOR end			
]}	--- PRIOR_RESULT end			
	--- OBSERVATION REQUEST end			
}	--- ORDER end			

Field MSH-9 - Message Type (MSG) shall have its three components respectively valued to "OML", "O21" and "OML_O21".

The triplet (ORC, TQ1, OBR) represents the Order (i.e. an ordered battery/test). In case of an Order Group, this triplet is repeated as many times as there are Orders in the Order Group.

1920 The OBSERVATION repeatable segment group carries the observations provided by the orderer (patient temperature, blood pressure, weight, …), with eventual comments (NTE).

The PRIOR RESULT segment group provides the prior results obtained for the same patient. Segment PID is not provided in this segment group because it is the same patient, and the laboratory is not concerned by the fact that this patient might have had a different identification when the prior results were produced.

Segment PV1, which is the first segment of the segment group PRIOR RESULT, is mandatory. The presence of this segment at this point in the message structure announces unambiguously a set of prior orders with related prior observations. The segment PV1 represents the patient visit (or encounter) during which these prior observations were produced. The only field mandatory in the segment PV1 is PV1-2 "Patient Class" (as shown in section 3.4). If the sender of this message does not know the patient class, it SHALL value the field PV1-2 "U", which stands for "patient class unknown".

The ORC appearing in the PRIOR RESULT segment group is mandatory and SHALL have its first field "Order Control" populated with "PR" (Prior results).

Condition predicate for the SAC segment: This segment should be used only if it provides an information that has no placeholder in the SPM segment.

Condition predicate for the NTE segment below OBX (Comment of the result): Information that can be coded in OBX segments or OBR segments shall not be sent in a NTE segment.

4.5.4 ORL^O22 Static Definition

Table 4.5-2 : ORL^O22 Message

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[{ERR}]	Error	C	[0..*]	2
[	--- RESPONSE begin	C	[0..1]	
[	--- PATIENT begin	R	[1..1]	
[PID]	Patient Identification	O	[0..1]	3
{	--- ORDER begin	R	[1..*]	
ORC	Common Order	R	[1..*]	4
[{TQ1}]	Timing/Quantity	RE	[0..1]	4
	--- OBSERVATION REQUEST begin	R	[1..1]	
OBR	Observation Request	R	[1..1]	4
[{	--- SPECIMEN begin	O	[0..1]	
SPM	Specimen	R	[1..1]	7
[{SAC}]	Specimen Container Details	O	[0..*]	7
}]	--- SPECIMEN end			
	--- OBSERVATION REQUEST end			
}	--- ORDER end			
]	--- PATIENT end			
]	--- RESPONSE end			

MSH-9 - Message Type (MSG) shall have its three components respectively valued to "ORL", "O22" and "ORL_O22".

The ERR segment shall be used in case of negative acknowledgement (when MSA-1 = AE or AR).

The RESPONSE segment group is mandatory unless in case of error (MSA-1 = AE or AR). This segment group carries the response of the Order Filler in the segments ORC and OBR.

The mandatory ORC and OBR segments in the repeatable ORDER segment group provide the response of the Order Filler for each order, in particular the ORC-1 Order Control field.

4.5.5 OML^O33 Static Definition

Table 4.5-3: OML^O33

Segment	Meaning	Usage	Card.	HL7
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin	RE	[0..1]	
PID	Patient Identification	R	[1..1]	3
[PV1]	Patient Visit	RE	[0..1]	3
]	--- PATIENT end			
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..*]	7
[{SAC}]	Specimen Container	C	[0..*]	13
{	--- ORDER begin	R	[1..*]	
ORC	Common Order (for one battery)	R	[1..*]	4
[{TQ1}]	Timing Quantity	RE	[0..1]	4
	--- OBSERVATION REQUEST begin	R	[1..1]	
OBR	Observation Request	R	[1..1]	4
[{	--- OBSERVATION begin	O	[0..*]	
OBX	Observation Result	R	[1..1]	7
[{NTE}]	Notes and comments for result	C	[0..1]	
}]	--- OBSERVATION end			
[{	--- PRIOR RESULT begin	O	[0..*]	
PV1	Patient Visit – previous result	R	[1..1]	3
{	--- ORDER PRIOR begin	R	[1*]	
ORC	Common order – previous result	R	[1..1]	4
OBR	Order detail – previous result	R	[1..1]	4
{	--- OBSERVATION PRIOR begin	R	[1..*]	
OBX	Observation/Result – previous result	R	[1..1]	
[{NTE}]	Comment of the result	C	[0..*]	2
}	--- OBSERVATION PRIOR end			
}	--- ORDER PRIOR end			
}]	--- PRIOR RESULT end			
	--- OBSERVATION REQUEST end			
}	--- ORDER end			
}	--- SPECIMEN end			

1950 MSH-9 - Message Type (MSG) shall have its three components respectively valued to "OML", "O33", and "OML_O33".

The conditions on the OBSERVATION segment group are the same as for OML^O21.

The condition and cardinalities on the SAC segment are the same as for OML^O21.

The PRIOR RESULT segment group provides the prior results obtained for the same patient. Segment PID is not provided in this segment group because it is the same patient, and the laboratory is not concerned by the fact that this patient might have had a different identification when the prior results were produced.

Segment PV1, which is the first segment of the segment group PRIOR RESULT, is mandatory. The presence of this segment at this point in the message structure announces unambiguously a set of prior
1960 orders with related prior observations. The segment PV1 represents the patient visit (or encounter) during which these prior observations were produced. The only field mandatory in the segment PV1 is PV1-2 "Patient Class" (as shown in section 3.4). If the sender of this message does not know the patient class, it SHALL value the field PV1-2 "U", which stands for "patient class unknown".

The ORC appearing in the PRIOR RESULT segment group is mandatory and SHALL have its first field "Order Control" populated with "PR" (Prior results).

4.5.6 ORL^O34 Static Definition

Table 4.5-4: ORL^O34

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[{ERR}]	Error	O	[0..*]	2
[	--- RESPONSE begin	C	[0..1]	
[	--- PATIENT begin	R	[1..1]	
[PID]	Patient Identification	O	[0..1]	3
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..1]	7
[{SAC}]	Specimen Container	O	[0..*]	13
{	--- ORDER begin	R	[1..*]	
ORC	Common Order	R	[1..1]	4
[{TQ1}]	Timing/Quantity	RE	[0..1]	4
OBR	Observation Request	R	[1..1]	4
}	--- ORDER end			
}	--- SPECIMEN end			
]	--- PATIENT end			
]	--- RESPONSE end			

1970 MSH-9 - Message Type (MSG) shall have its three components respectively valued to "ORL", "O34" and "ORL_O34".

The RESPONSE segment group is mandatory unless in case of error (MSA-1 = AE or AR). This segment group carries the response of the Order Filler in the segments ORC and OBR.

The mandatory ORC and OBR segments in the repeatable ORDER segment group provide the response of the Order Filler for each order, in particular the ORC-1 Order Control field.

4.5.7 OML^O35 Static Definition

Table 4.5-5 : OML^O35 static definition for transaction LAB-1

Segment	Meaning	Usage	Card	HL7
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin	RE	[0..1]	
PID	Patient Identification	R	[1..1]	3
[PV1]	Patient Visit	RE	[0..1]	3
]	--- PATIENT end			
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..1]	7
{	--- CONTAINER begin	R	[1..*]	
SAC	Container detail	R	[1..1]	13
{	--- ORDER begin	R	[1..*]	
ORC	Common Order (for one battery)	R	[1..1]	4
[{TQ1}]	Timing Quantity	RE	[0..1]	4
	--- OBSERVATION REQUEST begin	R	[1..1]	
OBR	Observation Request	R	[1..1]	4
[{	--- OBSERVATION begin	O	[0..*]	
OBX	Observation Result	R	[1..*]	7
[{NTE}]	Comment of the result	C	[0..*]	2
}]	--- OBSERVATION end			
[{	--- PRIOR_RESULT begin	O	[0..*]	
PV1	Patient Visit – previous result	R	[1..1]	3
{	--- ORDER_PRIOR begin	R	[1..*]	
ORC	Common Order - previous result	R	[1..1]	4
OBR	Order Detail - previous result	R	[1..1]	4
{[NTE]}	Notes and Comments - previous result	O	[0..*]	2
{	--- OBSERVATION_PRIOR begin	R	[1..*]	
OBX	Observation/Result - previous result	R	[1..1]	7
{[NTE]}	Notes and Comments - previous result	O	[0..*]	2
}	--- OBSERVATION_PRIOR end			
}	--- ORDER_PRIOR end			
}]	--- PRIOR_RESULT end			
	--- OBSERVATION REQUEST end			
}	--- ORDER end			
}	--- CONTAINER end			
}	--- SPECIMEN end			

1980   Field MSH-9 - Message Type (MSG) shall have its three components respectively valued to "OML", "O35" and "OML_O35".

The conditions on the OBSERVATION segment group are the same as for message OML^O21.

The SAC segment below the SPM segment is mandatory in OML^O35 message structure.

The PRIOR RESULT segment group provides the prior results obtained for the same patient. Segment PID is not provided in this segment group because <u>it is the same patient</u>, and the laboratory

is not concerned by the fact that this patient might have had a different identification when the prior results were produced.

Segment PV1, which is the first segment of the segment group PRIOR RESULT, is mandatory. The presence of this segment at this point in the message structure announces unambiguously a set of prior orders with related prior observations. The segment PV1 represents the patient visit (or encounter) during which these prior observations were produced. The only field mandatory in the segment PV1 is PV1-2 "Patient Class" (as shown in section 3.4). If the sender of this message does not know the patient class, it SHALL value the field PV1-2 "U", which stands for "patient class unknown".

The ORC appearing in the PRIOR RESULT segment group is mandatory and SHALL have its first field "Order Control" populated with "PR" (Prior results).

4.5.8 ORL^O36 Static Definition

Table 4.5-6 : ORL^O36

Segment	Meaning	Usage	Card.	HL7
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[{ERR}]	Error	C	[0..*]	2
[	--- RESPONSE begin	C	[0..1]	
[	--- PATIENT begin	R	[1..1]	
PID	Patient Identification	O	[0..1]	3
{	--- SPECIMEN begin			
SPM	Specimen	R	[1..*]	7
{	--- CONTAINER begin	R	[1..*]	
SAC	Specimen Container	R	[0..*]	13
{	--- ORDER begin	R	[1..*]	
ORC	Common Order	R	[1..*]	4
[{TQ1}]	Timing/Quantity	RE	[0..1]	4
OBR	Observation Request	R	[1..1]	4
}	--- ORDER end			
}	--- CONTAINER end			
}	--- SPECIMEN end			
]	--- PATIENT end			
]	--- RESPONSE end			

MSH-9 - Message Type (MSG) shall have its three components respectively valued to "ORL", "O36" and "ORL_O36".

The RESPONSE segment group is mandatory unless in case of error (MSA-1 = AE or AR). This segment group carries the response of the Order Filler in the segments ORC and OBR.

The mandatory ORC and OBR segments in the repeatable ORDER segment group provide the response of the Order Filler for each order, in particular the ORC-1 Order Control field.

The SAC segment below the SPM is mandatory in ORL^O36 message structure.

4.5.9 Specific Segments Description for Transaction LAB-1

4.5.9.1 OBR - Observation Request Segment

2010 HL7 v2.5: chapter 4 (4.5.3)

Table 4.5-7 : OBR - Observation Request Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
2	22	EI	R	[1..1]		00216	Placer Order Number
3	22	EI	RE	[0..1]		00217	Filler Order Number
4	250	CE	R	[1..1]		00238	Universal Service Identifier
5	2	ID	X	[0..0]		00239	Priority – OBR
6	26	TS	X	[0..0]		00240	Requested Date/Time
7	26	TS	X	[0..0]		00241	Observation Date/Time #
8	26	TS	X	[0..0]		00242	Observation End Date/Time #
9	20	CQ	X	[0..0]		00243	Collection Volume *
10	250	XCN	RE	[0..*]		00244	Collector Identifier *
11	1	ID	RE	[0..1]	0065	00245	Specimen Action Code *
12	250	CE	X	[0..0]		00246	Danger Code
13	300	ST	X	[0..0]		00247	Relevant Clinical Information
14	26	TS	X	[0..0]		00248	Specimen Received Date/Time *
15	300	SPS	X	[0..0]		00249	Specimen Source
16	250	XCN	R	[1..1]		00226	Ordering Provider
17	250	XTN	RE	[0..2]		00250	Order Callback Phone Number
18	60	ST	X	[0..0]		00251	Placer Field 1
19	60	ST	X	[0..0]		00252	Placer Field 2
20	60	ST	X	[0..0]		00253	Filler Field 1 +
21	60	ST	X	[0..0]		00254	Filler Field 2 +
22	26	TS	X	[0..0]		00255	Results Rpt/Status Chng - Date/Time +
23	40	MOC	X	[0..0]		00256	Charge to Practice +
24	10	ID	C	[0..1]	0074	00257	Diagnostic Serv Sect ID
25	1	ID	C	[0..1]	0123	00258	Result Status +
26	400	PRL	X	[0..0]		00259	Parent Result +
27	200	TQ	X	[0..0]		00221	Quantity/Timing
28	250	XCN	C	[0..*]		00260	Result Copies To
29	200	EIP	X	[0..0]		00261	Parent
30	20	ID	X	[0..0]	0124	00262	Transportation Mode
37	4	NM	X	[0..1]		01028	Number of Sample Containers *
40	250	CE	X	[0..0]		01031	Transport Arrangement Responsibility
41	30	ID	X	[0..0]	0224	01032	Transport Arranged
42	1	ID	X	[0..0]	0225	01033	Escort Required
43	250	CE	X	[0..0]		01034	Planned Patient Transport Comment
48	250	CWE	X	[0..0]	0476	01646	Medically Necessary Duplicate Procedure Reason.

OBR-2 Placer Order Number (EI), required in transaction LAB-1.

Each ordered battery/test should be assigned to a unique Order, identified by a unique Placer Order Number. The same identifier will never be used twice by the Order Placer. The Placer Order Number is generated by the Order Placer actor and should be unique across all OBR segments across all messages. Please refer to section 2.4.6.1 for the details of the data type.

OBR-3 Filler Order Number (EI), required if available.

Each Order should be assigned a unique Filler Order Number by the Order Filler Actor. The same
2020 identifier will never be used twice by the Order Filler. The filler order number generated by the Order Filler should be unique across all OBR segments across all messages. Please refer to section 2.4.6.1 for the details of the data type.

OBR-4 Universal Service Identifier (CE), required

This field contains one ordered battery or test. A battery is composed of one or more tests or one or more batteries.

Additionally, when the "Report Fac-simile For Order Group" option is activated, when placing an Order Group, the Order Placer MAY request this service in an extra (ORC/OBR) segment group. In that case this requested service SHALL be identified in this field using this LOINC code exclusively:

```
11502-2^ LABORATORY REPORT.TOTAL^LN
```

2030 **OBR-5 Priority and OBR-6 Requested Date/Time**

These two fields are not supported. See TQ1 segment.

OBR-7, OBR-8, OBR-12, OBR-14, OBR-15 These fields are not supported. See SPM segment that supersedes them.

OBR-10   Collector Identifier, required if available.

This repeatable field contains the specimen collectors' identification.

OBR-11   Specimen Action Code   (ID), required if available.

The value of this field is dependent on the use case as described in Volume 1.

The field identifies the action to be taken with respect to the specimens that accompany or precede this order.   The purpose of this field is to further qualify (when appropriate) the general action
2040 indicated by the order control code contained in the accompanying ORC segment.

HL7 Table 0065 - Specimen Action Code gives the valid values:

Table 4.5-8 : HL7 Table 0065 - Specimen Action Code

Value	Description	Comment
A	Add ordered tests to the existing specimen	
G	Generated order; reflex order	
L	Lab to obtain specimen from patient	
O	Specimen obtained by service other than Lab	
P	Pending specimen; Order sent prior to delivery	
R	Revised order	
S	Schedule the tests specified below	

OBR-13   Relevant Clinical information   (ST), not supported.

Transaction LAB-1 uses OBX segment to carry relevant clinical information, or a NTE segment below the OBR for more comment orientated information.

OBR-16 Ordering Provider (XCN), required.

OBR-17 Order Callback Phone Number (XTN), required if available.

HL7 definition: This field contains the telephone number for reporting a status or a result using the standard format with extension and/or beeper number when applicable.

One or two phone numbers.

OBR-22 Results Rpt/Status Chng - Date/Time (TS), not used in LAB-1: OBR-22 is related to the RESULT, not to the ORDER. OBR-22 is related to OBR-25. ORC-9 contains the date/time of the latest status change of the ORDER.

OBR-24 Diagnostic Serv Sect ID (ID), conditional

Condition predicate: This field may be valued in OML messages sent by the Order Filler. In other words this field is RE for the order filler actor. The valid values are defined in HL7 Table 0074 - Diagnostic Service Section ID. The table below presents a subset of these valid values as identified in Volume 1.

Table 4.5-9 : HL7 Table 0074 - Diagnostic Service Section ID (subset)

Value	Description	Addressed by Laboratory TF 2003 - 2004
BG	Blood Gases	Yes
CH	Chemistry	Yes
CP	Cytopathology	
HM	Hematology	Yes
IMM	Immunology	Yes
LAB	Laboratory	Yes
MB	Microbiology	Yes
MCB	Mycobacteriology	Yes
MYC	Mycology	Yes
OSL	Outside Lab	
SR	Serology	Yes
TX	Toxicology	Yes
VR	Virology	Yes

OBR-25 Order Result Status (ID), Conditional.

Condition predicate: This field shall not be filled in messages sent by the Order Placer. This field shall be filled in messages sent by the Order Filler, according to HL7 Table 0123 described in Chapter 7 of HL7. In this version of the Laboratory Technical Version, the possible values for this field are a subset of this table:

HL7 Table 0123 - Result Status

Value	Description	Comment
O	Order received; specimen not yet received	
I	No results available; specimen received, procedure incomplete	
S	No results available; procedure scheduled, but not done	
R	Results stored; not yet verified	
P	Preliminary: A verified early result is available, final results not yet obtained	
F	Final results; results stored and verified. Can only be	

Value	Description	Comment
	changed with a corrected result.	
C	Correction to results	
X	No results available. Order canceled	

Note: For the conditions of use of these values, please read section 3.10 "Correlations of status between ORC, OBR and OBX".

2070 **OBR-28 Result Copies To (XCN)**, conditional.

HL7 Definition: This field identifies the people who are to receive copies of the results. By local convention, either the ID number or the name may be absent.

Condition predicate: The Order Placer shall fill this field when it sends a new order for which there are persons or care units declared for receiving a copy of the results.

5 Transaction LAB-2: Filler Order Management

5.1 Scope

This transaction is supporting the general use case "*Filler order with specimens identified by third party or collected by the laboratory*" described in LAB TF-1:4.2.3.

2080 This transaction is used by the Order Filler to inform the Order Placer that a new Order, standalone or embedded in an existing Order Group, has been generated on the laboratory side. By this transaction, the Order Filler Actor requests the Order Placer to assign a unique Placer Order Number to this new Order. The Order contains a battery or a test to be performed by the laboratory, using biological specimens collected from the subject.

5.2 Use Case Roles
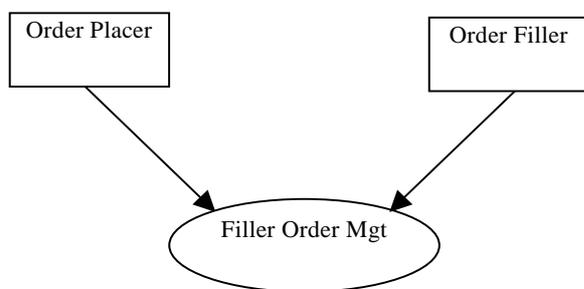
Actor : Order Placer

Roles : Receives filler orders. Notifies the Order Filler of acceptance or refusal. Notifies the Order
2090 Filler of the placer order number if the filler order was accepted.

Actor : Order Filler

Roles : Notifies filler orders to the Order Placer. Receives acceptance or rejection from the Order Placer. Receives the Placer Order Number from the Order Placer if the Order was accepted.

5.3 Referenced Standards

HL7 version 2.5:
- Chapter 2: "Control" --> generic segments and data types
- Chapter 3: "ADT" --> PID and PV1 segments
- Chapter 4: "Order Entry" --> OML and ORL messages
2100 - Chapter 7: "Observation Reporting" --> SPM segment
- Chapter 13: "Clinical Laboratory Automation" --> SAC segment

5.4 Interaction Diagrams

Trigger events: In all interactions below, the initiator chooses the best OML message structure appropriate to its orders. The responder SHALL respond with the related ORL message structure:

OML^O21 → ORL^O22
OML^O33 → ORL^O34
OML^O35 → ORL^O36

An OML message shall be responded to with exactly 1 ORL message.

2110   ORL messages SHALL be created by the Order Placer application, and not by a message broker. The message broker (an intermediary between the Order Filler and the Order Placer) has no knowledge of the tests being requested and can't assign identification numbers on behalf of the Order Placer.

5.4.1 Process of a Filler Order

The figure below shows the flow of messages in the normal process of a filler order. A Filler Order is placed, and responded to by either a rejection or acceptance.

Note that the creation of a filler order may be triggered by a prior placer order, e.g. if the results of one of the previously ordered tests triggers the laboratory to perform additional tests. The creation of a filler order could also happen during the quality control performed by the laboratory on a new order

2120   received from the Order Placer: the laboratory may then decide that some extra battery that was not ordered should be added, e.g. regarding the pathology context.
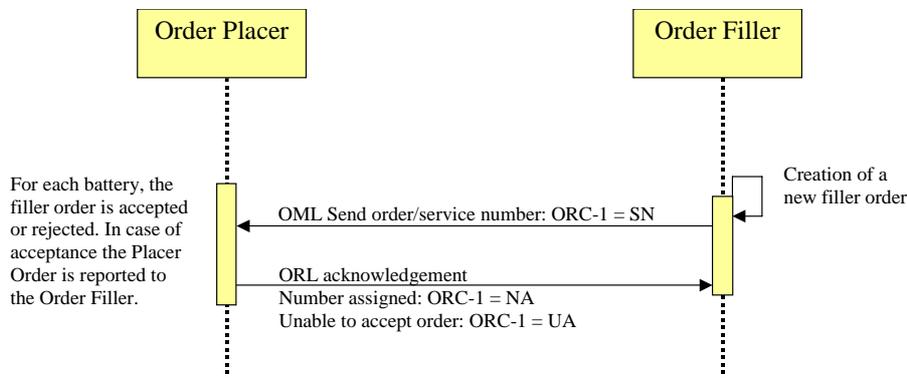
Figure 5.4-1: Process of a filler order

5.5 Messages Static Definitions

5.5.1 Restrictions on OML Messages for Transaction LAB-2

Transaction LAB-2 allows all message types used by transaction LAB-1. See paragraph 4.5.1 for a
detailed description.

The following restriction is made for transaction LAB-2: Timing/quantity is limited to one instance
per order (i.e. there is one iteration of the TQ1 segment related to an OBR). The main reason for this
choice is that collecting the specimens is not delegated to a separate actor in this cycle of the IHE
Laboratory Technical Framework. The collection process is part of either the Order Placer or the
Order Filler. See the explanation given in LAB-1 section.

5.5.2 OML and ORL Messages Static Definitions

The static definitions of the messages in LAB-2 are equal to the static definition for LAB-1. See
paragraph 4.5.3. up to paragraph 4.5.8. for details.

5.5.3 Specific Segments Description for Transaction LAB-2

5.5.3.1 OBR - Observation Request Segment

HL7 v2.5: chapter 4 (4.5.3)

Table 5.5-1 : OBR - Observation Request Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
2	22	EI	C	[0..1]		00216	Placer Order Number
3	22	EI	R	[1..1]		00217	Filler Order Number
4	250	CE	R	[1..1]		00238	Universal Service Identifier
5	2	ID	X	[0..0]		00239	Priority – OBR
6	26	TS	X	[0..0]		00240	Requested Date/Time
7	26	TS	X	[0..0]		00241	Observation Date/Time #
8	26	TS	X	[0..0]		00242	Observation End Date/Time #
9	20	CQ	X	[0..0]		00243	Collection Volume *
10	250	XCN	RE	[0..*]		00244	Collector Identifier *
11	1	ID	RE	[0..1]	0065	00245	Specimen Action Code *
12	250	CE	X	[0..0]		00246	Danger Code
13	300	ST	X	[0..0]		00247	Relevant Clinical Information
14	26	TS	X	[0..0]		00248	Specimen Received Date/Time *
15	300	SPS	X	[0..0]		00249	Specimen Source
16	250	XCN	RE	[0..1]		00226	Ordering Provider
17	250	XTN	RE	[0..2]		00250	Order Callback Phone Number
18	60	ST	X	[0..0]		00251	Placer Field 1
19	60	ST	X	[0..0]		00252	Placer Field 2
20	60	ST	X	[0..0]		00253	Filler Field 1 +
21	60	ST	X	[0..0]		00254	Filler Field 2 +
22	26	TS	X	[0..0]		00255	Results Rpt/Status Chng - Date/Time +
23	40	MOC	X	[0..0]		00256	Charge to Practice +
24	10	ID	RE	[0..1]	0074	00257	Diagnostic Serv Sect ID

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
25	1	ID	X	[0..0]	0123	00258	Result Status +
26	400	PRL	X	[0..0]		00259	Parent Result +
27	200	TQ	X	[0..0]		00221	Quantity/Timing
28	250	XCN	C	[0..*]		00260	Result Copies To
29	200	EIP	X	[0..0]		00261	Parent
30	20	ID	X	[0..0]	0124	00262	Transportation Mode
37	4	NM	X	[0..1]		01028	Number of Sample Containers *
40	250	CE	X	[0..0]		01031	Transport Arrangement Responsibility
41	30	ID	X	[0..0]	0224	01032	Transport Arranged
42	1	ID	X	[0..0]	0225	01033	Escort Required
43	250	CE	X	[0..0]		01034	Planned Patient Transport Comment
48	250	CWE	X	[0..0]	0476	01646	Medically Necessary Duplicate Procedure Reason.

OBR-2 Placer Order Number (EI), conditional.

Condition predicate: Used only in the ORL message sent back by the Order Placer to acknowledge an accepted filler order. In that case ORC-1 = "NA" (number assigned). Not used in OML messages of LAB-2.

OBR-3 Filler Order Number (EI), required.

Note that all batteries/tests contained in the filler order should be assigned a unique identifier. The same identifier will never be used twice. The filler order number should be unique across all OBR segments across all messages ever sent by the order filler. Please refer to section 2.4.6.1 for the details of the data type.

OBR-4 Universal Service Identifier (CE), required

This field contains one ordered battery or test. A battery is composed of one or more tests or one or more batteries.

OBR-5 Priority and OBR-6 Requested Date/Time

These two fields are not supported. See TQ1 segment.

OBR-7, OBR-8, OBR-12, OBR-14, OBR-15 These fields are not supported. See SPM segment for fields that supersedes them.

OBR-10 Collector Identifier, required if available.

This repeatable field contains the specimen collectors' identification.

OBR-11 Specimen Action Code (ID), required if available.

The value of this field is dependent on the use case as described in volume 1.

The field identifies the action to be taken with respect to the specimens that accompany or precede this order. The purpose of this field is to further qualify (when appropriate) the general action indicated by the order control code contained in the accompanying ORC segment.

HL7 Table 0065 - Specimen Action Code gives the valid values:

Table 5.5-2 : HL7 Table 0065 - Specimen Action Code

Value	Description	Comment
G	Generated order; filler order	

2170   **OBR-13   Relevant Clinical information (ST)**, not supported.

Instead of OBR-13, transaction LAB-2 uses OBX segment to carry relevant clinical information, or a NTE segment below the OBR for more comment orientated information.

OBR-16   Ordering Provider (XCN), required if available.

OBR-17 Order Callback Phone Number (XTN), required if available. One or two phone numbers.

OBR-24 Diagnostic Serv Sect ID (ID), required if available.

The valid values are defined in HL7 Table 0074 - Diagnostic Service Section ID. The table below presents a subset of these valid values as identified in volume 1.

Table 5.5-3 : HL7 Table 0074 - Diagnostic Service Section ID (subset)

Value	Description	Addressed by Laboratory TF 2003 - 2004
BG	Blood Gases	Yes
CH	Chemistry	Yes
CP	Cytopathology	
HM	Hematology	Yes
IMM	Immunology	Yes
LAB	Laboratory	Yes
MB	Microbiology	Yes
MCB	Mycobacteriology	Yes
MYC	Mycology	Yes
OSL	Outside Lab	
SR	Serology	Yes
TX	Toxicology	Yes
VR	Virology	Yes

2180   **OBR-28 Result Copies To (XCN)**, conditional.

HL7 Definition: This field identifies the persons who are to receive copies of the results. By local convention, either the ID number or the name may be absent.

Condition predicate: If there are known individuals or care units that should receive a copy of results related to this order, they should be listed here.

6 Transaction LAB-3: Order Results Management

6.1 Scope

2190

This transaction notifies the Order Result Tracker of requested tests upon creation of an order or reception of a specimen in the laboratory. It transmits the observation results from the Order Filler to the Order Result Tracker, when a result is acquired, clinically validated, modified or deleted at the Order Filler level. Another goal of this transaction is to provide the Order Result Tracker with the complete sorted set of results related to a Placer Order or a Placer Order Group. The Order Result Tracker shall store these results in the sorting order given by the Order Filler. In addition, if the "Report Fac-simile For Order Group" option is activated, this transaction MAY provide in the results messages related to an Order Group a pdf report built by the OF presenting the releasable results of this Order Group.

In order to maintain consistency between order and result messages, the result messages of transaction T3 should refer to primary specimen even in the case where some of the observations are performed on secondary samples that are derived from primary specimen after specific preparation.

2200

6.2 Use Case Roles
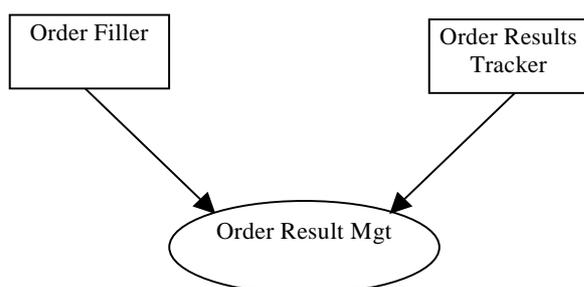
Actor: Order Filler

Roles: Provides notification to the Order Result Tracker for specimen arrival, acquisition of technically validated results, clinical validation of results, modification/cancellation of results and deletion of tests. Provides the complete sorted set of results related to a Placer Order or a Placer Order Group.

2210

In case the "Report Fac-simile For Order Group" option is in use, upon request from the OP the OF complements its results messages related to an Order Group and carrying some clinically validated results, with a link to the pdf report recapitulating the set of clinically validated results completed for this Order Group.

Actor: Order Result Tracker

Roles: Receives test order and results from the Order Filler, gives access to this order and results to the healthcare enterprise, respects the sorting order of the results as received from the Order Filler. In case the "Report Fac-simile For Order Group" option is in use, when receiving a result message related to an Order Group providing a link to the pdf report, the ORT imports this pdf file immediately, and integrates it with the set of results received.

6.3 Referenced Standards

HL7 version 2.5:

2220
- Chapter 2: "Control" --> generic segments and data types
- Chapter 3: "Patient Administration" --> PID and PV1 segments
- Chapter 4: "Order Entry" --> OBR segment
- Chapter 7: "Observation Reporting" --> OUL and ORU message structures

6.4 Interaction Diagrams

6.4.1 Normal Process for Management of Results of a Filler Order

The figures below show the flow of messages that occurs during normal process of a filler order, from the reception of specimen or entry of the order in the laboratory, up to the completion of this order and visualization of results by an end user on the Order Result Tracker. For each triggering event of an OUL or ORU message, the value of the result status of the OBR (OBR-25) is indicated.
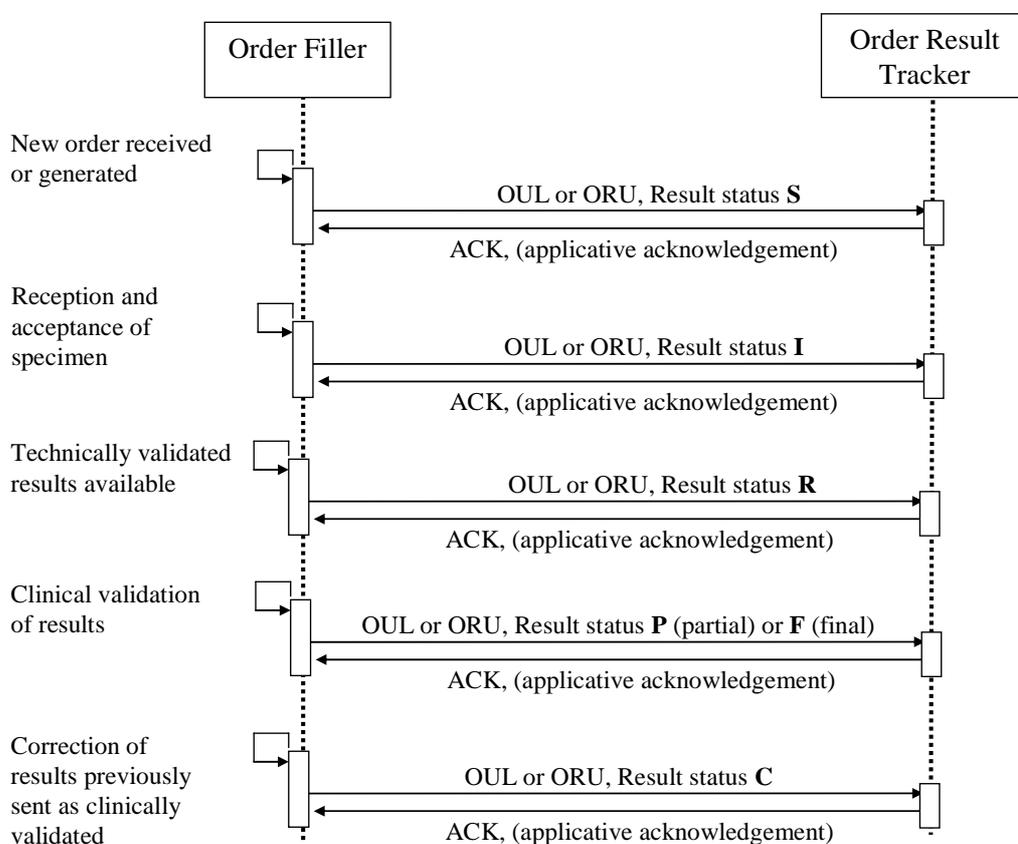
2230

Figure 6.4-1: Normal process for management of results of a filler order

The decision whether to deliver or not technically validated results (using OBR-25 "Result Status" "R") to the Order Result Tracker is driven by organization rules specific to each healthcare enterprise. These rules may take account of the order priority (TQ1-9), the ordering provider, the particular ordered battery, the executing laboratory, the observation result itself… The IHE Laboratory Technical Framework does not make any assertion on these rules. It only states that an Order Filler MUST be able to send all the result statuses mentioned in the above diagram, and doing so, MUST conform to the correlation diagrams and transition diagrams presented in section 3.10.

The same remark applies to the sending of partial clinically validated results (using OBR-25 "Result
2240   Status" "P").

6.4.2 Deletion of Battery/Test in a Filler Order

At any time during the process, an ordered test/battery of the order can be deleted from the filler order
by the laboratory, which should trigger a message to the Order Result Tracker, with OBR-25 "Result
Status"set to "X" for this particular Order, as shown below.
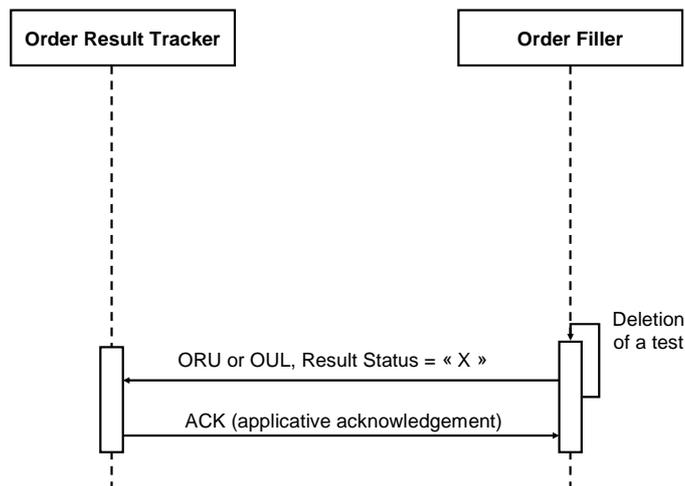
Figure 6.4-2: Deletion of a test by the Order Filler

6.4.3 Summary of Events Triggering LAB-3 Messages

The following events detected by the Order Filler application (LIS) will trigger the sending of an
OUL or of an ORU message to the Order Result Tracker:

2250   • Entry of an Order at the laboratory level for an already collected specimen

• Reception and acceptance of a specimen for an existing Order

• Acquisition of some technically validated results, in the context where transmission of such
results is expected by the ward staff.

• Clinical validation of results

• Correction of results previously transmitted

• Cancellation of results previously transmitted

• Deletion of tests

6.5 Messages Static Definitions

Transaction LAB-3 offers two message profiles:

2260   -   The OUL^R22 message is designed for Specimen centered result reporting.

-    The ORU^R01 message is designed for Order centered result reporting.

In both message structures the order in which the OBX segments appear defines the sorting order for
the presentation of the results for a given battery or specimen. In this respect, the Order Filler shall
transmit all available results for the battery or specimen in recapitulative mode no matter whether they
have already been transmitted or not.

An Order Filler chooses whichever message profile to use depending upon its own business rules. The Order Filler is not mandated to be able to use both message profiles.

An Order Result Tracker must be able to receive both message structures.

The OUL^R24 message profile designed for multi-specimen batteries was usable in release 1 of the Laboratory Technical Framework. However, the HL7 OUL^R24 message structure is ambiguous in that it gives no clue to the receiver to distinguish between the results (OBX) related to the order and the observations (OBX) related to the last specimen of that order. Therefore, as of its release 2, this Laboratory Technical Framework deprecates OUL^R24 message profile, kept for backward compatibility only, and viewable in:
ftp://ftp.ihe.net/Laboratory/Tech_Framework/V2/ ihe_lab_TF_2.0_Vol1_FT_2006-12-04.doc

6.5.1 OUL^R22 Static Definition

Table 6.5-1 : OUL^R22 static definition

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin	RE	[0..1]	
PID	Patient Identification	R	[1..1]	3
[PV1]	Patient Visit	RE	[0..1]	3
]	--- PATIENT end			
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..1]	7
[{OBX}]	Observation related to specimen	O	[0..*]	
[{SAC}]	Container information	O	[0..*]	13
{	--- ORDER begin	R	[1..*]	
OBR	Observation Request	R	[1..*]	4
ORC	Common Order (for one specimen)	R	[1..1]	4
[{TQ1}]	Timing Quantity	RE	[0..1]	4
[{	--- RESULT begin	O	[0..*]	
OBX	Observation related to OBR	R	[1..*]	7
[{NTE}]	Comment of the result	C	[0..*]	2
}]	--- RESULT end			
}	--- ORDER end			
}	--- SPECIMEN end			

Field MSH-9 – Message Type shall have its three components valued as follows: OUL^R22^OUL_R22

For specimen oriented observation message, additional parameters that are related to the specimen (e.g.: Anatomic origin, Collection procedure) should be transmitted in OBX segments that immediately follow the SPM segment..

For each set of observations (e.g. Microscopy; Culture; Antibiotic Susceptibility) the Order Filler should generate an OBR segment that identifies the Observation followed by a series of OBX segments, each of them carrying the result of an individual test/observation.

Following the SPM segment, the Order Filler should systematically transmit in the OUL message, all OBR and OBX segments related to this SPM. This systematic transmission of all observations linked to an SPM segment and their respective status may help the Order Result Tracker to recover from an

2290   error situation, when for some hazardous reasons a previous OUL message for the same request could not have been properly processed. For the same reason the "U" value should not be used in the Observation Result Status field of an OBX segment (see description of this segment in section 3.9 of this document).

In case an observation previously transmitted is deleted, the Order Filler should transmit all OBX segments linked to the OBR to which the deleted observation relates to; and it should indicate the current status of each OBX segment. The Observation Result Status field of the OBX that correspond to the deleted observation should be valued with a "D".

Unless the Report Status field (OBR-25) of the OBR is valued with an "X" (deleted battery), the OBR segment shall always be followed by one or several OBX segments.

2300   TQ1 and ORC segments shall be transmitted because they contain important information such as the priority of the order and the order group number.

6.5.2 ORU^R01 Static Definition

Table 6.5-2: ORU^R01 static definition

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin	RE	[0..1]	
PID	Patient Identification	R	[1..1]	3
[PV1]	Patient Visit	RE	[0..1]	3
]	--- PATIENT end			
{	--- ORDER_OBSERVATION begin	R	[1..*]	
ORC	Common Order (for one battery)	R	[1..1]	4
OBR	Observation Request	R	[1..1]	4
[{TQ1}]	Timing Quantity	RE	[0..1]	4
[{	--- OBSERVATION begin	O	[0..*]	
OBX	Observation related to OBR	R	[1..1]	7
[{NTE}]	Comment of the result	C	[0..*]	2
}]	--- OBSERVATION end			
[{	--- SPECIMEN begin	O	[0..*]	
SPM	Specimen	R	[1..1]	7
[{OBX}]	Observation related to specimen	O	[0..*]	
}]	--- SPECIMEN end			
}	--- ORDER_OBSERVATON end			

Field MSH-9 – Message Type shall have its three components valued as follows: ORU^R01^ORU_R01
For multi-specimen batteries, each specimen of the battery is described in an SPM segment. The tests performed on that specimen shall have their observations reported in OBX segments following the SPM.

2310   Following the ORC/OBR, the Order Filler should systematically transmit in the message, all OBX and SPM segments related to this ORC/OBR. This systematic transmission of all observations linked to an OBR and their respective status may help the Order Result Tracker to recover from error situations.
For the same reason the "U" value should not be used in the Observation Result Status field of an OBX segment (see description of this segment in Chapter 3.11 earlier in this document).

In case an observation previously transmitted is deleted, the Order Filler should transmit all OBX segments linked to the OBR to which the deleted observation relates to; and it should indicate the current status of each OBX segment. The Observation Result Status field of the OBX that correspond to the deleted observation should be valued with a "D".

2320　　　Unless the Report Status field (OBR-25) of the OBR is valued with an "X" (deleted battery), the OBR segment shall always be followed by one or several SPM and OBX segments.

TQ1 and ORC segments shall be transmitted because they contain important information such as the priority of the order and the Order Group Number.

6.5.3 OBR Segment

This section describes the OBR segment usage in ORU and OUL messages described above.

The OUL/ORU message corresponding to an Order Group should contain as many OBR segments as Orders involved by the triggering event of the message. For example, upon reception of a specimen in the laboratory, the Order Filler application (the LIS) will generate a message that contains as many OBR segments as batteries or tests requested for this specimen. The modification of a result of an 2330　　　observation will trigger an OUL message that contains the OBR segment describing the related Order.

Table 6.5-2 : OBR segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
2	22	EI	RE	[0..1]		00216	Placer Order Number
3	22	EI	R	[1..1]		00217	Filler Order Number
4	250	CE	R	[1..1]		00238	Universal Service Identifier
5	2	ID	X	[0..0]		00239	Priority – OBR
6	26	TS	X	[0..0]		00240	Requested Date/Time
7	26	TS	C	[0..1]		00241	Observation Date/Time
8	26	TS	X	[0..0]		00242	Observation End Date/Time
9	20	CQ	X	[0..0]		00243	Collection Volume
10	250	XCN	RE	[0..1]		00244	Collector Identifier
11	1	ID	C	[0..1]	0065	00245	Specimen Action Code
12	250	CE	X	[0..0]		00246	Danger Code
13	300	ST	X	[0..0]		00247	Relevant Clinical Information
14	26	TS	X	[0..0]		00248	Specimen Received Date/Time
15	300	SPS	X	[0..0]		00249	Specimen Source or Segment SPM
16	250	XCN	RE	[0..1]		00226	Ordering Provider
17	250	XTN	X	[0..0]		00250	Order Callback Phone Number
18	60	ST	X	[0..0]		00251	Placer Field 1
19	60	ST	X	[0..0]		00252	Placer Field 2
20	60	ST	X	[0..0]		00253	Filler Field 1
21	60	ST	X	[0..0]		00254	Filler Field 2
22	26	TS	X	[0..0]		00255	Results Rpt/Status Chng – Date/Time
23	40	MOC	X	[0..0]		00256	Charge to Practice
24	10	ID	R	[0..0]	0074	00257	Diagnostic Serv Sect ID
25	1	ID	R	[1..1]	0123	00258	Order Result Status
26	400	PRL	C	[0..1]		00259	Parent Result
27	200	TQ	X	[0..0]		00221	Quantity/Timing
28	250	XCN	RE	[0..*]		00260	Result Copies To
29	200	EIP	C	[0..1]		00261	Parent

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
30	20	ID	X	[0..0]	0124	00262	Transportation Mode
31	250	CE	X	[0..0]		00263	Reason for Study
32	200	NDL	C	[0..1]		00264	Principal Result Interpreter
33	200	NDL	X	[0..0]		00265	Assistant Result Interpreter
34	200	NDL	X	[0..0]		00266	Technician
37	4	NM	X	[0..0]		01028	Number of Sample Containers *
38	250	CE	X	[0..0]		01029	Transport Logistics of Collected Sample
39	250	CE	X	[0..0]		01030	Collector's Comment *
40	250	CE	X	[0..0]		01031	Transport Arrangement Responsibility
41	30	ID	X	[0..0]	0224	01032	Transport Arranged
42	1	ID	X	[0..0]	0225	01033	Escort Required
43	250	CE	X	[0..0]		01034	Planned Patient Transport Comment
44	250	CE	X	[0..0]	0088	00393	Procedure Code
45	250	CE	X	[0..0]	0340	01316	Procedure Code Modifier
46	250	CE	X	[0..0]	0411	01474	Placer Supplemental Service Information
47	250	CE	X	[0..0]	0411	01475	Filler Supplemental Service Information
48	250	CWE	X	[0..0]	0476	01646	Medically Necessary Duplicate Procedure Reason.
49	2	IS	X	[0..0]	N	01647	Result Handling

OBR-2   Placer Order Number (EI), required if available

This field is required if the value is known to the sender. See section 2.4.6.1 for the details of the data type. In case of a Filler Order, the value of this field will be known to the sender after transaction LAB-2 Filler Order Management (section 5.4.1) has taken place.

OBR-3 Filler Order Number (EI), required

This field is required. It allows the Order Result Tracker to link all the Tests/results of a request together. It also identifies the order at the Order Filler level. Please refer to section 2.4.6.1 for the details of the data type.

OBR-4 Universal Service Identifier (CE), required

The first three sub-fields "Identifier", "Text" and "Name of Coding System" are required.

The second sub-field "Text" allows the Order Result Tracker to manage the results without the help of Battery Master File.

The last three sub-fields are optional.

OBR-7 Observation Date/Time (TS), conditional

Condition predicate: If the order is related to one single specimen, then OBR-7 SHALL be populated with the content of SPM-17.1, which represents the physiologically relevant date-time (i.e. the time the specimen was collected from the patient). In all other situations this field OBR-7 SHALL be populated with a null value: """

OBR-9 Collection Volume (CQ)

Since when it is needed by the laboratory and reported, the volume of collection is the result of an observation (sometimes done by the Order Placer) that can be used for calculation of other results

(e.g. Creatinine Clearance); this information should be transferred in an OBX segment as all other results of observation. This field OBR-9 should consequently not be used in this transaction.

OBR-10 Collector Identifier (XCN)

This field identifies the person, department or facility that collected the specimen(s).

OBR-11 Specimen Action Code (ID)

This field is only required in the following events:

2360
- The order is entered at the Order Filler (LIS) level as described in LAB TF-1:4.2.3. The value of the Action Code is A.

- The battery or test has been added by the Order Filler (LIS) for confirmation of a diagnostic (reflex testing); value G.

In all other triggering events of this transaction, this Action Code field is meaningless.

OBR-12 Danger Code (CE)

This field should not be used in this first version of Laboratory Technical Framework.

OBR-13 Relevant Clinical Information (ST)

Since it is stated in the HL7 V2.5 Chapter 7 that "for some orders this information may be sent on a more structured form as a series of OBX segments (see HL7 V2.5 Chapter 7) that immediately 2370 follow the order segment", it is preferable and more consistent to systematically use OBX segments in OUL message for sending Clinical Information.

OBR-14 Specimen Received Date/Time (TS)

This field should not be used; this information should be transmitted in an SPM segment.

OBR-15 Specimen Source (SPS)

As for OBR-13, if this information needs to be transmitted to the Order Result Tracker it is more consistent to transfer it in an OBX segment. This field should not be used.

OBR-16 Ordering Provider (XCN)

This field is required if it was part of the order sent by the Order Placer.

2380 **OBR-24 Diagnostic Serv Sect ID (ID)**

This field is required. In case the Order Result Tracker receives part of the results of an entire order at different time, the Order Result Tracker can use this field for presenting all the batteries/test with the same Diagnostic Serv. Sect. ID together.

OBR-25 Result Status (ID)

This field is required and should be filled according to HL7 Table 0123 described in Chapter 4. Depending on the triggering event of the OUL message the possible values for this field are:

- Value I is used to indicate reception of specimen(s) at the laboratory. In case a battery or test requires more than one specimen (e.g. Creatinine clearance) this I status has to be used when all the required specimens have been received. An OBR segment with this I status 2390 may be followed by OBX segments that contains result of observations performed at specimen collection time (e.g. Volume of collected specimen).

- Value R, to indicate that some results are available and technically validated but not yet clinically validated.

- Value P, to indicate that some of the results, but not all, are available and have been clinically validated. The identity of the Clinical Expert should in this case be indicated in the OBR-32 field.

- Value F, to indicate that all results are available and have been clinically validated. The identity of the Clinical Expert should in this case be indicated in the OBR-32 field.

2400

- Value C, to indicate that at least one result contained in one of the following OBX segments has been modified after the results have been transmitted with the F status. This C value should never be used before results have been transmitted with the F status. Since a Corrected result is supposed to be clinically validated, the identity of the Clinical Expert should be indicated in the OBR-32 field when the value of the Result Status is C.

- Value X, to indicate that the battery/test has been deleted. This deletion could have been, either received from the Order Placer for an already received specimen and accepted by the Order Filler, or decided by the laboratory. This value X should not be used if some results for this test have already been transmitted.

- Value S, although the usage of this value is mainly in response to a Query message. It can be used in OUL messages for tests that have been added to the original request by the Order Filler (LIS). In this case, the value of the OBR-11 field (Action Code) should be either A, or G.

2410

Note: For the conditions of use of these values, please read section 3.10 "Correlations of status between ORC, OBR and OBX".

OBR-26 Parent Result (PRL)

This field is used to report spawned orders in microbiology. See section 3.11 for detailed specification of usage.

OBR-28 Result Copies To (XCN)

This field may be used to indicate the list of recipients who will receive a hard copy of the results report, which may be useful information for users who have access to these results.

2420

OBR-29 Parent (EIP)

This field is used to report spawned orders in microbiology. See section 3.11 for detailed specification of usage.

OBR-32 Principal Result Interpreter (NDL)

This field is required when the value of the Results Status field (OBR-25) is P, F or C (corrected results are supposed to be verified). The field identifies who validated the results, where, and when this clinical validation was performed. It describes completely the "Clinical Validation" step.

2430 **OBR-33 Assistant Result Interpreter (NDL)**

This field is meaningless when the value of the Result Status field is different from P, F or C.

OBR-34 Technician (NDL)

This field should not be used, as all observations linked to the battery have not necessarily been performed by the same Technician. The OBX-16 (Responsible Observer) should be used instead.

OBR-35 Transcriptionist (NDL)

This field is only applicable when the final report has been dictated and transcribed, which is frequent for Histology and Cytology reports.

OBR-36 Scheduled - Date/Time (TS)

This field is optional and only applies when the value of the Result Status field (OBR-25) is S.

OBR-44 Procedure Code (CE)

This field is in principle meaningless in an OUL message sent by a Laboratory but may be needed in some organizations.

OBR-45 Procedure Code Modifier (CE)

This field can be used only when OBR-44 (Procedure Code) is filled.

6.5.4 Use of the Option Report Fac-simile For Order Group

6.5.4.1 Pdf Report Provided By Reference

When this option is activated, if the Order Placer requested this fac-simile report service with an Order Group, then messages OUL^R22 and ORU^R01 carrying clinically validated results related to an Order Group SHALL provide the link to the pdf report recapitulating all clinically validated and reportable results for this Order Group.

6.5.4.2 OF Actor Sending Responsibilities Extended for this Option

If the OP requested the fac-simile of the report in an Order Group, when the OF prepares a message containing some clinically validated results for this Order Group, it SHALL construct the pdf report recapitulating all results validated and releasable for this Order Group and SHALL include a link to this pdf report in the results message.

When canceling some results previously transmitted to ORT with a pdf report fac-simile, if after this cancellation occurs, no result remains releasable for this Order Group, then OF SHALL provide a nullified link in the results message, to request the cancellation without replacement of the report fac-simile.

6.5.4.3 ORT Actor Receiving Responsibilities Extended for this Option

Upon reception of a results message carrying such a link, the ORT Actor SHALL follow the link, retrieve the pdf report immediately, and store it attached to the Order Group and its current set of results, replacing any previous report fac-simile for this Order Group with this new one.

Upon reception of a results message carrying a nullified link (meaning the previous report transmitted for this Order Group is canceled and not replaced), the ORT Actor SHALL mark the report fac-simile as canceled and no longer usable for care purpose.

6.5.4.4 Segment Group Dedicated to the Report Fac-simile

Message ORU^R01 provides this link in a dedicated ORDER_OBSERVATION segment group, appearing at the bottom of the message. This last ORDER_OBSERVATION segment group, which was requested by the Order Placer when the Order Group was placed, is composed of only 3 segments: ORC, OBR, OBX.

Message OUL^R22 provides this link through in a dedicated ORDER segment group appearing at the end of the last SPECIMEN segment group of the message. This last ORDER segment group is composed of only 3 segments: OBR, ORC, OBX.

In both message structures the 3 segments introducing the pdf report are populated as follows:

6.5.4.5 ORC Segment Introducing the Laboratory Report for the Order Group

This segment is populated with at least these 3 fields:

Field	DT	Element name	Value	comment
ORC-1	ID	Order Control	SC	*A results message is always a **S**tatus **C**hange.*
ORC-4	EI	Placer Group Number	*The Order Group number*	*The identifier assigned by the Order Placer to this Order Group.*
ORC-9	TS	Date/Time of Transaction	*Date time of the triggering event*	*Date/time of this release of the laboratory report produced for this Order Group.*

6.5.4.6 OBR Segment Introducing the Laboratory Report for the Order Group

2480 This segment is populated with at least these 4 fields:

Field	DT	Element name	Value	comment
OBR-2	EI	Placer Order Number	As assigned by OP	
OBR-3	EI	Filler Order Number	As assigned by OF	
OBR-4	CE	Universal Service Identifier		
OBR-4.1	ST	Code	11502-2	*This code announces the laboratory report*
OBR-4.2	ST	Text	LABORATORY REPORT.TOTAL	*The LOINC name of this code*
OBR-4.3	ID	Name of Coding System	LN	*Coding system LOINC*
OBR-25	ID	Result Status	P, F, C, X	*The report is **P**reliminary, **F**inal, **C**orrected (after final) or canceled (**X**). When existing, it contains only verified results (i.e. clinically validated).*

6.5.4.7 OBX Segment Carrying the Link to the Laboratory Report

This segment is populated with these 6 fields:

Field	DT	Element name	Value	comment
OBX-1	SI	Set ID – OBX	1	
OBX-2	ID	Value Type	RP	*Reference Pointer*
OBX-3		Observation Identifier		
OBX-3.1	ST	Code	11502-2	*The observation is the laboratory report itself*
OBX-3.2	ST	Text	LABORATORY REPORT.TOTAL	*The LOINC name of this code*
OBX-3.3	ID	Name of Coding System	LN	*Coding system LOINC*
OBX-5	RP	Observation Value		
OBX-5.1	ST	Pointer	*URL of the laboratory report*	*The syntax of the URL SHALL be conformant with RFC 1738 and RFC 1808.*
OBX-5.2	HD	Application ID	*unique ID assigned to the OF application*	
OBX-5.3	ID	Type Of Data	AP	*Other application data. The report is not to be interpreted by a HL7 parser.*
OBX-5.4	ID	Subtype	PDF *or* JPG	*The laboratory report is in pdf or jpeg format*

Field	DT	Element name	Value	comment
OBX-11	ID	Observation Result Status	P, F, C, D	*The report is **P**reliminary, **F**inal, **C**orrected , **D**eleted, or cannot be produced (**X**). In the two latter cases (D or X) OBX-5.1 SHALL be nullified (i.e. populated with two double quotes)*
OBX-13	ST	User Defined Access Checks	P *or empty*	*P means this report should be viewed only by privileged users.*

6.5.4.8 Example of ORDER_OBSERVATION Segment Group in an ORU Message

```
…
ORC|SC|||777^Nephro|||||200805191100
OBR||||11502-2^LABORATORY REPORT.TOTAL^LN||||||||||||||||||||||||F
OBX|1|RP|11502-2^LABORATORY REPORT.TOTAL^LN||file://hserv/lr/lr12345678.pdf||||||F||P
```

6.6 Acknowledgement of OUL and ORU messages

2490 OUL and ORU messages received by the Order Result Tracker shall generate a logical acknowledgement message from the Order Result Tracker to the Order Filler. This General Acknowledgement Message 'ACK' shall be built according to HL7 V2.5 standard.

7   Transaction LAB-4: Work Order Management

7.1 Scope

This transaction is used if the Order Filler issues a new order to the Automation Manager.

In addition, this transaction is used to cancel and/or modify an order that was previously sent to the Automation Manager.

It is also possible to cancel a previous order and send a new order to modify it.

7.2 Use case roles

2500
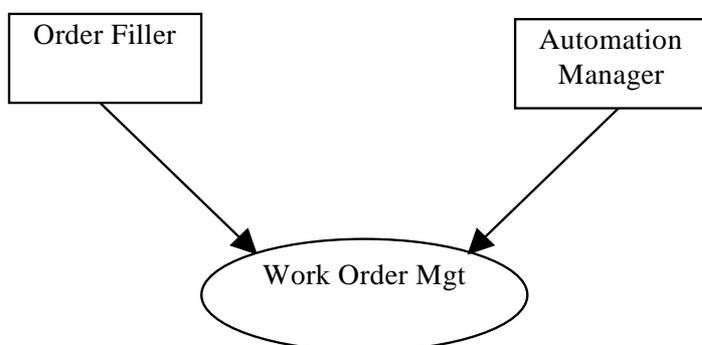
Actor: Order Filler

The role: manages orders and takes care of the routing to the appropriate Automation Manager.

Actor: Automation Manager

The role: receives the orders from the order filler and manages the preprocessing, the analysis, and the post processing of the order.

7.3 Referenced Standards

HL7 version 2.5 Chapter 4

2510

7.4 Interaction Diagrams

ORL messages SHALL be created by the Automation Manager application, and not by a message broker. The message broker (an intermediary between the Order Filler and the Automation Manager) has no knowledge of the tests being requested and can't accept/reject these test on behalf of the Automation Manager.
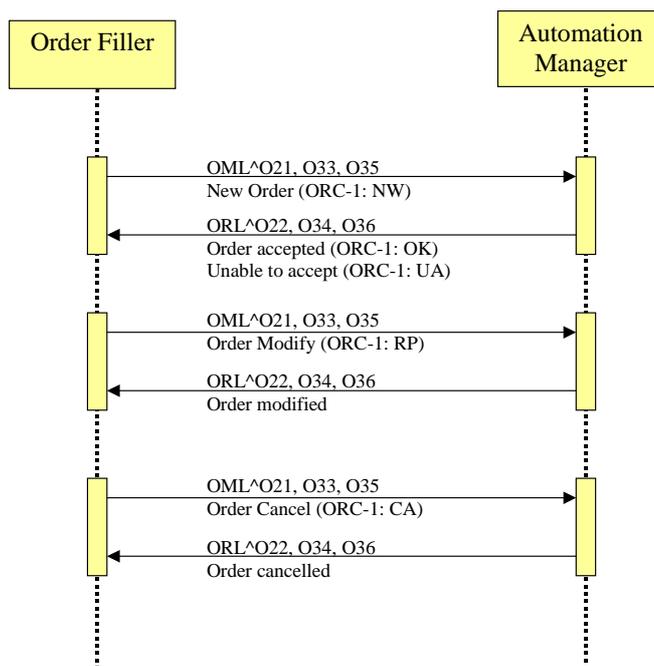
Figure 7.4-1: Normal process of ordering to Automation Manager

2520 An OML message shall be responded to with exactly 1 ORL message.

Notes: ORM^O01 is not used, and OML^O21 bears the usage. ORR^O02 is not used either, and ORL^O22 bears the usage.

7.5 **Messages Static Definitions**

7.5.1 **Laboratory Order Message (OML^O21, ORL^O22)**

The following message is used for analytical messages where it is required that the Specimen/Container information is within ORC/OBR segment group.

7.5.1.1 **Trigger Events**

2530 OML(O21) : Work order sent by the Order Filler.

ORL (O22) : Acknowledgement of the Work Order sent by the Automation Manager.

7.5.1.2 **Message Semantics**

Refer to the HL7 standard for the OML message of HL7 2.5 Chapter 4 and the general message semantics.

In addition, when the Order Filler sends a new work order to the Automation Manager, ORC-1 "Order Control Code" is valued with "NW". When the work order is canceled, ORC-1 is valued with "CA". The correction of the work order uses value "RP".

The OBX segments are used to convey the patient's previous results, as well as some observation provided by the Order Placer or by the Order Filler, such as: blood pressure, patient's temperature,
2540 specimen collection volume…

Table 7.5-1: OML^021 Message

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin	O	[0..1]	
PID	Patient Identification	R	[1..1]	3
[PV1]	Patient Visit	RE	[0..1]	3
]	--- PATIENT end			
{	--- ORDER begin	R	[1..*]	
ORC	Common Order (for one battery)	R	[1..1]	4
[{TQ1}]	Timing Quantity	RE	[0..1]	4
[	--- OBSERVATION REQUEST begin	O	[0..1]	
OBR	Observation Request	R	[1..1]	4
[TCD]	Test Code Details	O	[0..1]	13
[{	--- OBSERVATION begin	O	[0..*]	
OBX	Observation Result	R	[1..1]	7
[{NTE}]	Comment of the result	C	[0..*]	2
}]	--- OBSERVATION end			
[{	--- SPECIMEN begin	C	[0..*]	
SPM	Specimen	R	[1..1]	7
[{	--- CONTAINER begin	C	[0..*]	
SAC	Specimen Container	R	[1..1]	13
[{OBX}]	Additional specimen characteristics	O	[0..*]	7
}]	--- CONTAINER end			
}]	--- SPECIMEN end			
[{	--- PRIOR_RESULT begin	O	[0..*]	
PV1	Patient Visit – previous result	R	[1..1]	3
{	--- ORDER_PRIOR begin	R	[1..*]	
[ORC]	Common Order - previous result	R	[1..1]	4
OBR	Order Detail - previous result	R	[1..1]	4
{[NTE]}	Notes and Comments - previous result	O	[0..*]	2
{	--- OBSERVATION_PRIOR begin	R	[1..*]	
OBX	Observation/Result - previous result	R	[1..1]	7
{[NTE]}	Notes and Comments - previous result	O	[0..*]	2
}	--- OBSERVATION_PRIOR end			
}	--- ORDER_PRIOR end			
]}	--- PRIOR_RESULT end			
]	--- OBSERVATION REQUEST end			
}	--- ORDER end			

The PRIOR RESULT segment group provides the prior results obtained for the same patient. Segment PID is not provided in this segment group because <u>it is the same patient</u>, and the laboratory is not concerned by the fact that this patient might have had a different identification when the prior results were produced.

Segment PV1, which is the first segment of the segment group PRIOR RESULT, is mandatory. The presence of this segment at this point in the message structure announces unambiguously a set of prior

orders with related prior observations. The segment PV1 represents the patient visit (or encounter) during which these prior observations were produced. The only field mandatory in the segment PV1 is PV1-2 "Patient Class" (as shown in section 3.4). If the sender of this message does not know the patient class, it SHALL value the field PV1-2 "U", which stands for "patient class unknown".

The ORC appearing in the PRIOR RESULT segment group is mandatory and SHALL have its first field "Order Control" populated with "PR" (Prior results).

Field MSH-9 – Message Type shall have its three components valued as follows: OML^O21^OML_O21

PV1 is optional in the LAB-4/LAB-5 segments since Automation manager and analytical instruments do not usually need the outpatient information.

The SPECIMEN group is required when the specimen has already been collected and prepared, and is registered in the Order Filler application. In this case, there is at least one SPM segment present in this group. Below each SPM segment, the condition of use of the SAC segment is the one described in the paragraph describing this segment, section 3.10.

If neither Automation Manager nor analytical instruments compare the test result with the previous result, ORC, OBR, and OBX for the previous result are not necessary.

The OBX segment in the OBSERVATION group is used for the vital signs if it is necessary for technical validation.

The OBX segment in the CONTAINER group is used when a rerun is ordered.

Table 7.5-2 : ORL^O22 Message

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[{ERR}]	Error	O	[0..*]	2
[	--- RESPONSE begin	X	[0..0]	
[	--- PATIENT begin	O	[0..1]	
PID	Patient Identification	R	[1..1]	3
{	--- ORDER begin	R	[1..*]	
ORC	Common Order	R	[1..*]	4
[{TQ1}]	Timing/Quantity	RE	[0..1]	4
[	--- OBSERVATION REQUEST begin	O	[0..1]	
OBR	Observation Request	R	[1..1]	4
[{	--- SPECIMEN begin	C	[0..*]	
SPM	Specimen	R	[1..1]	7
[{SAC}]	Specimen Container Details	C	[0..*]	7
}]	--- SPECIMEN end			
]	--- OBSERVATION end			
}]	--- OBSERVATION REQUEST end			
]	--- ORDER end			
]	--- PATIENT end			
]	--- RESPONSE end			

2570

Field MSH-9 – Message Type shall have its three components valued as follows: ORL^O22^ORL_O22

This message never carries the RESPONSE segment group. It is therefore limited to the first two or three segments.

7.5.2 Multiple Orders Related to a Single Specimen (OML^O33, ORL^O34)

7.5.2.1 Trigger Events

OML (O33): Work order sent by the Order Filler.

ORL (O34): Acknowledgement of the Work Order sent by the Automation Manager.

The trigger event for this message is "any status change of a work order". Such changes include
2580 submission of new orders, cancellations, updates, etc where multiple orders are associated with a single specimen, which may be carried in multiple containers.

7.5.2.2 Message Semantics

Refer to the HL7 standard for the OML message of HL7 2.5 Chapter 4 and the general message semantics.

In addition, when the Order Filler sends a new work order to the Automation Manager, ORC-1 "Order Control Code" is valued with "NW". When the work order is canceled, ORC-1 is valued with "CA". The correction of the work order uses value "RP".

The OBX segments are used to convey the patient's previous results, as well as some observation provided by the Order Placer or by the Order Filler, such as: blood pressure, patient's temperature,
2590 specimen collection volume…

Table 7.5-3: OML^O33

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin	O	[0..1]	
PID	Patient Identification	R	[1..1]	3
[PV1]	Patient Visit	RE	[0..1]	3
]	--- PATIENT end			
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..1]	7
[{SAC}]	Specimen Container	O	[0..*]	
{	--- ORDER begin	R	[1..*]	
ORC	Common Order (for one battery)	R	[1..1]	4
[{TQ1}]	Timing Quantity	RE	[0..1]	4
[	--- OBSERVATION REQUEST begin	O	[O..1]	
OBR	Observation Request	R	[1..1]	4
[TCD]	Test Code Details	O	[0..1]	13
[{OBX}]	Observation Result	C	[0..*]	7
{	--- PRIOR RESULT start	O	[0..*]	
[PV1]	Patient Visit	R	[1..1]	3

[ORC]	Common order – prior result	R	[1..1]	4
OBR	Order detail – prior result	R	[1..1]	4
{OBX}	Observation/Result – prior result	R	[1..*]	
[{NTE}]	Comment of the result	C	[0..*]	2
}	--- PRIOR RESULT end			
]	--- OBSERVATION REQUEST end			
}	--- ORDER end			
}	--- SPECIMEN end			

Field MSH-9 – Message Type shall have its three components valued as follows: OML^O33^OML_O33

The PRIOR RESULT segment group provides the prior results obtained for the same patient. Segment PID is not provided in this segment group because it is the same patient, and the laboratory is not concerned by the fact that this patient might have had a different identification when the prior results were produced.

2600 Segment PV1, which is the first segment of the segment group PRIOR RESULT, is mandatory. The presence of this segment at this point in the message structure announces unambiguously a set of prior orders with related prior observations. The segment PV1 represents the patient visit (or encounter) during which these prior observations were produced. The only field mandatory in the segment PV1 is PV1-2 "Patient Class" (as shown in section 3.4). If the sender of this message does not know the patient class, it SHALL value the field PV1-2 "U", which stands for "patient class unknown".

The ORC appearing in the PRIOR RESULT segment group is mandatory and SHALL have its first field "Order Control" populated with "PR" (Prior results).

2610 **Table 7.5-4: ORL^O34**

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[{ERR}]	Error	O	[0..*]	2
[	--- RESPONSE begin	X	[0..0]	
[	--- PATIENT begin	R	[1..1]	
[PID]	Patient Identification	R	[1..1]	3
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..1]	7
[{SAC}]	Specimen Container	O	[0..*]	13
[{	--- ORDER begin	O	[0..*]	
ORC	Common Order	R	[1..1]	4
[{TQ1}]	Timing/Quantity	RE	[0..1]	4
[OBR]	Observation Request	R	[1..1]	4
}]	--- ORDER end			
}	--- SPECIMEN end			
]	--- PATIENT end			
]	--- RESPONSE end			

MSH-9 - Message Type (MSG) shall have its three components respectively valued to "ORL", "O34" and "ORL_O34".

This message never carries the RESPONSE segment group. It is therefore limited to the first two or three segments.

7.5.3 Multiple Orders for a Single Container/Specimen (OML^O35, ORL^O36)

7.5.3.1 Trigger Events

OML (O35): Work order sent by the Order Filler.

ORL (O36): Acknowledgement of the Work Order sent by the Automation Manager.

2620   The trigger event for this message is any change to a laboratory order. Such changes include submission of new orders, cancellations, updates, etc where multiple orders are associated with a single container of a specimen.

> Notes HL7 V2.5 Chapter 4 describes "The trigger event for this message is any change to a laboratory order. Such changes include submission of new orders, cancellations, updates, etc where multiple orders are associated with a single sample which may be carried in a multiple container". This is same as OML^O33, and it seems a miss of typing.

7.5.3.2 Message Semantics

Refer to the HL7 standard for the OML message of HL7 2.5 Chapter 4 and the general message semantics.

2630   In addition, when the Order Filler sends a new work order to the Automation Manager, ORC-1 "Order Control Code" is valued with "NW". When the work order is canceled, ORC-1 is valued with "CA". The correction of the work order uses value "RP".

The OBX segments are used to convey the patient's previous results, as well as some observation provided by the Order Placer or by the Order Filler, such as: blood pressure, patient's temperature, specimen collection volume…

Table 7.5-5 : OML^O35

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
[	--- PATIENT begin	O	[0..1]	
PID	Patient identification	R	[1..1]	3
[PV1]	Patient visit	RE	[0..1]	3
]	--- PATIENT end			
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..1]	7
{	--- CONTAINER begin	R	[1..*]	
SAC	Specimen Container	R	[1..1]	13
{	--- ORDER begin	R	[1..*]	
ORC	Common order	R	[1..1]	4
[{TQ1}]	Timing/Quantity Order Sequence	RE	[0..1]	4
[	--- OBSERVATION REQUEST begin	O	[0..1]	
OBR	Observation Request	R	[1..1]	4
[TCD]	Test Code Details	O	[0..1]	13

[{OBX}]	Additional specimen characteristics	O	[0..*]	7
{	--- PRIOR RESULT begin	O	[0..*]	
[PV1]	Patient Visit	R	[1..1]	3
[ORC]	Common order – prrior result	O	[0..1]	4
OBR	Order detail – prior result	R	[1..1]	4
{OBX}	Observation/Result - prior result	R	[1..*]	7
}	--- PRIOR RESULT end			
]	--- OBSERVATION REQUEST end			
}	--- ORDER end			
}	--- CONTAINER end			
}	--- SPECIMEN end			

Field MSH-9 – Message Type shall have its three components valued as follows: OML^O35^OML_O35

2640 The PRIOR RESULT segment group provides the prior results obtained for the same patient. Segment PID is not provided in this segment group because it is the same patient, and the laboratory is not concerned by the fact that this patient might have had a different identification when the prior results were produced.

Segment PV1, which is the first segment of the segment group PRIOR RESULT, is mandatory. The presence of this segment at this point in the message structure announces unambiguously a set of prior orders with related prior observations. The segment PV1 represents the patient visit (or encounter) during which these prior observations were produced. The only field mandatory in the segment PV1 is PV1-2 "Patient Class" (as shown in section 3.4). If the sender of this message does not know the patient class, it SHALL value the field PV1-2 "U", which stands for "patient class unknown"

2650 **Table 7.5-6 : ORL^O36**

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R		2
MSA	Message Acknowledgement	R		2
[{ERR}]	Error	O		2
[	--- RESPONSE begin	X	[0..0]]	
[	--- PATIENT begin	R	[1..1]	
[PID]	Patient Identification	O	[0..1]	3
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..1]	7
{	--- CONTAINER begin	R	[1..*]	
SAC	Specimen Container	R	[1..1]	13
[{	--- ORDER begin	O	[0..*]	
ORC	Common Order	R	[1..1]	4
[{TQ1}]	Timing/Quantity	RE	[0..1]	4
[OBR]	Observation Request	R		4
}]	--- ORDER end			
}	--- CONTAINER end			
}	--- SPECIMEN END			
]	--- PATIENT end			
]	--- RESPONSE end			

Field MSH-9 – Message Type shall have its three components valued as follows: ORL^O36^ORL_O36

This message never carries the RESPONSE segment group. It is therefore limited to the first two or three segments.

7.5.3.2.1 OBR Segment

All fields are optional except those listed in table below.

Table 7.5-7 : OBR Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	4	SI	O	[0..1]		00237	Set ID – OBR
2	22	EI	R	[1..1]		00216	Placer Order Number
3	22	EI	RE	[0..1]		00217	Filler Order Number
4	250	CE	R	[1..1]		00238	Universal Service Identifier
5	2	ID	X	[0..0]		00239	Priority – OBR
6	26	TS	X	[0..0]		00240	Requested Date/Time
7	26	TS	X	[0..0]		00241	Observation Date/Time #
8	26	TS	X	[0..0]		00242	Observation End Date/Time #
9	20	CQ	X	[0..0]		00243	Collection Volume *
10	250	XCN	O	[0..*]		00244	Collector Identifier *
11	1	ID	RE	[0..1]	0065	00245	Specimen Action Code *
12	250	CE	X	[0..0]		00246	Danger Code
13	300	ST	X	[0..0]		00247	Relevant Clinical Information
14	26	TS	X	[0..0]		00248	Specimen Received Date/Time *
15	300	SPS	X	[0..0]		00249	Specimen Source
16	250	XCN	R	[1..1]		00226	Ordering Provider
17	250	XTN	RE	[0..2]		00250	Order Callback Phone Number
18	60	ST	X	[0..0]		00251	Placer Field 1
19	60	ST	X	[0..0]		00252	Placer Field 2
20	60	ST	X	[0..0]		00253	Filler Field 1 +
21	60	ST	X	[0..0]		00254	Filler Field 2 +
22	26	TS	X	[0..0]		00255	Results Rpt/Status Chng - Date/Time +
23	40	MOC	X	[0..0]		00256	Charge to Practice +
24	10	ID	C	[0..1]	0074	00257	Diagnostic Serv Sect ID
25	1	ID	X	[0..0]	0123	00258	Result Status +
26	400	PRL	X	[0..0]		00259	Parent Result +
27	200	TQ	X	[0..0]		00221	Quantity/Timing
28	250	XCN	O	[0..*]		00260	Result Copies To
29	200	EIP	X	[0..0]		00261	Parent
30	20	ID	X	[0..0]	0124	00262	Transportation Mode
31	250	CE	O	[0..1]		00263	Reason for Study
32	200	NDL	O	[0..1]		00264	Principal Result Interpreter +
33	200	NDL	O	[0..1]		00265	Assistant Result Interpreter +
34	200	NDL	O	[0..1]		00266	Technician +
35	200	NDL	O	[0..1]		00267	Transcriptionist +
36	26	TS	O	[0..1]		00268	Scheduled Date/Time +

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
37	4	NM	O	[0..1]		01028	Number of Sample Containers *
38	250	CE	O	[0..1]		01029	Transport Logistics of Collected Sample *
39	250	CE	O	[0..1]		01030	Collector's Comment *
40	250	CE	X	[0..0]		01031	Transport Arrangement Responsibility
41	30	ID	X	[0..0]	0224	01032	Transport Arranged
42	1	ID	X	[0..0]	0225	01033	Escort Required
43	250	CE	X	[0..0]		01034	Planned Patient Transport Comment
44	250	CE	O	[0..1]	0088	00393	Procedure Code
45	250	CWE	O	[0..1]	0340	01316	Procedure Code Modifier
46	250	CE	O	[0..1]	0411	01474	Placer Supplemental Service Information
47	250	CE	O	[0..1]	0411	01475	Filler Supplemental Service Information
48	250	CWE	X	[0..0]	0476	01646	Medically Necessary Duplicate Procedure Reason.
49	2	IS	O	[0..1]	0507	01647	Result Handling

OBR-2 Placer Order Number shall be reflected in a test result (LAB-5:OUL message), and it is used to in order that Order Filler or Order Placer use it to pull out the corresponding order record.

OBR-3 If Filler Order Number present, it should be filled in.

2660

7.5.3.2.2 TCD Segment

All fields are optional except those listed in table below.

Table 7.5-8 : TCD Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	250	CE	R	[1..1]		00238	Universal Service Identifier
2	20	SN	O	[0..1]		01420	Auto-Dilution Factor
3	20	SN	O	[0..1]		01421	Rerun Dilution Factor
4	20	SN	O	[0..1]		01422	Pre-Dilution Factor
5	20	SN	O	[0..1]		01413	Endogenous Content of Pre-Dilution Diluent
6	1	ID	O	[0..1]	0136	01416	Automatic Repeat Allowed
7	1	ID	O	[0..1]	0136	01424	Reflex Allowed
8	250	CE	O	[0..1]	0389	01425	Analyte Repeat Status

7.5.3.3 Expected Action

If the OML message of the Order Control Code NW is received from Order Filler, the Automation Manager will receive and register the order information, then it will transmit the result either "Accept" or "Reject" to Order Filler by the ORL message.

If the OML message of the Order Control Code CA is received from Order Filler, Automation Manager will cancel the existing previous order information, and will not try to schedule or execute the command. Moreover, the command that has already started at the Automation Manager is not canceled. The result either Accept or Reject is transmitted to Order Filler by the ORL message.

Automation Manager will change and register record of the command, if the OML message of the Order Control Code RP is received from Order Filler. However, Automation Manager does not change the command that has already started. The result either Accept or Reject is transmitted to Order Filler by the ORL message.

2680
8 Transaction LAB-5: Test Results Management

This section corresponds to transaction LAB-5 of IHE Laboratory Technical Framework. The actors using this transaction are the Order Filler and the Automation Manager.

8.1 Scope

This transaction is used when Automation Manager transmits test results to Order Filler.

8.2 Use Case Roles
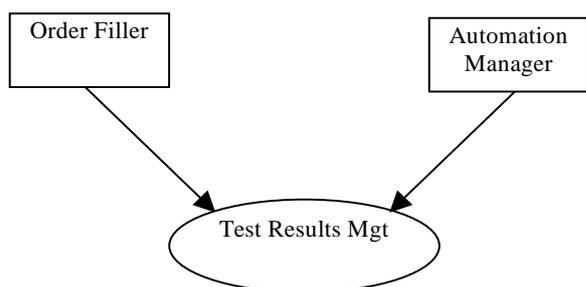
Actor: Order Filler

Role: The Order Filler manages the test results notified by the Automation Manager.

Actor: Automation Manager

2690 **Role**: Handles the preprocessing and the analysis processing to fulfill the Work Order, performs the technical validation and sends the results technically validated to the Order Filler.

8.3 Referenced Standards

HL7 Version 2.5--mainly referred to in Chapter 7.

8.4 Interaction Diagrams
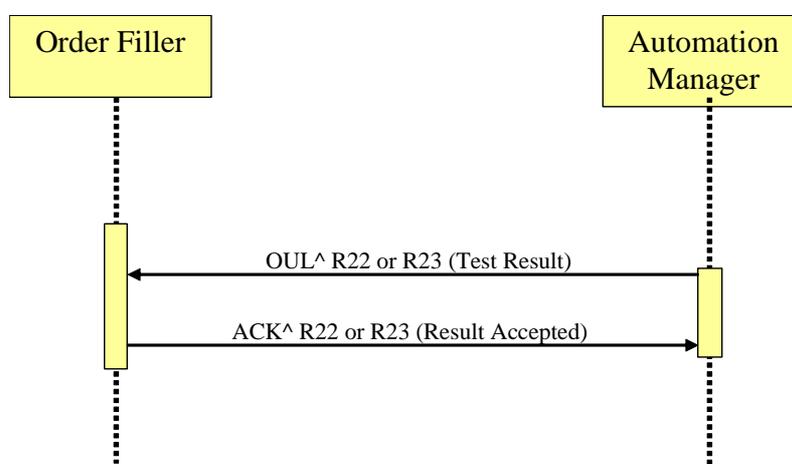
Figure 8.4-1: Unsolicited Observation Message from Automation Manager

8.5 Messages Static Definitions

8.5.1 Trigger Events

2700 OUL (R22 or R23): Automation Manager transmits test results.

The use of R22 is recommended when transferring multiple results related to a specimen from a patient.

The use of R23 is recommended when transferring multiple results related to one or more specific containers with one or more specimens from a patient.

The use of R24 is deprecated, since this HL7 message structure is ambiguous. OUL^R24 can be viewed in:
ftp://ftp.ihe.net/Laboratory/Tech_Framework/V2/ ihe_lab_TF_2.0_Vol2_FT_2006-12-04.doc

ACK (R22 or R23): Order Filler response acknowledgements.

8.5.1.1 Message Semantics (R22)

2710 Refer to HL7 2.5 Chapter 7, section 7.3.7 for the general semantics of this message structure.

Table 8.5-1 OUL^R22

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
[PID]	Patient Identification	RE	[0..1]	3
[PV1]	Patient Visit	O	[0..1]	3
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen information	R	[1..1]	7
[{ OBX }]	Observation Result (for Specimen)	O	[0..*]	7
[{	--- CONTAINER begin	0	[0..*]	
SAC	Container information	R	[1..1]	13
[INV]	Detailed Substance information (e.g., id, lot, manufacturer, … of QC specimen)	O	[0..1]	13
}]	--- CONTAINER end			
{	--- ORDER begin	R	[1..*]	
OBR	Observation Order	R	[1..1]	7
[ORC]	Common Order	O	[0..1]	4
[{	--- RESULT begin	O	[0..*]	
OBX	Observation Result	R	[1..1]	7
[TCD]	Test Code Detail	O	[0..1]	13
[{SID}]	Substance Identifier (e.g., reagents used for testing)	O	[0..*]	13
[{NTE}]	Notes and comments	O	[0..*]	
}]	--- RESULT end			
}	--- ORDER end			
}	--- SPECIMEN end			

The carrier information in the case of notifying the test results of a patient's sample uses SAC.

Table 8.5-2 ACK^R22

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[ERR]	Error	O	[0..1]	2

Field MSH-9 – Message Type shall have its three components valued as follows: OUL^R22^OUL_R22

8.5.1.2 Message Semantics (R23)

2720   Refer to HL7 2.5 Chapter 7, section 7.3.8 for the general semantics of this message structure.

Table 8.5-3: OUL^R23

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
[PID]	Patient Identification	RE	[0..1]	3
[PV1]	Patient Visit	O	[0..1]	3
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen information	R	[1..1]	7
[{ OBX }]	Observation Result (for Specimen)	O	[0..*]	7
{	--- CONTAINER begin	R	[1..*]	
SAC	Container information	R	[1..1]	13
[INV]	Detailed Substance information (e.g., id, lot, manufacturer, … of QC specimen)	O	[0..1]	13
{	--- ORDER begin	R	[1..*]	
OBR	Observation Order	R	[1..1]	7
[ORC]	Common Order	O	[0..1]	4
[{	--- RESULT begin	O	[0..*]	
OBX	Observation Result	R	[1..1]	7
[TCD]	Test Code Detail	O	[0..1]	13
[{SID}]	Substance Identifier (e.g., reagents used for testing)	O	[0..*]	13
[{NTE}]	Notes and comments	O	[0..*]	
}]	--- RESULT end			
}	--- ORDER end			
}	--- CONTAINER end			
}	--- SPECIMEN end			

Field MSH-9 – Message Type shall have its three components valued as follows: OUL^R23^OUL_R23

The carrier information in the case of notifying the test results of a patient's sample uses SAC.

Refer to HL7 Chapter 13 for INV, SID segments and refer to HL7 Chapter 7 for CTI segment.

Table 8.5-4 ACK^R23

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[ERR]	Error	O	[0..1]	2

2730

Field MSH-9 - Message Type (MSG) shall have its two first components respectively valued to "OUL" and "R23".

Refer to HL7 Chapter 13 for INV, SID segments and refer to HL7 Chapter 7 for CTI segment.

8.5.1.3 Expected Action

The Automation Manager notifies test results with the OUL message to the Order Filler. The Order Filler accepts and registers information, and responds to the Automation Manager with the ACK message.

2740 ### 8.5.1.4 OBR Segment

All fields are optional except those listed in table below.

Table 8.5-5: OBR segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	4	SI	O	[0..1]		00237	Set ID – OBR
2	22	EI	R	[1..1]		00216	Placer Order Number
3	22	EI	RE	[0..1]		00217	Filler Order Number
4	250	CE	R	[1..1]		00238	Universal Service Identifier
5	2	ID	X	[0..0]		00239	Priority – OBR
6	26	TS	X	[0..0]		00240	Requested Date/Time
7	26	TS	RE	[0..1]		00241	Observation Date/Time #
8	26	TS	RE	[0..1]		00242	Observation End Date/Time #
9	20	CQ	O	[0..1]		00243	Collection Volume *
10	250	XCN	O	[0..*]		00244	Collector Identifier *
11	1	ID	RE	[0..1]	0065	00245	Specimen Action Code *
12	250	CE	X	[0..0]		00246	Danger Code
13	300	ST	X	[0..0]		00247	Relevant Clinical Information
14	26	TS	X	[0..0]		00248	Specimen Received Date/Time *
15	300	SPS	X	[0..0]		00249	Specimen Source
16	250	XCN	R	[1..1]		00226	Ordering Provider
17	250	XTN	RE	[0..2]		00250	Order Callback Phone Number
18	60	ST	X	[0..0]		00251	Placer Field 1
19	60	ST	X	[0..0]		00252	Placer Field 2
20	60	ST	X	[0..0]		00253	Filler Field 1 +
21	60	ST	X	[0..0]		00254	Filler Field 2 +
22	26	TS	C	[0..1]		00255	Results Rpt/Status Chng - Date/Time +
23	40	MOC	X	[0..0]		00256	Charge to Practice +

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
24	10	ID	C	[0..1]	0074	00257	Diagnostic Serv Sect ID
25	1	ID	R	[1..1]	0123	00258	Result Status +
26	400	PRL	C	[0..1]		00259	Parent Result +
27	200	TQ	X	[0..0]		00221	Quantity/Timing
28	250	XCN	O	[0..*]		00260	Result Copies To
29	200	EIP	C	[0..1]		00261	Parent
30	20	ID	X	[0..0]	0124	00262	Transportation Mode
31	250	CE	O	[0..1]		00263	Reason for Study
32	200	NDL	O	[0..1]		00264	Principal Result Interpreter +
33	200	NDL	O	[0..1]		00265	Assistant Result Interpreter +
34	200	NDL	O	[0..1]		00266	Technician +
35	200	NDL	O	[0..1]		00267	Transcriptionist +
36	26	TS	O	[0..1]		00268	Scheduled Date/Time +
37	4	NM	O	[0..1]		01028	Number of Sample Containers *
38	250	CE	O	[0..1]		01029	Transport Logistics of Collected Sample *
39	250	CE	O	[0..1]		01030	Collector's Comment *
40	250	CE	X	[0..0]		01031	Transport Arrangement Responsibility
41	30	ID	X	[0..0]	0224	01032	Transport Arranged
42	1	ID	X	[0..0]	0225	01033	Escort Required
43	250	CE	X	[0..0]		01034	Planned Patient Transport Comment
44	250	CE	O	[0..1]	0088	00393	Procedure Code
45	250	CWE	O	[0..1]	0340	01316	Procedure Code Modifier
46	250	CE	O	[0..1]	0411	01474	Placer Supplemental Service Information
47	250	CE	O	[0..1]	0411	01475	Filler Supplemental Service Information
48	250	CWE	X	[0..0]	0476	01646	Medically Necessary Duplicate Procedure Reason.
49	2	IS	O	[0..1]	0507	01647	Result Handling

All field data should reflect LAB-4 transaction's OBR, except:

OBR-26 Parent Result (PRL)

> **This field is used to report spawned orders in microbiology. See section 3.11 for detailed specification of usage.**

OBR-29 Parent (EIP)

> **This field is used to report spawned orders in microbiology. See section 3.11 for detailed specification of usage.**

2750 **1.1.1.1 TCD Segment**

All fields are optional except those listed in table below.

Table 8.5-6 : TCD segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	250	CE	R	[1..1]		00238	Universal Service Identifier

9   Transaction LAB-21: Work Order Step Download to LD

9.1 Scope

This transaction is used between an Automation Manager and a Laboratory Device working in download mode. It enables the AM to issue a new WOS to the LD, or cancel or modify an existing WOS previously sent to the LD. Modification may also be achieved by combining cancellation and sending of a new WOS.

2760 ## 9.2 Use Case Roles

```
┌─────────────┐              ┌──────────────────┐
│ Automation  │              │       LD         │
│  Manager    │              │   (Analyzer,     │
│             │              │ Pre/Post Processor)│
└─────────────┘              └──────────────────┘
         \                          /
          \                        /
           ↘        ┌─────────────┐↙
                    │ WOS download │
                    └─────────────┘
```
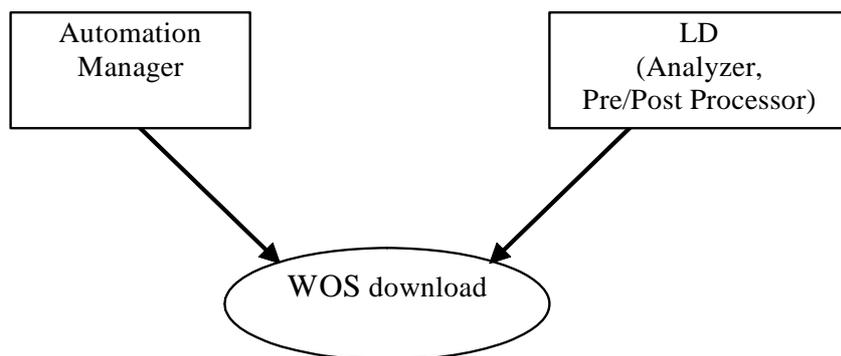
Actor: Automation Manager

Role: Translates a Work Order into a series of WOS assigned to the LDs. Downloads a WOS related to a specimen to the appropriate LD.

Actor: (LD) Pre/Post-processor, Analyzer

Role: Performs the WOS on the specimen

9.3 Referenced Standard

HL7 v2.5, Chapter 4

9.4 Interaction Diagram
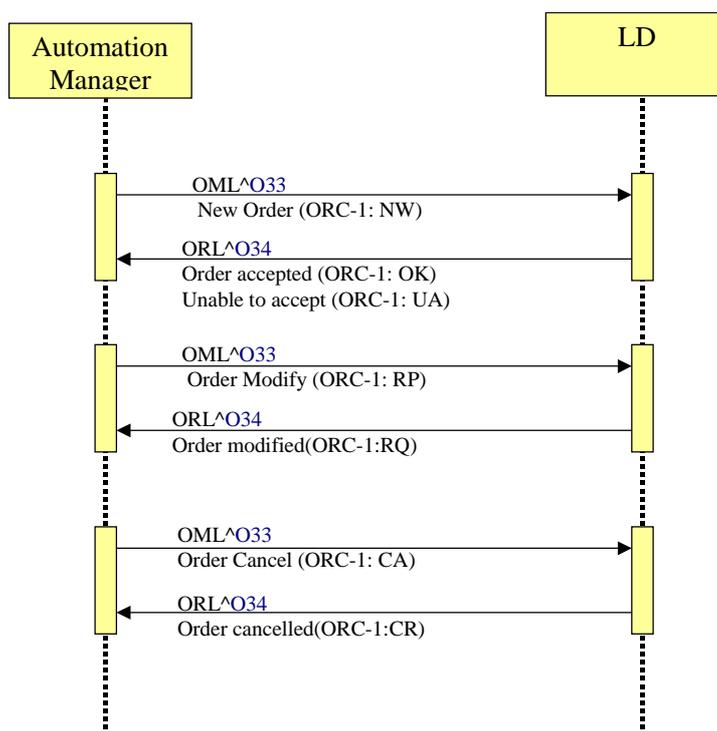
Figure 9.4-1: WOS management on LD in download mode

9.5 Message Static Definitions

This transaction contains the messages used to download a Work Order Step (WOS) from the Automation Manager to the Analyzer or Pre/Post-processor. It includes "new WOS", "update WOS", "cancel WOS" and the related application acknowledgements.

9.5.1 Trigger Events

OML (O33): Event on WOS sent by the Automation Manager.

ORL (O34): Acknowledgement sent by the LD.

9.5.2 Message Semantics

2780 **Table 9.5-1: OML^O33**

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin	O	[0..1]	
PID	Patient Identification	R	[1..1]	3
[PV1]	Patient Visit	RE	[0..1]	3
]	--- PATIENT end			
{	--- SPECIMEN begin	R	[1..1]	
SPM	Specimen	R	[1..1]	7
[{SAC}]	Specimen Container	O	[0..1]	
{	--- ORDER begin	R	[1..1]	
ORC	Common Order (for one battery)	R	[1..1]	4

[{TQ1}]	Timing Quantity	RE	[0..1]	4
	--- OBSERVATION REQUEST begin	R	[1..1]	
OBR	Observation Request	R	[1..1]	4
[TCD]	Test Code Details	O	[0..1]	13
[{	--- OBSERVATION begin	O	[0..*]	
OBX	Observation Result	R	[1..*]	7
[TCD]	Test Code Detail	O	[0..*]	13
[{ NTE }]	Notes and Comments (for Results)	O	[0..*]	2
}]	--- OBSERVATION end			
[{	--- PRIOR RESULT begin	O	[0..*]	
PV1	Patient Visit – previous result	R	[1..1]	3
{	--- ORDER PRIOR begin	R	[1..*]	
ORC	Common order – prior result	R	[1..1]	4
OBR	Order detail – prior result	R	[1..1]	4
{	--- OBSERVATION PRIOR begin	R	[1..*]	
OBX	Observation/Result – prior result	R	[1..*]	
[{NTE}]	Comment of the result	C	[0..*]	2
}	--- OBSERVATION PRIOR end			
}	--- ORDER PRIOR end			
}]	--- PRIOR RESULT end			
	--- OBSERVATION REQUEST end			
}	--- ORDER end			
}	--- SPECIMEN end			

MSH-9 - Message Type (MSG) shall have its three components respectively valued to

"OML", "O33" and "OML_O33"

SPM-11 Specimen Role (CWE) in SPM segment shall be coded "Q"(Control specimen) in the case of a QC AWOS.

The PRIOR RESULT segment group provides the prior results obtained for the same patient. Segment PID is not provided in this segment group because it is the same patient, and the laboratory is not concerned by the fact that this patient might have had a different identification when the prior results were produced.

2790 Segment PV1, which is the first segment of the segment group PRIOR RESULT, is mandatory. The presence of this segment at this point in the message structure announces unambiguously a set of prior orders with related prior observations. The segment PV1 represents the patient visit (or encounter) during which these prior observations were produced. The only field mandatory in the segment PV1 is PV1-2 "Patient Class" (as shown in section 3.4). If the sender of this message does not know the patient class, it SHALL value the field PV1-2 "U", which stands for "patient class unknown".

The ORC appearing in the PRIOR RESULT segment group is mandatory and SHALL have its first field "Order Control" populated with "PR" (Prior results).

Some LD need 'Observation OBX,TCD,NTE segments' (ex: analyzer). Therefore, the message carries optional OBSERVATION segment group to provide the analyzer with results related to the
2800 tests to be performed.

Table 9.5-2: ORL^O34

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[{ERR}]	Error	O	[0..*]	2
[	--- RESPONSE begin	X	[0..0]	
[	--- PATIENT begin	R	[1..1]	
[PID]	Patient Identification	R	[1..1]	3
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..1]	7
[{SAC}]	Specimen Container	O	[0..*]	13
[{	--- ORDER begin	O	[0..*]	
ORC	Common Order	R	[1..1]	4
[{TQ1}]	Timing/Quantity	RE	[0..1]	4
[OBR]	Observation Request	R	[1..1]	4
}]	--- ORDER end			
}	--- SPECIMEN end			
]	--- PATIENT end			
]	--- RESPONSE end			

MSH-9 - Message Type (MSG) shall have its three components respectively valued to "ORL", "O34" and "ORL_O34".

This message never carries the RESPONSE segment group. It is therefore limited to the first two or three segments.

9.5.3 Expected Actions

If the OML message with the Order Control Code NW is received from the Automation Manager, the LD will receive and register the order information, then it will transmit the result either "Accept" or "Reject" to the Automation Manager in a ORL message.

2810

9.5.4 OBR Segment

All fields are optional except those listed in table below.

Table 9.5-3: OBR Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
2	22	EI	R	[1..1]		00216	Placer Order Number
3	22	EI	RE	[0..1]		00217	Filler Order Number
4	250	CE	R	[1..1]		00238	Universal Service Identifier
5	2	ID	X	[0..0]		00239	Priority – OBR
6	26	TS	X	[0..0]		00240	Requested Date/Time
7	26	TS	X	[0..0]		00241	Observation Date/Time #
8	26	TS	X	[0..0]		00242	Observation End Date/Time #
9	20	CQ	X	[0..0]		00243	Collection Volume *
11	1	ID	RE	[0..1]	0065	00245	Specimen Action Code *

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
12	250	CE	X	[0..0]		00246	Danger Code
13	300	ST	X	[0..0]		00247	Relevant Clinical Information
14	26	TS	X	[0..0]		00248	Specimen Received Date/Time *
15	300	SPS	X	[0..0]		00249	Specimen Source
16	250	XCN	R	[1..1]		00226	Ordering Provider
17	250	XTN	RE	[0..2]		00250	Order Callback Phone Number
18	60	ST	X	[0..0]		00251	Placer Field 1
19	60	ST	X	[0..0]		00252	Placer Field 2
20	60	ST	X	[0..0]		00253	Filler Field 1 +
21	60	ST	X	[0..0]		00254	Filler Field 2 +
22	26	TS	X	[0..0]		00255	Results Rpt/Status Chng - Date/Time +
23	40	MOC	X	[0..0]		00256	Charge to Practice +
24	10	ID	C	[0..1]	0074	00257	Diagnostic Serv Sect ID
25	1	ID	X	[0..0]	0123	00258	Result Status +
26	400	PRL	X	[0..0]		00259	Parent Result +
27	200	TQ	X	[0..0]		00221	Quantity/Timing
29	200	EIP	X	[0..0]		00261	Parent
30	20	ID	X	[0..0]	0124	00262	Transportation Mode
40	250	CE	X	[0..0]		01031	Transport Arrangement Responsibility
41	30	ID	X	[0..0]	0224	01032	Transport Arranged
42	1	ID	X	[0..0]	0225	01033	Escort Required
43	250	CE	X	[0..0]		01034	Planned Patient Transport Comment
48	250	CWE	X	[0..0]	0476	01646	Medically Necessary Duplicate Procedure Reason.

9.5.5 TCD Segment

Table 9.5-4: TCD Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	250	CE	R	[1..1]		00238	Universal Service Identifier
2	20	SN	O	[0..1]		01420	Auto-Dilution Factor
3	20	SN	O	[0..1]		01421	Rerun Dilution Factor
4	20	SN	O	[0..1]		01422	Pre-Dilution Factor
5	20	SN	O	[0..1]		01413	Endogenous Content of Pre-Dilution Diluent
6	1	ID	O	[0..1]	0136	01416	Automatic Repeat Allowed
7	1	ID	O	[0..1]	0136	01424	Reflex Allowed
8	250	CE	O	[0..1]	0389	01425	Analyte Repeat Status

Note: Universal Service Identifier is a copy of OBR-4.

2820 **10 Transaction LAB-22: WOS Query**

This transaction is used between an Automation Manager and a Laboratory Device working in query mode. It enables the AM to issue a new WOS to the LD, or cancel or modify an existing WOS previously sent to the LD. Modification may also be achieved by combining cancellation and sending of a new WOS.

This transaction is used by the LD to get the WOS to perform for each specimen by querying the Automation Manager after specimen recognition. The transaction provides a query for multiple specimen and the reply will carry zero or one container and one WOS for each specimen. The Automation Manager and the LD preserve the conformity between the specimen and the WOS by checking the Specimen Information (Specimen ID and the like) within the message.

2830 **10.1 Scope**

This transaction is used by the general use case "Query for the WOS after specimen arrival on the LD" It is used by the Automation Manager (Laboratory Automation System) and the LD which supports "Query Mode".

10.2 Use Case Roles
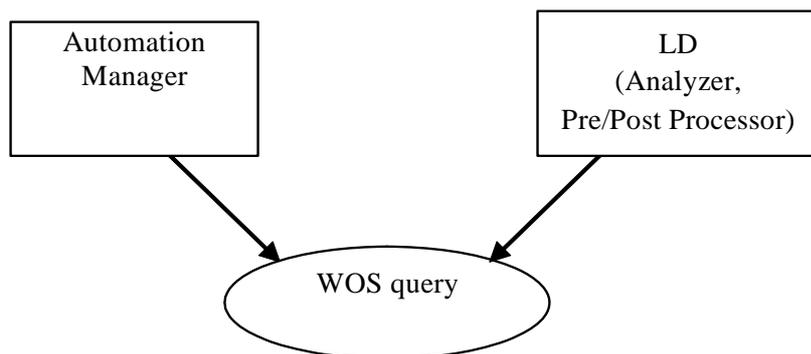
Actor: Automation Manager

Role: Manages the Work Orders and WOS. Responds with the appropriate WOS to a query from the LD.

Actor: (LD) Pre/Post-processor, Analyzer

2840 **Role:** Queries the Automation Manager for a WOS related to the specimen, and receives the WOS as the response.

10.3 Referenced Standard

HL7 version 2.5:

- Chapter5: "Query" --> QBP and RSP messages
- Chapter5: "Query" --> QPD, RCP and QAK segments

10.4 Interaction Diagram
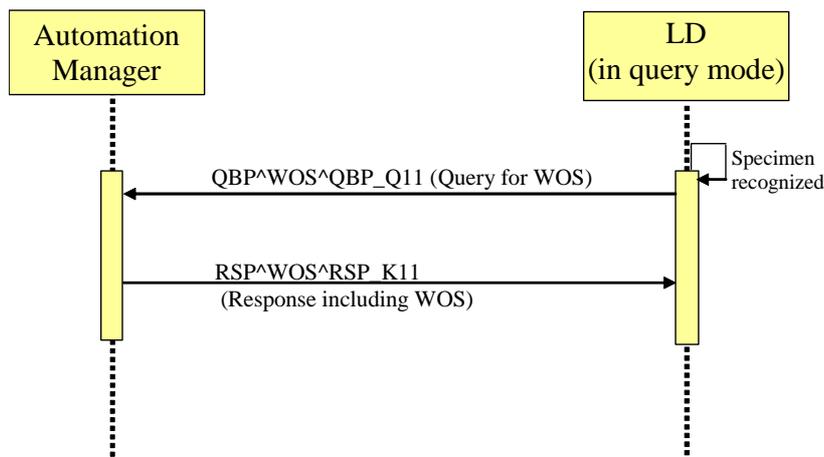
10.5 Message Static Definitions

2850 After the LD working in query mode recognizes one or more specimens, the LD sends "WOS Query Message"(QBP^WOS^QBP_Q11) with one or more Specimen IDs or other IDs to the Automation Manager.

The Automation Manager replies with the response message (RSP^WOS^RSP_K11) containing one or more WOS for each specimen identified in the query.

10.5.1 Trigger Events

QBP(Q11) : Query for the WOS sent by the LD.
RSP(K11) : Response including the WOS sent by the Automation Manager.

10.5.2 Message Semantics

Table 10.5-1: QBP^WOS^QBP_Q11

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
[{SFT}]	Software Segment	O	[0..*]	2
QPD	Query Parameter Definition	R	[1..1]	5
RCP	Response Control Parameter	R	[1..1]	5
[DSC]	Continuation Pointer	O	[0..1]	2

MSH-9 - Message Type (MSG) shall have its two first components respectively valued to "QBP" and 2860 "Q11".

Table 10.5-2: RSP^WOS^RSP_K11

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
[{SFT}]	Software Segment	O	[0..*]	2
MSA	Message Acknowledgement	R	[1..1]	2

[ERR]	Error	O	[0..1]	2
QAK	Query Acknowledgement	R	[1..1]	5
QPD	Query Parameter Definition	R	[1..1]	5
{	--- SPECIMEN begin	C	[0..*]	
SPM	Specimen	R	[1..1]	7
[{OBX}]	Observation related to specimen	O	[0..*]	7
[{SAC}]	Specimen Container	RE	[0..1]	13
[	--- PATIENT begin	O	[0..1]	
PID	Patient Identification	R	[1..1]	3
[{OBX}]	Observation related to the patient	O	[0..*]	7
]	--- PATIENT end			
{	--- ORDER begin	R	[1..1]	
ORC	Common Order	R	[1..1]	4
[{TQ1}]	Timing/Quantity	RE	[0..1]	4
[	--- OBSERVATION REQUEST begin	O	[0..1]	
OBR	Observation Request	R	[1..1]	4
[TCD]	Test Code Details	O	[0..1]	13
[{	--- OBSERVATION begin	O	[0..*]	
OBX	Observation/Result	R	[1..*]	7
[TCD]	Test Code Detail	O	[0..*]	13
[{ NTE }]	Notes and Comments (for Results)	O	[0..*]	2
}]	--- OBSERVATION end			
]	--- OBSERVATION REQUEST end			
[{	--- PRIOR RESULT begin	O	[0..*]	
PV1	Patient Visit – previous result	R	[1..1]	3
{	--- ORDER PRIOR begin	R	[1*]	
ORC	Common order – previous result	R	[1..1]	4
OBR	Order detail – previous result	R	[1..1]	4
{	--- OBSERVATION PRIOR begin	R	[1..*]	
OBX	Observation/Result – previous result	R	[1..1]	
[{NTE}]	Comment of the result	C	[0..*]	2
}	--- OBSERVATION PRIOR end			
}	--- ORDER PRIOR end			
}]	--- PRIOR RESULT end			
}	--- ORDER end			
}	--- SPECIMEN end			

MSH-9 - Message Type (MSG) shall have its two first components respectively valued to "RSP" and "K11".

SPM-11 Specimen Role (CWE) in SPM segment shall be coded "Q" (Control specimen) in the case of a QC AWOS.

If the query was not based on the specimen ID, the response shall contain a SAC segment.

Some LD need 'Observation OBX,TCD,NTE segments' (ex: analyzer). Therefore, the response message carries optional OBSERVATION segment group to provide the analyzer with results related to the tests to be performed.

The SPECIMEN segment group is not present in case of an erroneous query (e.g. barcode read error).

The PRIOR RESULT segment group provides the prior results obtained for the same patient. Segment PID is not provided in this segment group because it is the same patient, and the laboratory is not concerned by the fact that this patient might have had a different identification when the prior results were produced.

Segment PV1, which is the first segment of the segment group PRIOR RESULT, is mandatory. The presence of this segment at this point in the message structure announces unambiguously a set of prior orders with related prior observations. The segment PV1 represents the patient visit (or encounter) during which these prior observations were produced. The only field mandatory in the segment PV1 is PV1-2 "Patient Class" (as shown in section 3.4). If the sender of this message does not know the patient class, it SHALL value the field PV1-2 "U", which stands for "patient class unknown".

The ORC appearing in the PRIOR RESULT segment group is mandatory and SHALL have its first field "Order Control" populated with "PR" (Prior results).

10.5.3 Expected Actions

When specimen arrives on the LD which supports "Query Mode", the LD sends a QBP message to the Automation Manager to get WOS. This QBP message may have one or more Specimen IDs/Container IDs.

The Automation Manager receives the QBP message and prepares the appropriate WOS by checking IDs contained in the QBP message. The Automation Manager returns the RSP message with WOS to the LD immediately. The LD receives WOS and performs processing for the specimen.

Even if the Automation Manager could not prepare WOS for one or more IDs, the RSP message must have SPM segments of the same number as IDs contained in the QBP message. OBR/TCD segments can be omitted.

10.5.4 QPD Segment

Table 10.5-3 : QPD segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	60	CE	R	[1..1]		01375	Message Query Name
2	32	ST	R	[1..1]		00696	Query Tag
3	80	EIP	C	[0..*]		01756	SPM-2:Specimen Identification
4	80	EI	C	[0..*]		01331	SAC-3:Container Identification
5	80	EI	C	[0..1]		01337	SAC-10:Carrier Identification
6	80	NA	C	[0..1]		01338	SAC-11:Position in Carrier
7	80	EI	C	[0..1]		01340	SAC-13:Tray Identification
8	80	NA	C	[0..1]		01341	SAC-14:Position in Tray
9	250	CE	C	[0..*]		01342	SAC-15:Location

QPD-1 Message Query Name (CE), required
Must be valued "**WOS^Work Order Step^IHE_LABTF**"

QPD-2 Query Tag (ST), required
Unique to each query message instance.

QPD-3 Specimen Identification (EIP), conditional
As for the 1st component "Placer Assigned Identifier"(EI), contains the placer assigned identifier and

its assigning authority.

As for the 2nd component "Filler Assigned Identifier"(EI), contains the filler assigned identifier and its assigning authority.

If this field is valued all other query fields shall be empty.

QPD-4 Container Identification (EI), conditional

Contains the identification of the container.

2910 **QPD-5 Carrier Identification (EI),** conditional

Contains the identification of the carrier (also known as Rack).

If this field is valued, then the field "QPD-6:Position in Carrier" shall also be valued.

If these 2 fields(QPD-5,6) are valued all other query fields shall be empty, with the possible exception of the Location field(QPD-9).

QPD-6 Position in Carrier (NA), conditional

Contains the positions of the specimen/aliquot on the carrier (rack).

If this field is valued, then the field "QPD-5: Carrier Identification" shall also be valued.

QPD-7 Tray Identification (EI), conditional

Contains the identification of the Tray.

2920 **QPD-8 Position in Tray (NA),** conditional

Contains the position of the carrier on the tray.

QPD-9 Location (CE), conditional

Contains the physical location of the specimen.

This field cannot be valued in isolation, it must always be combined with the physical location/position of the specimen on either a carrier or a tray.

This field shall never be used in combination with either the specimen identification or the container identification fields.

10.5.5 RCP Segment

Table 10.5-4 : RCP segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	1	ID	O	[0..1]	0091	00027	Query Priority
2	10	CQ	O	[0..1]	0126	00031	Quantity Limited Request
		NM					
		CE					
3	60	CE	O	[0..1]	0394	01440	Response Modality
7	256	ID	O	[0..*]		01594	Segment group inclusion

2930 **RCP-1 Query Priority(ID)**, optional

Fixed to "I" (=Immediate). If no value is given, the default is "**I''**.

RCP-2 Quantity Limited Request(CQ), optional

As for the 1st component "Quantity"(NM), Number of Records which will be returned in each increment of the response. If no value is given, the entire response will be returned in a single increment.

As for the 2nd component "Units"(CE), "RD"(=Records) is always set. If no value is given, the default is RD.

RCP-3 Response Modality(CE), optional

Fixed to "R" (=Realtime). If no value is given, the default is "R".

2940 **RCP-7 Segment group inclusion(ID),** optional

Specifies those optional segment groups which are to be included in the response. If this field is not valued, all segment groups will be included.

11 Transaction LAB-23: AWOS Status Change

11.1 Scope

This transaction is used by the Analyzer to send test results to the Automation Manager.

11.2 Use Case Roles
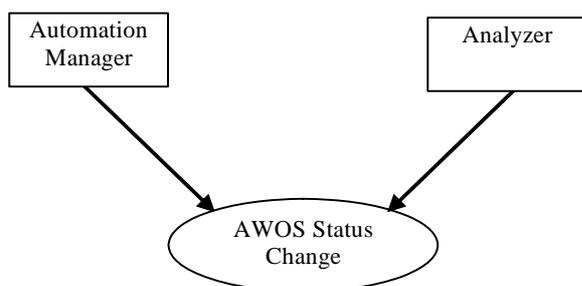
Actor: Automation Manager

2950 **Role:** Manages Analyzer in order to implement the AWOS. Receives the test results from Analyzer, performs technical validation, then sends the validated results to Order filler

Actor: Analyzer

Role: Analyzes the specimen and outputs the test results.

11.3 Referenced Standard

HL7 Version 2.5--mainly referred to in Chapter 7.

11.4 Interaction Diagram
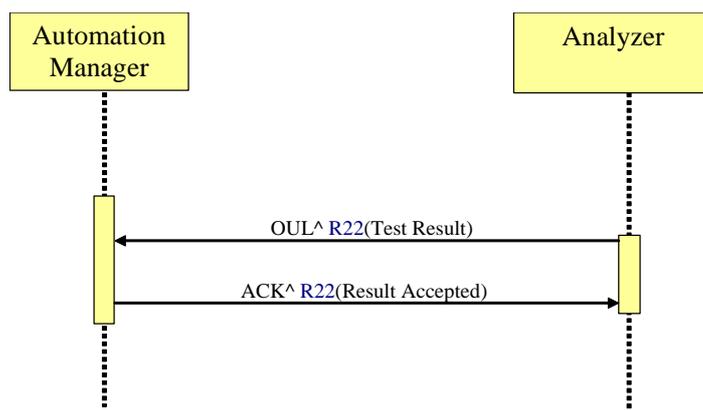
Figure 11-1: AWOS Status change

11.5 Message Static Definitions

2960 This transaction contains the messages used by the Analyzer to report the status of an AWOS (such as "specimen arrived", "first run failed", "second run started", "AWOS complete"…) and to send the tests results when the AWOS is complete. It also includes the related applicative acknowledgements from the Automation Manager.

11.5.1 Trigger Events

Analyzer sends test results. Automation Manager returns acknowledgement.

11.5.2 Message Semantics

Table 11.5-1: OUL^R22

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
[PID]	Patient Identification	RE	[0..1]	3
[PV1]	Patient Visit	O	[0..1]	3
{	--- SPECIMEN begin	R	[1..1]	
SPM	Specimen information	R	[1..1]	7
[{ OBX }]	Observation Result (for Specimen)	O	[0..*]	7
[{	--- CONTAINER begin	0	[0..1]	
SAC	Container information	R	[1..1]	13
[INV]	Detailed Substance information (e.g., id, lot, manufacturer, … of QC specimen)	O	[0..1]	13
}]	--- CONTAINER end			
{	--- ORDER begin	R	[1..1]	
OBR	Observation Order	R	[1..1]	7
[ORC]	Common Order	O	[0..1]	4
[{	--- RESULT begin	O	[0..*]	
OBX	Observation Result	R	[1..1]	7
[TCD]	Test Code Detail	C[*1]	[0..1]	13
[{SID}]	Substance Identifier (e.g., reagents used for testing)	C[*1]	[0..*]	13
[{NTE}]	Notes and comments	O	[0..*]	
}]	--- RESULT end			
}	--- ORDER end			
}	--- SPECIMEN end			

Table 11.5-2: ACK^R22

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[ERR]	Error	O	[0..1]	2

2970 MSH-9 - Message Type (MSG) shall have its three components respectively valued to "OUL", "R22" and "OUL_R22".

SPM-11 Specimen Role (CWE) in SPM segment shall be coded "Q" (Control specimen) in the case of a QC AWOS.

[*1] If it is patient sample, this is Optional. If it is a QC sample it is Mandatory if it is available.

11.5.3 Expected Actions

Analyzer notifies Automation Manager of the test results using the OUL message . Automation Manager accepts and registers information, and responds to the Analyzer with the ACK message.

11.5.4 OBR Segment

All fields are optional except those listed in table below.

Table 11.5-3: OBR segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
2	22	EI	RE	[0..1]		00216	Placer Order Number
3	22	EI	RE	[0..1]		00217	Filler Order Number
4	250	CE	R	[1..1]		00238	Universal Service Identifier
5	2	ID	X	[0..0]		00239	Priority – OBR
6	26	TS	X	[0..0]		00240	Requested Date/Time
7	26	TS	RE	[0..1]		00241	Observation Date/Time #
8	26	TS	RE	[0..1]		00242	Observation End Date/Time #
11	1	ID	RE	[0..1]	0065	00245	Specimen Action Code *
12	250	CE	X	[0..0]		00246	Danger Code
13	300	ST	X	[0..0]		00247	Relevant Clinical Information
14	26	TS	X	[0..0]		00248	Specimen Received Date/Time *
15	300	SPS	X	[0..0]		00249	Specimen Source
16	250	XCN	R	[1..1]		00226	Ordering Provider
17	250	XTN	RE	[0..2]		00250	Order Callback Phone Number
18	60	ST	X	[0..0]		00251	Placer Field 1
19	60	ST	X	[0..0]		00252	Placer Field 2
20	60	ST	X	[0..0]		00253	Filler Field 1 +
21	60	ST	X	[0..0]		00254	Filler Field 2 +
22	26	TS	C	[0..1]		00255	Results Rpt/Status Chng - Date/Time +
23	40	MOC	X	[0..0]		00256	Charge to Practice +
24	10	ID	C	[0..1]	0074	00257	Diagnostic Serv Sect ID
25	1	ID	R	[1..1]	0123	00258	Result Status +
27	200	TQ	X	[0..0]		00221	Quantity/Timing
30	20	ID	X	[0..0]	0124	00262	Transportation Mode
40	250	CE	X	[0..0]		01031	Transport Arrangement Responsibility
41	30	ID	X	[0..0]	0224	01032	Transport Arranged
42	1	ID	X	[0..0]	0225	01033	Escort Required
43	250	CE	X	[0..0]		01034	Planned Patient Transport Comment
48	250	CWE	X	[0..0]	0476	01646	Medically Necessary Duplicate Procedure Reason.

2980   All field data should reflect LAB-21,22 transaction's OBR.

11.5.5 TCD Segment

All fields are optional except those listed in table below.

Table 11.5-4: TCD segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	250	CE	R	[1..1]		00238	Universal Service Identifier

12 Transaction LAB-26: SWOS Status Change

12.1 Scope

2990

This transaction is used when the Pre/Post Processor transmits a Process Results to the Automation Manager.

12.2 Use Case Roles
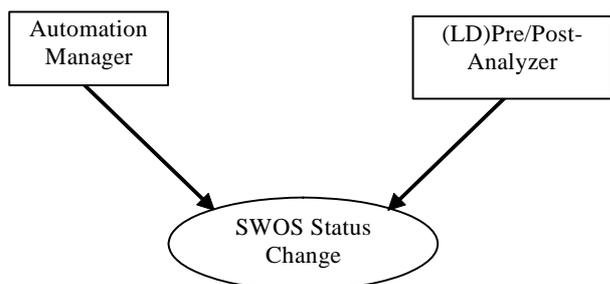
Actor: Automation Manager

Role: Manages the SWOS

Actor: (LD) Pre/Post Processor

Role: Manages the Pre/Post-analysis process on the specimen and generates a Process Result or Specimen Status Message.

12.3 Referenced Standard

3000

HL7 Version 2.5--mainly referred to in Chapter 7 and Chapter13.

12.4 Interaction Diagram
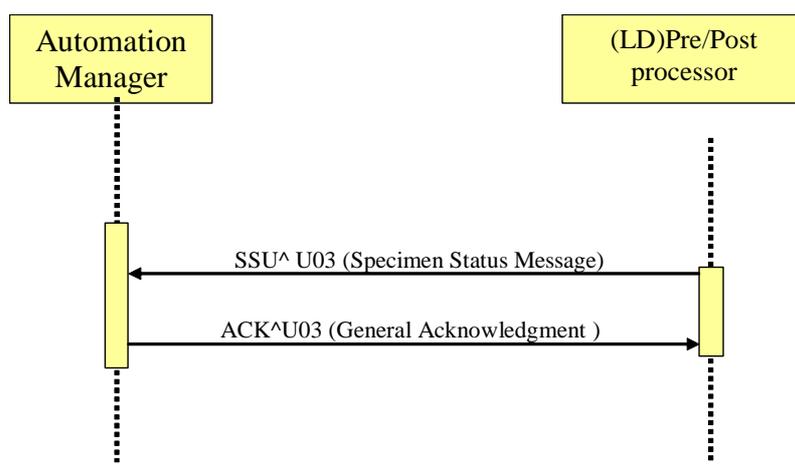
Figure 2-2 : Unsolicited SWOS Status Change from Pre/Post Processor

12.5 Message Static Definitions

This transaction contains the messages used by the Pre or Post-Processor to report all the status changes of the SWOS, and the related application acknowledgements. Status changes include: "specimen arrived", "SWOS complete", "SWOS failed"…

3010 **12.5.1 Trigger Events**

SSU (U03): Pre/Post Processor transmits a Specimen Status Update Message.

ACK (U03): Automation Manager sends the affirmative response.

12.5.2 Message Semantics

Table 12.5-1: SSU^U03

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
EQU	Equipment Detail	R	[1..1]	13
{	--- SPECIMEN_CONTAINER begin	R	[1..1]	
SAC	Specimen Container Detail	R	[1..1]	13
{ [OBX] }	Additional specimen characteristics	O	[0..*]	7
[{	--- SPECIMEN begin	O	[0..1]	
SPM	Specimen information	R	[1..1]	7
{ [OBX] }	Observation Result (for Specimen)	O	[0..*]	7
}]	--- SPECIMEN end			
}	--- SPECIMEN_CONTAINER end			

Table 12.5-2: ACK^U03

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[ERR]	Error	O	[0..1]	2

12.5.3 Expected Actions

The Pre/Post Processor sends a Process Result using the SSU message to the Automation Manager. 3020 The Automation Manager accepts and registers the Process Result, and responds to the Pre/Post Processor using the ACK message.

Note: The SSU message might appear too restrictive to meet future needs for carrying the output data of a SWOS, brought along by specific pre or post processing devices. If such a use case appears in the future for a specific device, alternative messages will be studied to extend this profile.

13 Transaction LAB-30: Initiate POCT on a patient specimen

This transaction is used on a persistently connected POCRG. It implements option *Patient Identity Checking* of the LPOCT integration profile.

13.1 Scope

The point of care devices often work with a patient (or visit) identifier scanned or typed on their user interface. The purpose of this transaction is to provide a real-time control of this patient/visit identifier, and to avoid any risks of mistyping.

This transaction is used by a POCRG in a ward to inform the POCDM that a new point of care set of tests is about to start on a patient specimen. The POCRG delivers the relevant information related to the testing, including a patient/visit identifier. The POCDM checks the information received, and particularly verifies that the patient/visit identifier is associated with this ward. It then sends back an acknowledgement carrying either the patient's name or a textual error (e.g. "Patient unknown"). The POCRG displays the information received in the acknowledgement, enabling the operator to check that he is testing on the right patient.

13.2 Use Case Roles
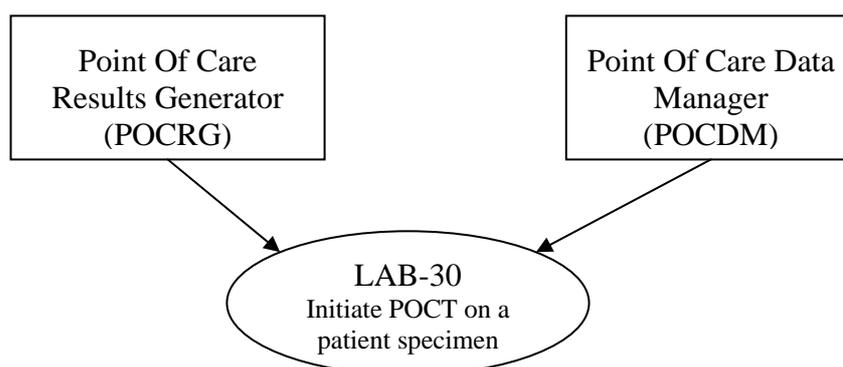
Figure 13-1: Use case for LAB-30

Actor: POCRG

Role: Informs the POCDM that a new set of tests is starting, giving all relevant information related to this point of care testing. Waits for the patient identity in the acknowledgement, and displays this identity on its user interface.

Actor: POCDM

Role: Checks the information received related to the point of care testing, searches for the patient data related to the patient identifier received, and sends an acknowledgement back to the POCRG. The acknowledgement carries either the patient's name, or an error (e.g. "Test unauthorized on this device")

13.3 Referenced Standard

POCT1-A : Device Message Layer (DML) defined in Appendix B of POCT1-A standard.

> In the POCT1-A standard, the POCRG actor of IHE is called the *Device* and the POCDM actor of IHE is called the *Observation Reviewer*.

This transaction LAB-30 uses the ***Continuous Mode*** defined in section 4.2 of Appendix B of POCT1-A. This continuous mode is usable if the POCRG has a persistent link with the POCDM, which is the prerequisite for using transaction LAB-30.

3060

13.4 Interaction Diagram
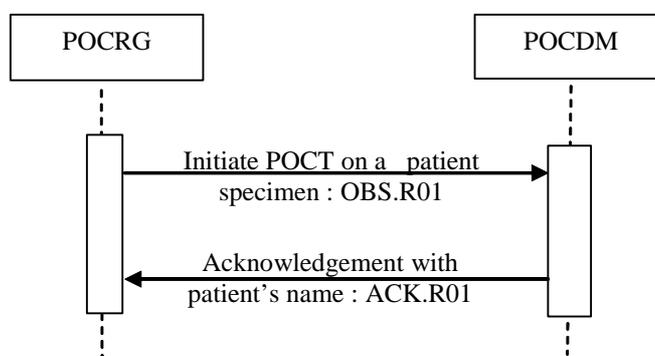
Figure 13-2: Interaction Diagram [LAB-30]

13.4.1 Patient Identity Checking

The POCT1-A standard currently does not describe this interaction for real-time patient identity checking. Transaction LAB-30 of this IHE profile will use as initial message a "patient-related observation message" OBS.R01 as defined in POCT1-A Appendix B. The status of the Service object will be valued to "INI" (as "initiate a point of care testing"), and no results will be provided in the message. This value "INI" is added by IHE to the table of service status defined in POCT1-A.

3070 The Acknowledgement message ACK.R01 from the POCDM to the POCRG, will carry the patient's name as a note related to the acknowledgement, within the note_txt field of the Acknowledgement object.

The two messages are exchanged within a "***Observations***" ***Topic*** within the ***Continuous Mode*** of POCT1-A Device Messaging Level.

13.5 Trigger Events

An operator (caregiver or patient) sets a patient specimen on the point of care device (the POCRG actor supporting the option "Patient identity checking"), and enters relevant information including the operator's ID and the patient's ID. This triggers the initial message of Transaction LAB30: "Initiate 3080 POCT on a patient specimen".

13.6 Message Semantics

13.6.1 Initiate POCT on a patient specimen – Message OBS.R01, status_cd = 'INI'

The figure below describes the use of message OBS.R01 in Transaction LAB-30. It respects the formalism of POCT1-A, Annex B.

OBJECT MODEL	XML DTD FRAGMENT
Header -message_type : CV +control_id : ST +version_id: ST +creation_dttm: TS -encoding_chars: ST OBS.R01 Patient-related Observations **Service** +role_cd : CS +observation_dttm: TS -status_cd: CS -reason_cd: CS -sequence_nbr: INT **Patient** +patient_id : ST -location_dttm: ST -name: PN -birth_date: TS -gender_cd: CS -weight: PQ -height: PQ **Operator** [0..1] +operator_id : ST -name: PN **Order** [0..1] +universal_service_id : CE -ordering_provider_id: ST -order_id: CV **Specimen** [0..1] +specimen_dttm : TS -specimen_id: CV -source_cd: CE -type_cd: CE	<!ELEMENT OBS.R01 (HDR, SVC+)> <!ELEMENT HDR (HDR.message_type?, HDR.control_id, HDR.version_id, HDR.creation_dttm, HDR.encoding_chars?)> <!ELEMENT SVC (SVC.role_cd, SVC.observation_dttm, SVC.status_cd?, SVC.reason_cd?, SVC.sequence_nbr ?, PT, OPR?, ORD?, SPC?)> <!ELEMENT PT (PT.patient_id, PT.location?, PT.name?, PT.birth_date?, PT.gender_cd ?, PT.weight?, PT.height?)> <!ELEMENT OPR (OPR.operator_id, OPR.name?)> <!ELEMENT ORD (ORD.universal_service_id, ORD.ordering_provider_id?, ORD_order_id?)> <!ELEMENT SPC (SPC.specimen_dttm, SPC.specimen_id?, SPC.source_cd?, SPC.type_cd?)>

Figure 13-3: Message OBS.R01 in Transaction LAB-30

3090

13.6.1.1 Use of the Service object

One and only one occurrence of this object must appear in the context of Transaction LAB-30.

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
role_cd	CS	R	[1..1]	Value "OBS": Patient test observation
observation_dttm	TS	R	[1..1]	Starting date/time of the test
status_cd	ST	R	[1..1]	Value "INI": The point of care test is about to start. No observation produced yet.
reason_cd	ST	X	[0..0]	This code is not used in the context of LAB-30.
sequence_nbr	ST	X	[O..0]	This number is not used in the context of LAB-30.

Table 48 of POCT1-A: Service Status code Field Values

Code	Meaning	Description
NRM	Normal	This test was performed under normal conditions
OVR	Override	This test was performed in an 'override' or 'stat' circumstance. Some normal procedures (e.g., QC) may not have been followed.
UNK	Unknown	It is not known under what circumstances this test was performed.
INI	Test starting	This test is going to start for this patient. Value added by IHE to this table

The last value "INI" is added by this LPOCT IHE profile, for the unique purpose of this Transaction LAB-30.

13.6.1.2 Use of the Patient object

One and only one occurrence of this object must appear in the context of Transaction LAB-30.

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
patient_id	ST	R	[1..1]	A unique identifier for the patient, supposed to be known from the POCDM actor
location	ST	RE	[0..1]	Location of the patient
name	PN	X	[0..0]	Patient name. Not used in the context of LAB-30.
birth_date	TS	X	[0..0]	Patient date of birth. Not used in the context of LAB-30.
gender_cd	CS	X	[0..0]	Patient gender. Not used in the context of LAB-30.
weight	PQ	X	[0..0]	Patient weight. Not used in the context of LAB-30.
height	PQ	X	[0..0]	Patient height. Not used in the context of LAB-30.

13.6.1.3 Use of the Operator object

3100   One and only one occurrence of this object must appear in the context of Transaction LAB-30.

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
operator_id	ST	R	[1..1]	A unique identifier for the operator
name	PN	RE	[0..1]	Operator's name. Required if available on the POCRG.

13.6.1.4 Use of the Order object

Zero or one occurrence of this object may appear in the context of Transaction LAB-30.

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
universal_service_id	CE	R	[1..1]	Identifies the service provided by these observations. LOINC is the preferred encoding scheme. The CE data type allows transmission of two encodings, if appropriate.
ordering_provider_id	ST	RE	[0..1]	An identifier that uniquely identifies the provider who ordered this service.
order_id	CV	O	[0..1]	An identifier that uniquely identifies this service instance. This field may contain an order id, accession number, or other such identifier.

13.6.1.5 Use of the Specimen object

Zero or one occurrence of this object may appear in the context of Transaction LAB-30.

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
specimen_dttm	TS	R	[1..1]	Time the specimen was drawn.
specimen_id	CV	O	[0..1]	Code identifying the specimen
source_cd	CE	O	[0..1]	Location of the specimen. Coded in table 51 of POCT1-A
type_cd	CE	O	[0..1]	Type of the specimen. Coded in table 52 of POCT1-A

13.6.1.6 Example Message OBS.R01: Initiate POCT on a Patient Specimen

```
<OBS.R01>
    <HDR>
        <HDR.control_id V="12345"/>
        <HDR.version_id V="POCT1"/>
        <HDR.creation_dttm V="2005-05-16T16:30:00+01:00"/>
    </HDR>
    <SVC>
        <SVC.role_cd V="OBS"/>
        <SVC.observation_dttm V="2005-05-16T16:30:00+01:00"/>
        <SVC.status_cd V="INI"/>
        <PT>
            <PT.patient_id V="888888"/>
        </PT>
        <OPR>
            <OPR.operator_id V="Nurse007"/>
            <OPR.name V="Nancy Nursery">
                < GIV V="Nancy"/>
                < FAM V="Nursery"/>
            </OPR.name>
        </OPR>
        <ORD>
            <ORD.universal_service_id V="BG-OXI-ELECT"/>
            <ORD.ordering_provider_id V="Facility1"/>
        </ORD>
    </SVC>
</OBS.R01>
```

In this example, the operator Nancy Nursery, wants to start a blood gas test on a patient specimen for a patient whose enterprise id is « 888888 ». The device is in a hospital in Palermo one hour ahead GMT.

13.6.2 Acknowledgement with Patient Name – Message ACK.R01

The figure below is extracted from POCT1-A, Annex B.

13.6.2.1 Use of the Header object

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
message_type	CV	X	[0..0]	Not used: Redundant with the root element of the message
control_id	ST	R	[1..1]	unique identifier of the instance of this acknowledgement message
version_id	ST	R	[1..1]	"POCT1"
creation_dttm	TS	C	[O..1]	date/time of creation of this acknowledgement

13.6.2.2 Use of the Acknowledgement object

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
type_cd	CS	R	[1..1]	AA: Application Accept AE: Application Error
ack_control_id	ST	R	[1..1]	The unique identifier of the acknowledged message
note_txt	ST	R	[1..1]	This field is required in the context of IHE Transaction LAB-30. It contains either the patient's name in case of Application Accept or a text describing the error condition in case of Application Error.
error_detail_cd	CV	R	[1..1]	A code detailing the error. Described in Table 14 of Annex B of POCT1-A.

Condition predicate for the field **note_txt**:

If the POCDM has matched an existing patient, and has controlled that the information received within the OBS.R01 message is consistent with this patient and that the test for this patient on this device by this operator is authorized, then the POCDM sends back a positive acknowledgement (type_cd = "AA", error_detail_cd = "0"). In this case, the note_txt is required and shall be valued with the patient's name, using any display oriented string format.

Example of positive acknowledgement for patient Jeanne DUPONT:

```
<ACK.R01>
        <HDR>
                < HDR.control_id V="45678"/>
                < HDR.version_id V="POCT1"/>
                < HDR.creation_dttm V="2005-05-16T16:30:00"/>
        </HDR>
        <ACK>
                < ACK.type_cd V="AA"/>
                < ACK.ack_control_id V="12345"/>
                < ACK.note_txt V=" DUPONT Jeanne "/>
                < ACK.error_detail_cd V= "0"/>
        </ACK>
</ACK.R01>
```

If the POCDM has failed to match a patient from the patient identifier received within the OBS.R01 message, then it sends back a negative acknowledgement (type_cd = "AA", error_detail_cd = "202"), with the field note_txt containing a text explaining the error condition.

Example of negative acknowledgement:

```
<ACK.R01>
        <HDR>
                < HDR.control_id V="45679"/>
                < HDR.version_id V="POCT1"/>
                < HDR.creation_dttm V="2005-05-16T16:30:00"/>
        </HDR>
        <ACK>
                < ACK.type_cd V="AE"/>
                < ACK.ack_control_id V="12345"/>
                < ACK.note_txt V=" Unknown patient identifier 888888"/>
                < ACK.error_detail_cd V= "202"/>
        </ACK>
</ACK.R01>
```

13.7 Expected Actions

When receiving the message "Initiate POCT on a patient specimen", the POCDM must search for the patient using the patient ID, and must check the information related to the testing. Then the POCDM builds its Acknowledgement message and sends it to the POCRG.

When receiving the message "Acknowledgement with patient identity", the POCRG must display as much of the patient identity as possible, to allow the operator to verify this identity.

14 Transaction LAB-31: Produced Observation Set

14.1 31.1 Scope

The POCRG sends a set of observations to the POCDM. The POCDM checks the content of this set of results. If it is acceptable, the POCDM stores it and acknowledges it to the POCRG; otherwise the POCDM rejects the set of results and sends a negative acknowledgement back to the POCRG that will display it to its user.

The set of observations may be obtained on a patient specimen or on a QC specimen.

14.2 Use Case Roles
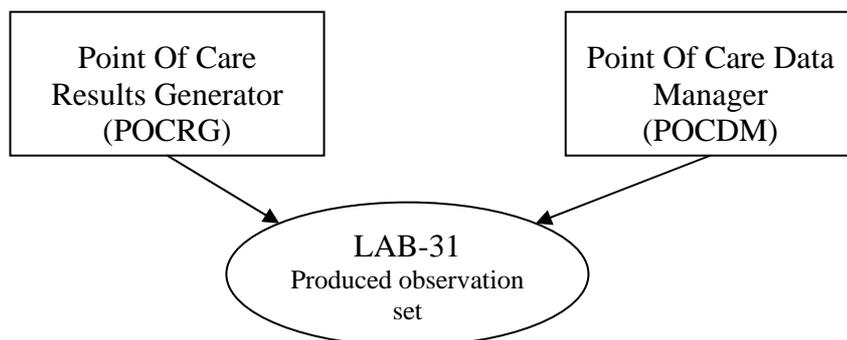
Actor: POCRG

Role: Sends to the POCDM a new set of observations obtained on a patient specimen or a QC specimen. Waits for the acknowledgement of this set of observations

Actor: POCDM

Role: Checks the information received with this set of observations, controls the results against its own business rules, accepts them or rejects them, stores the accepted results, and acknowledges them to the POCRG.

14.3 Referenced Standard

POCT1-A : Device Message Layer (DML) defined in Appendix B.

> This LPOCT profile describes the upper-layer messaging protocol (DML) of POCT1-A. The POCRG actor of IHE is called the "***Device***" in POCT1-A. The POCDM actor of IHE is called "***Observation Reviewer***" in POCT1-A.

> This transaction LAB-31 can be used on the ***Basic Profile*** defined in section 4.1 of Appendix B of POCT1-A, or on the ***Continuous Mode*** defined in section 4.2 of the same document.

14.4 Interaction Diagram
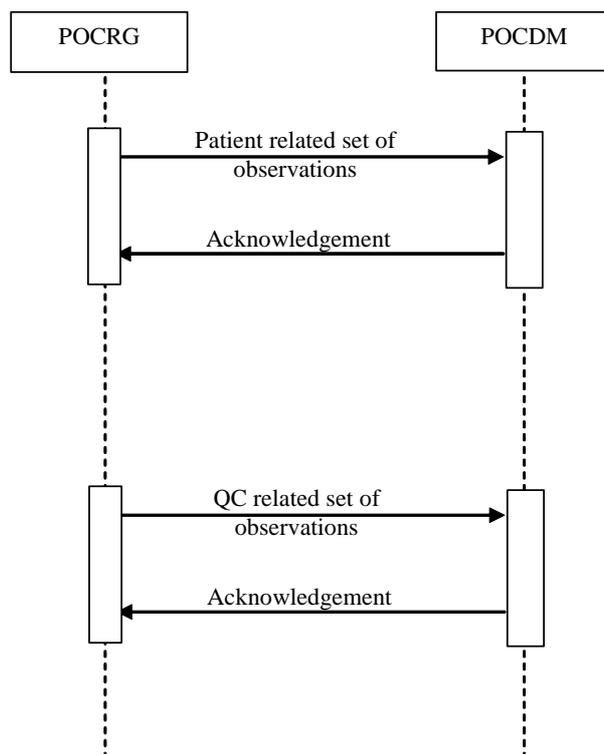
Figure 14-1: Interaction Diagram for [LAB-31]

The message "Patient related set of observations" of the diagram above uses the Observations message **OBS.R01** defined in Appendix B – section 6.10 of POCT1-A.

The message "QC related set of observations" uses the Observations message **OBS.R02** defined in the same section of POCT1-A.

14.5 Trigger Events

- The "Patient related set of observations" message is triggered by any new patient observations obtained on the POCRG actor.

- The "QC related set of observations" message is triggered by any new non-patient observations (internal or external QC, calibration) obtained on the POCRG actor.

When using the "*Continuous Mode*" of POCT1-A the above events trigger the Observations messages at once.

When using the "*Basic Profile*" of POCT1-A the sending of these Observation messages requires these prior conditions:

- Establishment of a *Conversation* between POCRG and POCDM. (*Topic Hello*)

- The sending of the message "Device status" by the POCRG actor and its acknowledgement by the POCDM actor. (*Topic Device Status*)

- The sending of the message "Request Observations" by the POCDM to the POCRG (if the Conversation is not in continuous mode).

3180 ## 14.6 Message Semantics

14.6.1 Message OBS.R01: Patient-related Set of Observations

The figure below is extracted from POCT1-A, Annex B.

OBJECT MODEL	XML DTD FRAGMENT

Header
-message_type : CV
+control_id : ST
+version_id : ST
+creation_dttm : TS
-encoding_chars : ST
 	
OBS.R01
Patient-related
Observations
 	
Service (1...*)
+role_cd : CS
+observation_dttm : TS
-status_cd : CS
-reason_cd : CS
-sequence_nbr : INT
 	
Patient
+patient_id : ST
-location : ST
-name : PN
-birth_date : TS
-gender_cd : CS
-weight : PQ
-height : PQ
 	
Observation (1...*)
+observation_id : CE
-value : PQ
-qualitative_value : CV
+method_cd : CS
-status_cd : CS
-interpretation_cd : CS
-normal_lo-hi_limit : IVL<PQ>
-critical_lo-hi_limit : IVL<PQ>
 	
Note (0...*)
+text : ST
 	
Operator (0...1)
+operator_id : ST
-name : PN
 	
Order (0...1)
+universal_service_id : CE
-ordering_provider_id : ST
-order_id : CV
 	
Specimen (0...1)
+specimen_dttm : TS
-specimen_id : CV
-source_cd : CE
-type_cd : CE
 	
Reagent (0...*)
+name : ST
+lot_number : CV
+expiration_date : TS
 	
Note (0...*)
+text : ST
	`<!ELEMENT OBS.R01 (HDR, SVC+)>`
	
	`<!ELEMENT HDR (HDR.message_type?, HDR.control_id,`
	`     HDR.version_id, HDR.creation_dttm, HDR.encoding_chars?)>`
	
	`<!ELEMENT SVC (SVC.role_cd, SVC.observation_dttm, SVC.status_cd?,`
	`     SVC.reason_cd?, SVC.sequence_nbr?, PT, OPR?, ORD?, SPC?,`
	`     RGT*, NTE*)>`
	
	`<!ELEMENT PT (PT.patient_id, PT.location?, PT.name?, PT.birth_date?,`
	`     PT.gender_cd?, PT.weight?, PT.height?, OBS+)>`
	
	`<!ELEMENT OBS (OBS.observation_id, OBS.value?,`
	`     OBS.qualitative_value?, OBS.method_cd, OBS.status_cd?,`
	`     OBS.interpretation_cd?, OBS.normal_lo-hi_limit?,`
	`     OBS.critical_lo-hi_limit?, NTE*)>`
	
	`<!ELEMENT OPR (OPR.operator_id, OPR.name?)>`
	
	`<!ELEMENT ORD (ORD.universal_service_id,`
	`     ORD.ordering_provider_id?, ORD.order_id?)>`
	
	`<!ELEMENT SPC (SPC.specimen_id?, SPC.specimen_dttm,`
	`     SPC.source_cd?, SPC.type_cd?)>`
	
	`<!ELEMENT RGT (RGT.name, RGT.lot_number, RGT.expiration_date)>`
	
	`<!ELEMENT NTE (NTE.text)>`

Figure 14-2: Patient-related Observation Message Model, POCT1-A – Appendix B

14.6.1.1 Use of the Service object

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
role_cd	CS	R	[1..1]	Value "**OBS**": Patient test observation
observation_dttm	TS	R	[1..1]	production date/time of this set of observations
status_cd	ST	R	[1..1]	One of the values listed in table 48 of POCT1-A, Annex B
reason_cd	ST	R	[1..1]	One of the values listed in table 49 of POCT1-A, Annex B
sequence_nbr	ST	O	[O..1]	An optional number to indicate the position of this service in a historical list of services performed by this Device. This number is unique only across a single Device, and may wrap (e.g., a 'use counter').

Table 48 of POCT1-A: Service Status code Field Values

Code	Meaning	Description
NRM	Normal	This test was performed under normal conditions
OVR	Override	This test was performed in an 'override' or 'stat' circumstance. Some normal procedures (e.g., QC) may not have been followed.
UNK	Unknown	It is not known under what circumstances this test was performed.

Table 49 of POCT1-A: Service Reason Code Field Values

Code	Meaning	Description
NEW	New	Default. This is a new set of observations.
RES	Resent	This set of observations is being resent.
EDT	Edited	Some fields of this set of observations have been edited since last transmission

14.6.1.2 Use of the Patient object

One and only one occurrence of Patient per Service:

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
patient_id	ST	R	[1..1]	A unique identifier for the patient, supposed to be known from the POCDM actor
location	ST	RE	[0..1]	Location of the patient. Required if known.
name	PN	RE	[0..1]	Patient name. Required if known.
birth_date	TS	RE	[0..1]	Patient date of birth. Required if known.
gender_cd	CS	RE	[0..1]	Patient gender. Required if known.
weight	PQ	C	[0..1]	Patient weight. Required if known and relevant for the test.
height	PQ	C	[0..1]	Patient height. Required if known and relevant for the test.

14.6.1.3 Use of the Observation object

3190 One or more occurrences of Observation per Patient:

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
observation_id	CE	R	[1..1]	The test identifier, preferably coded with LOINC
value	PQ	C	[0..1]	The observation result, if expressed quantitatively (i.e. a numerical value with units).
qualitative_value	CV	C	[0..1]	The observation result, if expressed qualitatively. POCT1-A, Annex B provides a list of codes in table 35. This list is extensible.
method_cd	CS	R	[1..1]	Origin of the result. Coded in table 36 of POCT1-A, Annex B. This LPOCT profile authorizes only these values: **C** = Calculated (The value was calculated) **D** = Default (The value is a default value) **E** = Estimated **I** = Input (The value was externally input to the POCRG) **M** = Measured (The value was measured on the POCRG)
status_cd	CS	R	[1..1]	Status of the result. Coded in table 37 of POCT1-A, Annex B. This IHE LPOCT profile authorizes only this value for patient-related results: **A** = Accepted
interpretation_cd	CS	C	[0..1]	Interpretation of the result (abnormal flags). Coded in table 38 of POCT1-A, Annex B: **L** = below low normal **H** = above high normal **LL** = below lower panic limits **HH** = above upper panic limits **<** = below absolute low-off instrument scale **>** = above absolute high-off instrument scale **N** = normal **A** = abnormal (applies to nonnumeric results) **AA** = very abnormal (applies to nonnumeric results) **null** = no range defined or normal ranges don't apply **U** = significant change up **D** = significant change down **B** = better (use when direction not relevant) **W** = worse (use when direction not relevant)
normal_lo-hi_limit	IVL<PQ>	R	[1..1]	The low and high limit range for a normal result
critical_lo-hi_limit	IVL<PQ>	R	[1..1]	The low and high limit range outside which clinical review is required

Condition predicate for fields *value*, *qualitative_value* and *interpretation_cd*:

Every Observation object instance must contain either a value or a qualitative_value field. The interpretation_cd field may be used to provide additional information about the quantitative or qualitative value.

14.6.1.4 Use of the Note Object Related to the Observation Object

Zero or one occurrence of this object may appear below an observation. The note is a comment related to the observation.

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
text	ST	R	[1..1]	Comment of the observation

14.6.1.5 Use of the Operator object

One and only one occurrence.

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
operator_id	ST	R	[1..1]	A unique identifier for the operator
name	PN	RE	[0..1]	Operator's name. Required if available on the POCRG.

3200 14.6.1.6 Use of the Order object

One and only one occurrence.

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
universal_service_id	CE	R	[1..1]	Identifies the service provided by these observations. LOINC is the preferred encoding scheme. The CE data type allows transmission of two encodings, if appropriate.
ordering_provider_id	ST	RE	[0..1]	An identifier that uniquely identifies the provider who ordered this service.
order_id	CV	O	[0..1]	An identifier that uniquely identifies this service instance. This field may contain an order id, accession number, or other such identifier.

14.6.1.7 Use of the Specimen object

Zero or one occurrence.

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
specimen_dttm	TS	R	[1..1]	Time the specimen was drawn.
specimen_id	CV	O	[0..1]	Code identifying the specimen
source_cd	CE	O	[0..1]	Location of the specimen. Coded in table 51 of POCT1-A, Annex B
type_cd	CE	R	[1..1]	Type of the specimen. Coded in table 52 of POCT1-A, Annex B

14.6.1.8 Use of the Reagent object

Zero or one occurrence.

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
name	ST	RE	[0..1]	The manufacturer's name for the reagent
lot_number	CV	R	[1..1]	The lot number of reagent used
expiration_date	TS	RE	[0..1]	The date past which the reagent should not be used

14.6.1.9 Use of the Note object

Zero or more occurrences of this object may appear below the Service object. The note is a comment related to the service (i.e. the set of observations).

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
text	ST	R	[1..1]	Comment of the observation

14.6.1.10   Example Message of Patient Observations

```
<OBS.R01>
        <HDR>
                <HDR.control_id V="12345"/>
                <HDR.version_id V="POCT1"/>
                <HDR.creation_dttm V="2005-05-16T16:30:00+1:00"/>
        </HDR>
        <SVC>
                <SVC.role_cd V="OBS"/>
                <SVC.observation_dttm V="2005-05-16T16:30:00+1:00"/>
                <SVC.status_cd V="NRM"/>
                <SVC.reason_cd V="NEW"/>
                <PT>
                        <PT.patient_id V="888888"/>
                        <PT.location V="ICU-Bed3"/>
                        <PT.name V="Pat Patient">
                                <GIV V="Patrick">
                                <FAM V="Patient">
                        </ PT.name >
                        <PT.birth_date V="1958-10-31"/>
                        <PT.gender_cd V="M"/>
                        <OBS>
                                < OBS.observation_id V="2703-7" SN="LN" DN="Oxygen"/>
                                <OBS.value V="110" U="mmHg"/>
                                 <OBS.method_cd V="M"/>
                                <OBS.status_cd V="A"/>
                                <OBS.interpretation_cd V="H"/>
                                <OBS.normal_lo-hi_limit V="[83;108]" V="mmHg"/>
                                <OBS.critical_lo-hi_limit V="[40;130]" V="mmHg"/>
                        </OBS>
                        <OBS>
                                < OBS.observation_id V="11557-6" SN="LN" DN="Carbon Dioxyd"/>
                                <OBS.value V="33.2" U="mmHg"/>
                                 <OBS.method_cd V="M"/>
                                <OBS.status_cd V="A"/>
                                <OBS.interpretation_cd V="L"/>
                                <OBS.normal_lo-hi_limit V="[35.0;48.0]" V="mmHg"/>
                                <OBS.critical_lo-hi_limit V="[20.0;60.0]" V="mmHg"/>
                        </OBS>
                        <NTE>
                                <NTE.text V="result below reference ranges, within critical ranges"/>
                        </NTE>
                        <OBS>
                                < OBS.observation_id V="11558-4" SN="LN" DN="pH"/>
                                <OBS.value V="7.47"/>
                                 <OBS.method_cd V="M"/>
                                <OBS.status_cd V="A"/>
                                <OBS.interpretation_cd V="H"/>
                                <OBS.normal_lo-hi_limit V="[7.35;7.45]" V="mmHg"/>
                                <OBS.critical_lo-hi_limit V="[7.00;7.60]" V="mmHg"/>
                        </OBS>
                </PT>
                <OPR>
                        <OPR.operator_id V="Nurse007"/>
                        <OPR.name V="Nancy Nursery">
                                < GIV V="Nancy"/>
                                < FAM V="Nursery"/>
                        </OPR.name>
                </OPR>
                <ORD>
                        <ORD.universal_service_id V="BG-OXI-ELECT"/>
                        <ORD.ordering_provider_id V="Facility1"/>
                </ORD>
                <SPC>
                        <SPC.specimen_dttm V="2005-05-19T10:20:00-1.00"/>
                        <SPC.source_cd V="LLFA"/>
                        <SPC.type_cd V="BLDA"/>
                </SPC>
                <NTE>
                        <NTE.text V="Battery approved by Dr Esclapios"/>
                </NTE>
        </SVC>
</OBS.R01>
```

3210

14.6.2 Message OBS.R02: QC Related Set of Observations

The figure below is extracted from POCT1-A, Annex B.
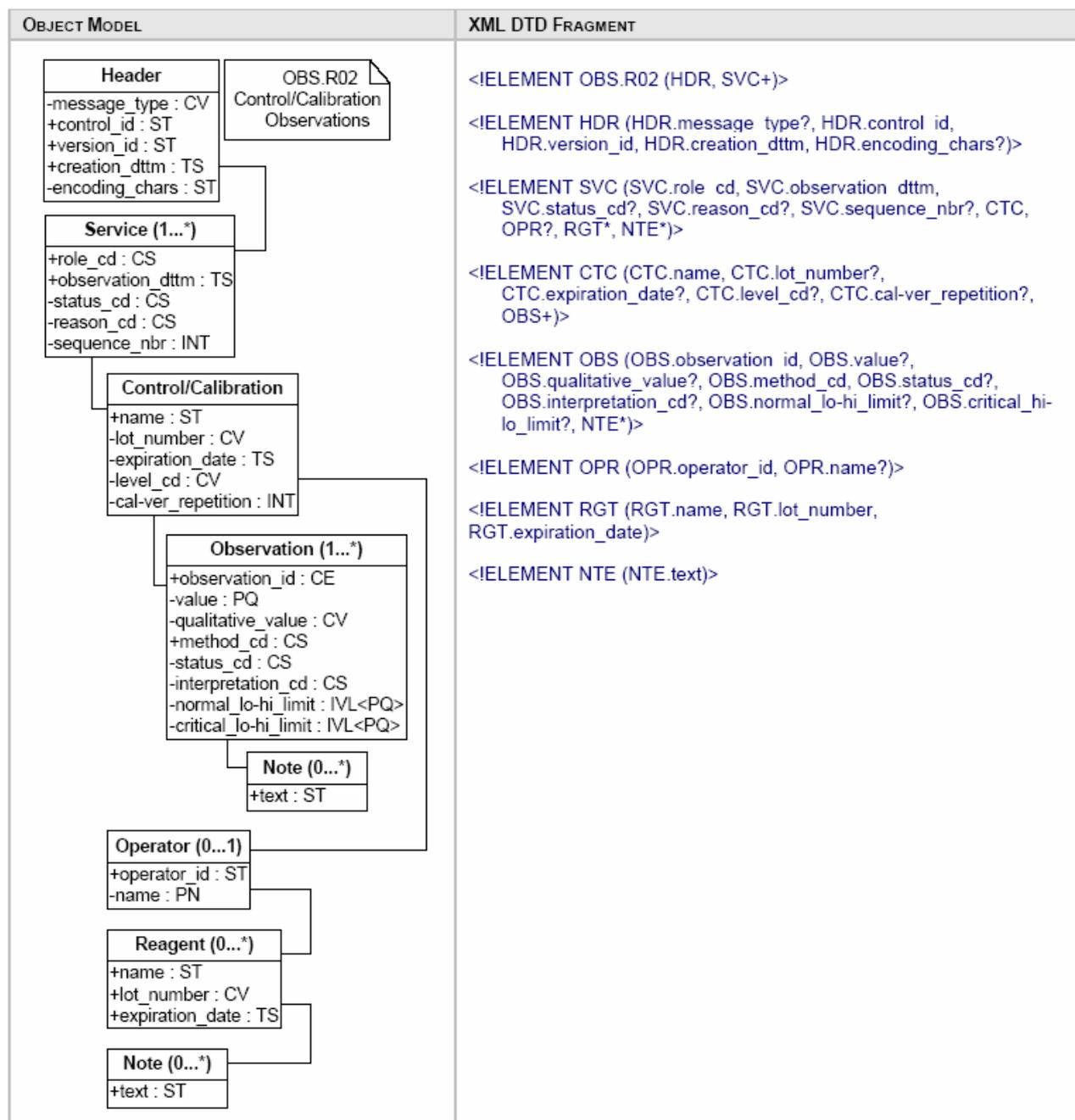
Figure 45. Nonpatient-related Observation Message Model

14.6.2.1 Use of the Service object

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
role_cd	CS	R	[1..1]	The following values are authorized within OBS.R02 message, taken from table 47 in POCT1-A, Annex B: **LQC** = Liquid QC (observation from a liquid QC test) **EQC** = Electronic QC (observation from an electronic QC test) **CVR** = Calibration verification **CAL** = Calibration **PRF** = Proficiency test
observation_dttm	TS	R	[1..1]	production date/time of this set of observations
status_cd	ST	R	[1..1]	One of the values listed in table 48 of POCT1-A, Annex B (see section Y.6.1.1 in this document)
reason_cd	ST	R	[1..1]	One of the values listed in table 49 of POCT1-A, Annex B (see section Y.6.1.1 in this document)
sequence_nbr	ST	O	[O..1]	An optional number to indicate the position of this service in a historical list of services performed by this Device. This number is unique only across a single Device, and may wrap (e.g., a 'use counter').

14.6.2.2 Use of the Control/Calibration Object

One and only one occurrence of Control/Calibration per Service:

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
name	ST	RE	[0..1]	The manufacturer's name for the QC/Calibration material
lot_number	CV	R	[1..1]	The vendor-specific lot number of the QC/Calibration material
expiration_date	TS	RE	[0..1]	The date past which the reagent should not be used
level_cd	CV	C	[0..1]	The level for the QC test or for the calibration verification test. Not applicable to proficiency tests nor to calibration tests.
cal-ver_repetition	INT	C	[0..1]	Only applicable to calibration verification: If tests within a linearity sequence are repeated at a given level, this field indicates the repetition count for this particular test.

14.6.2.3 Use of the Observation Object

At least one occurrence of Observation below Control/Calibration:

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
observation_id	CE	R	[1..1]	The test identifier, preferably coded with LOINC
value	PQ	C	[0..1]	The observation result, if expressed quantitatively (i.e. a numerical value with units).
qualitative_value	CV	C	[0..1]	The observation result, if expressed qualitatively.
method_cd	CS	R	[1..1]	Origin of the result. Coded in table 36 of POCT1-A, Annex B. This LPOCT profile authorizes only these values: **C** = Calculated (The value was calculated) **D** = Default (The value is a default value) **E** = Estimated **I** = Input (The value was externally input to the POCRG) **M** = Measured (The value was measured on the POCRG)
status_cd	CS	R	[1..1]	Status of the result. Coded in table 36 of POCT1-A, Annex B. This LPOCT profile authorizes only these values for

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
				patient-related results: **A** = Accepted **D** = Discarded **R** = Rejected
interpretation_cd	CS	C	[0..1]	Interpretation of the result (abnormal flags). Coded in table 38 of POCT1-A, Annex B (See section Y.6.1.3 above)
normal_lo-hi_limit	IVL<PQ>	RE	[0..1]	The low and high limit range for a normal result
critical_lo-hi_limit	IVL<PQ>	RE	[0..1]	The low and high limit range outside which clinical review is required

3220 Condition predicate for fields *value*, *qualitative_value* and *interpretation_cd*: Same as in section Y.6.1.3 above.

14.6.2.4 Use of the Note Object Related to the Observation Object

Zero or one occurrence of this object may appear below an observation. The note is a comment related to the observation.

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
text	ST	R	[1..1]	Comment of the observation

14.6.2.5 Use of the Operator Object

One and only one occurrence.

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
operator_id	ST	R	[1..1]	A unique identifier for the operator
name	PN	RE	[0..1]	Operator's name. Required if available on the POCRG.

14.6.2.6 Use of the Reagent object

Zero or one occurrence.

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
name	ST	RE	[0..1]	The manufacturer's name for the reagent
lot_number	CV	R	[1..1]	The lot number of reagent used
expiration_date	TS	RE	[0..1]	The date past which the reagent should not be used

14.6.2.7 Use of the Note object

3230 Zero or more occurrences of this object may appear below the Service object. The note is a comment related to the service (i.e. the set of observations).

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
text	ST	R	[1..1]	Comment of the observation

14.7 Expected Actions

The POCDM receiving a message OBS.R01 (patient related observations) must check this set of observations against its own configuration rules (comparison with normal ranges, QC performed and OK, operator allowed to proceed, patient known in this point of care …). It then accepts or rejects this set of observations, and sends its reply in an Acknowledgement message. If the set of observations was accepted, the POCDM stores it in its data base. If the option "Supervision by laboratory" is supported, the POCDM initiates a Transaction LAB-32 with the Order Filler to forward this accepted set of observations.

3240

The POCDM receiving a message OBS.R02 (non-patient related observations) must check this set of observations against its own configuration rules. It then accepts or rejects this set of observations, and sends its reply in an Acknowledgement message. If the set of observations (QC or calibration results) was accepted, the POCDM stores it in its data base.

15 Transaction LAB-32: Accepted Observation Set

15.1 Scope

This transaction is used within LPOCT profile with the option "Supervision by laboratory": The POCDM forwards all accepted sets of patient observations to the Order Filler.

15.2 Use Case Roles
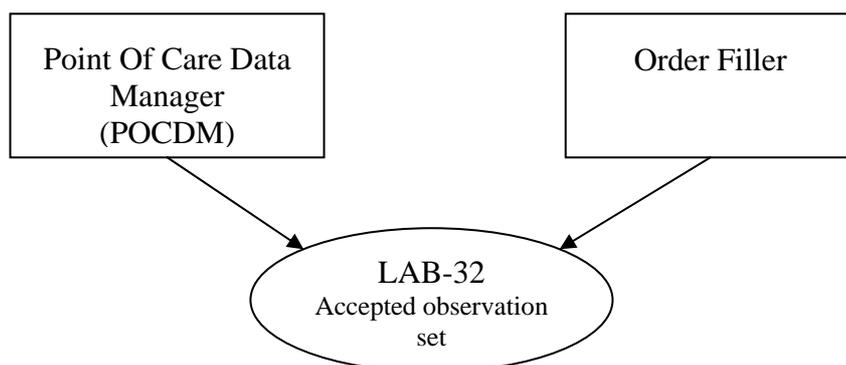
3250

Actor: POCDM

Role: Forwards to the Order Filler each set of observations accepted for a patient specimen. Waits for the acknowledgement of this set of observations and stores the filler order number that it contains.

Actor: Order Filler

Role: Receives the set of patient observations, and according to the trigger event, either stores this set in an existing order, or generates a new order for it. In either case it will return the filler order number in the associated acknowledgement sent back to the POCDM.

15.3 Referenced Standard

POCT1-A : Observation Reporting Interface (ORI) defined in Appendix C of this standard. The
3260 POCT1-A standard names "*Observation Reviewer*" the IHE **POCDM** actor, and names "*Observation Recipient*" the IHE **Order Filler** actor.

HL7 v2.5: The ORI of POCT1-A relies on HL7 v2.5 messages structures ORU defined in chapter 7 of the HL7 standard.

All implementation rules and notes specified in the present Volume 2 of the IHE Laboratory Technical Framework fully apply to the messages of this transaction LAB-32. More precisely:

- Section 2.2 "HL7 profiling conventions"

- Section 2.3 "HL7 implementation notes"

- Section 3 "Common message segments for Laboratory Technical Framework". This section provides the common description of segments MSH, MSA, NTE, ERR, PID, that are also
3270 applicable to this transaction LAB-32.

15.4 Interaction Diagram
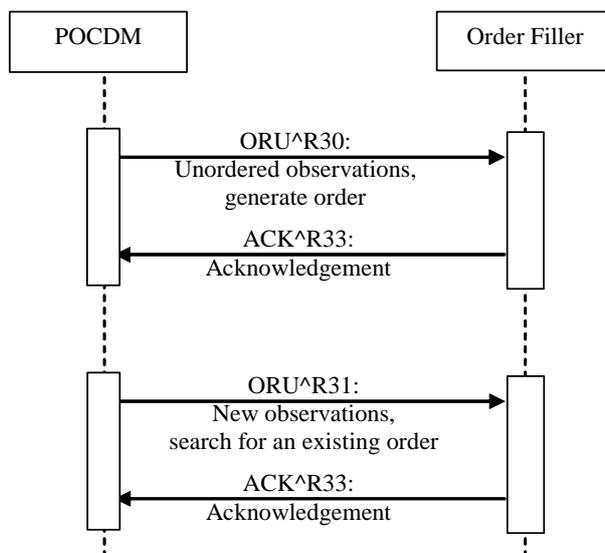
Figure 15-1: Interaction diagram for [LAB-32]

Transaction LAB-32 offers two distinct message structures to support the various use cases described in Volume 1:

- ORU^R30 (Unordered observations) is used in part 4 of scenarios 5.5.1 and 5.5.3, as well as in part 2 of scenario 5.5.4. The Order Filler SHALL generate a new order when receiving this message.

3280
- ORU^R31 is used in part 4 of scenario 5.5.2: The POCDM instructs the Order Filler to match an existing order to store the observations.

The acknowledgement to both message structures is ACK^R33. this acknowledgement is an application acknowledgement that sends back the filler order number of the order generated or matched by the Order Filler, to store this set of POCT results.

Note 5: The trigger event ORU^R32 "preordered observations" described in POCT1-A's ORI, is not part of the IHE LPOCT profile. As explained in Volume 1 of this profile, section 1.4 "Relationship to real world architectures, and in Volume 2, section 5.5.2, Note 1, this event corresponds to the normal scheduled workflow and is supported by the two IHE profiles LSWF and LDA.

15.5 Trigger Events

3290 The POCDM integrates a set of point of care observations for a patient, received from a POCRG on LAB-31. The option "Supervision by laboratory" being supported, this event triggers a message of LAB-32 that sends these observations to the Order Filler.

If the indication "existing order" is present in the set of observations, the message is ORU^R31, otherwise the message is ORU^R30.

15.6 Message Semantics

15.6.1 Common Static Definition for ORU^R30 and ORU^R31

Table 32.6.1-1 : static definition for ORU^R30 and ORU^R31

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message Header	R	[1..1]	2

PID	Patient Identification	R	[1..1]	3
ORC	Common Order information	R	[1..1]	4
OBR	Observation Request	R	[1..1]	4
[{NTE}]	Notes or Comments for order/Result	RE	[0..1]	4
[{	--- RESULT begin	O	[0..*]	
OBX	Observation related to OBR	R	[1..*]	7
[{NTE}]	Comment of the result	C	[0..1]	2
}]	--- RESULT end			

15.6.1.1 Usage of MSH segment

MSH-9 – Message Type, shall have its three components valued as follows:

- ORU^R30^ORU_R30 for the unordered point of care observations
- ORU^R31^ORU_R30 for the point of care observations to match with a possibly existing order

15.6.1.2 Usage of ORC Segment

The common definition of segment ORC in Volume 2 – section 3.7, does not apply to this LPOCT Integration Profile: The ORU^R30 message structure instructs the recipient to generate the order, and the ORU^R31 message instructs to match an existing order, without identifying it.

Hence, the usage definition of ORC segment within this LPOCT profile, below:

Table Z.6.1.3-1 : ORC Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	2	ID	R	[1..1]	0119	00215	Order Control
2	22	EI	X	[0..0]		00216	Placer Order Number
3	22	EI	C	[0..0]		00217	Filler Order Number
4	22	EI	X	[0..0]		00218	Placer Group Number
5	2	ID	X	[0..0]	0038	00219	Order Status
7	200	TQ	X	[0..0]		00221	Quantity/Timing
8	200	EIP	X	[0..0]		00222	Parent
9	26	TS	X	[0..0]		00223	Date/Time of Transaction
10	250	XCN	X	[0..0]		00224	Entered By
11	250	XCN	X	[0..0]		00225	Verified By
17	250	CE	X	[0..0]		00231	Entering Organization
20	250	CE	X	[0..0]	0339	01310	Advanced Beneficiary Notice Code
21	250	XON	RE	[0..1]		01311	Ordering Facility Name
25	250	CWE	X	[0..0]		01473	Order Status Modifier
26	60	CWE	X	[0..0]	0552	01641	Advanced Beneficiary Notice Override Reason
27	26	TS	X	[0..0]		01642	Filler's Expected Availability Date/Time

ORC-1 Order Control (ID), required. This field shall be valued to "NW" (new order) both in ORU^R30 and ORU^R31 message structures.

ORC-3 Filler Order Number (EI): This LPOCT profile applies the condition predicate specified by POCT1-A: "*The POCDM may supply an external identifier in this field that other systems can use to*

reference this result set. This specification places no restrictions on the format or content of this field's value. For example, some POCDM might expose a database key in this field while others might use a combination of Device name, serial number and the timestamp of the result as the unique external identifier".

ORC-21 Ordering Facility Name (XON), required but may be empty (RE).

For this LPOCT profile, this field contains the facility (ward) where this point of care observation set has been performed. These three components shall be valued:

3320

- 1st = Organization name.

- 7th = Identifier Type Code whith the value "FI", which means "Facility ID" as stated by HL7 table n° 0203.

- 10th = Organization Identifier.

Example: Urology^^^^^^FI^^^UR01

15.6.1.3 32.6.1.4 Usage of OBR Segment

Table Z.6.1.4-2 : OBR Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
2	22	EI	X	[0..0]		00216	Placer Order Number
3	22	EI	X	[O..0]		00217	Filler Order Number
4	250	CE	R	[1..1]		00238	Universal Service Identifier
5	2	ID	X	[0..0]		00239	Priority – OBR
6	26	TS	X	[0..0]		00240	Requested Date/Time
7	26	TS	X	[0..0]		00241	Observation Date/Time
8	26	TS	X	[0..0]		00242	Observation End Date/Time
9	20	CQ	X	[0..0]		00243	Collection Volume
10	250	XCN	X	[0..0]		00244	Collector Identifier
11	1	ID	R	[1..1]	0065	00245	Specimen Action Code
12	250	CE	X	[0..0]		00246	Danger Code
13	300	ST	X	[0..0]		00247	Relevant Clinical Information
14	26	TS	X	[0..0]		00248	Specimen Received Date/Time
15	300	SPS	RE	[0.1]		00249	Specimen Source or Segment SPM
16	250	XCN	RE	[0..1]		00226	Ordering Provider
17	250	XTN	X	[0..0]		00250	Order Callback Phone Number
18	60	ST	X	[0..0]		00251	Placer Field 1
19	60	ST	X	[0..0]		00252	Placer Field 2
20	60	ST	X	[0..0]		00253	Filler Field 1
21	60	ST	X	[0..0]		00254	Filler Field 2
22	26	TS	X	[0..0]		00255	Results Rpt/Status Chng – Date/Time
23	40	MOC	X	[0..0]		00256	Charge to Practice
24	10	ID	X	[0..0]	0074	00257	Diagnostic Serv Sect ID
25	1	ID	R	[1..1]	0123	00258	Order Result Status
26	400	PRL	X	[0..0]		00259	Parent Result
27	200	TQ	X	[0..0]		00221	Quantity/Timing
28	250	XCN	X	[0..0]		00260	Result Copies To
29	200	EIP	X	[0..0]		00261	Parent

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
30	20	ID	X	[0..0]	0124	00262	Transportation Mode
31	250	CE	X	[0..0]		00263	Reason for Study
32	200	NDL	C	[0..1]		00264	Principal Result Interpreter
33	200	NDL	X	[0..0]		00265	Assistant Result Interpreter
34	200	NDL	RE	[0..0]		00266	Technician
37	4	NM	X	[0..0]		01028	Number of Sample Containers *
38	250	CE	X	[0..0]		01029	Transport Logistics of Collected Sample
39	250	CE	X	[0..0]		01030	Collector's Comment *
40	250	CE	X	[0..0]		01031	Transport Arrangement Responsibility
41	30	ID	X	[0..0]	0224	01032	Transport Arranged
42	1	ID	X	[0..0]	0225	01033	Escort Required
43	250	CE	X	[0..0]		01034	Planned Patient Transport Comment
44	250	CE	X	[0..0]	0088	00393	Procedure Code
45	250	CE	X	[0..0]	0340	01316	Procedure Code Modifier
46	250	CE	X	[0..0]	0411	01474	Placer Supplemental Service Information
47	250	CE	X	[0..0]	0411	01475	Filler Supplemental Service Information
48	250	CWE	X	[0..0]	0476	01646	Medically Necessary Duplicate Procedure Reason.
49	2	IS	X	[0..0]	N	01647	Result Handling

OBR-4 Universal Service Identifier (CE): This field identifies either a battery (panel) or an individual test. The first sub-field (the code), and the third (the coding system) are required.

OBR-11 Specimen Action Code (ID): This required field will be valued to 'O' (Specimen obtained by service other than lab).

OBR-15 Specimen source (CM): This field is required if available within LPOCT profile, because the messages of this profile do not embed any SPM segment, given that very little information is needed on the specimen in point of care testing. This profile applies the POCT1-A recommendations of use for this field. The following components should be valued:

- 1st component: **Specimen Source Name or Code (CWE)**, called "Specimen Type" in POCT1-A. Codes are given by table 107 in POCT1-A.

- 4th component: **Body Site (CWE)**, called "Location" in POCT1-A. Code are given by table 108 in POCT1-A.

- 7th component: **Specimen Role (CWE)**, valued to 'P' (Patient specimen).

OBR-16 Ordering Provider (XCN): This field is required if available (RE). The POCDM shall value it with the ordering physician if it knows this information.

OBR-25 Order Result Status (ID): The set of observations is considered as reviewed (i.e. technically validated) either automatically or interactively by the POCDM application (called the Observation Reviewer in POCT1-A). Therefore the status shall be valued to "F" (Final results).

OBR-32 Principal Interpreter (NDL): The field identifies who validated (reviewed) the results, and when this technical validation was performed. It shall be valued if this review has been performed interactively by a human reviewer using the POCDM actor; in this case only the two first components are required:

- Name (CNN):

    o First sub-subcomponent = ID number of the reviewer

  o   Second sub-component = Family name

  o   Third component = Given name

- Stat Date/Time (TS): Date/Time of the review.

OBR-34 Technician (NDL): The field is required if available (RE). It identifies the operator who produced the set of observations on the point of care device (the actor POCRG). It also locates the point of care, room, bed, facility, and dates this production. The following components are to be valued if the information is known:

- 1st component: Name (CNN):

    o   First sub-subcomponent = ID number of the reviewer

    o   Second sub-component = Family name

    o   Third component = Given name

- 2nd component: Stat Date/Time (TS): Date/Time of the testing.

- 4th component: Point Of Care (IS)

- 5th component: Room (IS)

- 6th component: Bed (IS)

- 7th component: Facility (HD)

15.6.2 Static Definition for ACK^R33: Acknowledgement Message

This message sent by the Order Filler to the POCDM is the acknowledgement message for both ORU^R30 and ORU^R31 messages.

Table 32.6.1-1 : static definition for ACK^R33

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message Header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[{ERR}]	Error	C	[0..1]	2

MSH-9 – Message Type, shall have its three components valued "**ACK^R33^ACK**"

15.6.2.1 Usage of MSA Segment

Table 15.6-3: MSA - Message Acknowledgement

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	2	ID	R	[1..1]	0008	00018	Acknowledgement code
2	20	ST	R	[1..1]		00010	Message Control Id
3	80	ST	R	[0..0]		00020	Text Message
5			X	[0..0]		00022	Delayed Acknowledgment Type
6	250	CE	X	[0..0]	0357	00023	Error Condition

The general specification of use of this segment by the IHE Laboratory Technical Framework is given in section 3.2 of the present volume 2.

The particularity of use in the context of the Order Filler acknowledging a POCT observation set to the POCDM is as follows:

MSA-3 – Text Message (ST), is usage R (required). This field contains the filler order number sent
3380   by the Order Filler to the POCDM.

15.7 Expected Actions

When receiving an ORU^R30, the Order Filler performs the following sequence of actions:

1. It generates a new order to store this set of point of care observations within.

2. It sends back to the POCDM the acknowledgement message ACK^R33, including the filler order number.

3. Using Transaction LAB-2 of LSWF profile, the Order Filler propagates this new order to the Order Placer, and requires a placer order number for it. The placer order number is sent back by the Order Placer to the Order Filler.

3390   4. The Order Filler stores the placer order number within the order in its database.

When receiving an ORU^R31, the Order Filler performs the following sequence of actions:

1. It tries to match an existing order in its data base, corresponding to this set of observations. The criteria used may depend upon site-defined policies. They should include the patient, the ordering provider, the facility where the point of care tests was performed, the date-time of the observations and the ordering provider.

2. If no order can be matched, the Order Filler proceeds as if it had received an ORU^R30 (see the sequence of actions above).

3. If an order is matched, the Order Filler stores the results in this order, and acknowledges the order to the POCDM, sending back the filler order number in the acknowledgement.

3400   4. Using Transaction LAB-1 of LSWF profile, the Order Filler notifies the arrival of the POCT results to the Order Placer.

16 Transaction LAB-61: Label Delivery Request

16.1 Scope

This transaction is used by the Label Information Provider to send label delivery instructions to the Label Broker.

16.2 Use Case Roles
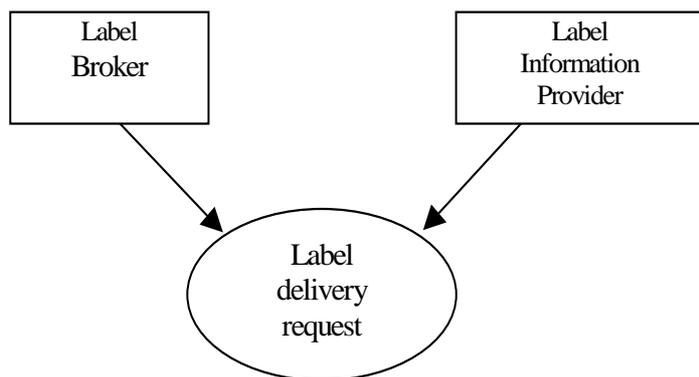
Actor: Label Broker

3410 **Role:** The Label Broker receives labeling instructions to issue the specimen container labels and stick them on the appropriate containers.

Actor: Label Information Provider

Role: The Label Information Provider transmits the labeling instructions to the Label Broker.

16.3 Referenced Standard

HL7 v2.5, Chapter 4

16.4 Interaction Diagram
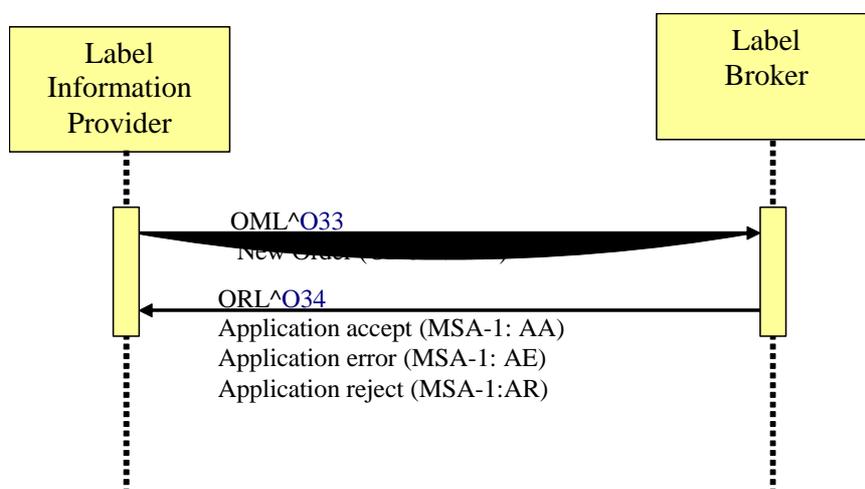
Figure 16-1: Interaction diagram for [LAB-61]

16.5 Message Static Definitions

3420   This transaction contains the messages used to send labeling instructions from the Label Information Provider to the Label Broker.

16.5.1 Trigger Events

OML (O33): Label information sent by the Label Information Provider.

ORL (O34): Application acknowledgement of the Label information sent by Label Broker.

16.5.2 Message Semantics

Table 16-1: OML^O33

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin	R	[1..1]	
PID	Patient Identification	R	[1..1]	3
[PV1]	Patient Visit	RE	[0..1]	3
]	--- PATIENT end			
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..1]	7
[{SAC}]	Specimen Container	O	[0..*]	
{	--- ORDER begin	R	[1..*]	
ORC	Common Order (for one battery)	R	[1..1]	4
[{TQ1}]	Timing Quantity	RE	[0..1]	4
[	--- OBSERVATION REQUEST begin	O	[O..1]	
OBR	Observation Request	R	[1..1]	4
[TCD]	Test Code Details	O	[0..1]	13
[{OBX}]	Observation Result	O	[0..*]	7
]	--- OBSERVATION REQUEST end			
}	--- ORDER end			
}	--- SPECIMEN end			

MSH-9 - Message Type (MSG) shall have its three components respectively valued to

"OML", "O33" and "OML_O33".

3430   This message carries the specimen container labeling instructions in the SPECIMEN segment group: The SPM segment contains the specimen ID (SPM-2) , specimen type (SPM-4), specimen source site (SPM-8), specimen collection amount (SPM-12), container type (SPM-27)… Optionally, the SAC segment may be used to deliver additional information on the physical container to be selected by the Label Broker.

Table 16-2: ORL^O34

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[{ERR}]	Error	C	[0..*]	2

[	--- RESPONSE begin	O	[0..1]	
[PID]	Patient Identification	O	[0..1]	3
{	--- SPECIMEN begin	O	[0..*]	
SPM	Specimen	R	[1..1]	7
[{SAC}]	Specimen Container	O	[0..*]	13
[{	--- ORDER begin	O	[0..*]	
ORC	Common Order	R	[1..1]	4
[{TQ1}]	Timing/Quantity	RE	[0..1]	4
[OBR]	Observation Request	R	[1..1]	4
}]	--- ORDER end			
}	--- SPECIMEN end			
]	--- RESPONSE end			

MSH-9 - Message Type (MSG) shall have its three components respectively valued to "ORL", "O34" and "ORL_O34".

Condition predicate for use of the ERR segment:

3440 The ERR segment SHALL be used whenever the Label Broker does not accept the labeling instruction (MSA-1 = AE or AR)

16.5.3 OBR Segment

Table : OBR Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	4	SI	O	[0..1]		00237	Set ID – OBR
2	22	EI	R	[1..1]		00216	Placer Order Number
3	22	EI	RE	[0..1]		00217	Filler Order Number
4	250	CE	R	[1..1]		00238	Universal Service Identifier
5	2	ID	X	[0..0]		00239	Priority – OBR
6	26	TS	X	[0..0]		00240	Requested Date/Time
7	26	TS	X	[0..0]		00241	Observation Date/Time #
8	26	TS	X	[0..0]		00242	Observation End Date/Time #
9	20	CQ	X	[0..0]		00243	Collection Volume *
10	250	XCN	O	[0..*]		00244	Collector Identifier *
11	1	ID	RE	[0..1]	0065	00245	Specimen Action Code *
12	250	CE	X	[0..0]		00246	Danger Code
13	300	ST	X	[0..0]		00247	Relevant Clinical Information
14	26	TS	X	[0..0]		00248	Specimen Received Date/Time *
15	300	SPS	X	[0..0]		00249	Specimen Source
16	250	XCN	R	[1..1]		00226	Ordering Provider
17	250	XTN	RE	[0..2]		00250	Order Callback Phone Number
18	60	ST	X	[0..0]		00251	Placer Field 1
19	60	ST	X	[0..0]		00252	Placer Field 2
20	60	ST	X	[0..0]		00253	Filler Field 1 +
21	60	ST	X	[0..0]		00254	Filler Field 2 +

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
22	26	TS	X	[0..0]		00255	Results Rpt/Status Chng - Date/Time +
23	40	MOC	X	[0..0]		00256	Charge to Practice +
24	10	ID	C	[0..1]	0074	00257	Diagnostic Serv Sect ID
25	1	ID	X	[0..0]	0123	00258	Result Status +
26	400	PRL	X	[0..0]		00259	Parent Result +
27	200	TQ	X	[0..0]		00221	Quantity/Timing
28	250	XCN	O	[0..*]		00260	Result Copies To
29	200	EIP	X	[0..0]		00261	Parent
30	20	ID	X	[0..0]	0124	00262	Transportation Mode
31	250	CE	O	[0..1]		00263	Reason for Study
32	200	NDL	O	[0..1]		00264	Principal Result Interpreter +
33	200	NDL	O	[0..1]		00265	Assistant Result Interpreter +
34	200	NDL	O	[0..1]		00266	Technician +
35	200	NDL	O	[0..1]		00267	Transcriptionist +
36	26	TS	O	[0..1]		00268	Scheduled Date/Time +
37	4	NM	O	[0..1]		01028	Number of Sample Containers *
38	250	CE	O	[0..1]		01029	Transport Logistics of Collected Sample *
39	250	CE	O	[0..1]		01030	Collector's Comment *
40	250	CE	X	[0..0]		01031	Transport Arrangement Responsibility
41	30	ID	X	[0..0]	0224	01032	Transport Arranged
42	1	ID	X	[0..0]	0225	01033	Escort Required
43	250	CE	X	[0..0]		01034	Planned Patient Transport Comment
44	250	CE	O	[0..1]	0088	00393	Procedure Code
45	250	CWE	O	[0..1]	0340	01316	Procedure Code Modifier
46	250	CE	O	[0..1]	0411	01474	Placer Supplemental Service Information
47	250	CE	O	[0..1]	0411	01475	Filler Supplemental Service Information
48	250	CWE	X	[0..0]	0476	01646	Medically Necessary Duplicate Procedure Reason.
49	2	IS	O	[0..1]	0507	01647	Result Handling

16.6 Expected Actions

The OML message with Order Control Code 'NW' received from the Label Information Provider, contains the specimen container labeling instructions for the Label Broker. The Label Broker will reply with an ORL^O34 message with either "Accept" (MSA-1 = AA) or "Reject" (MSA-1 = AR) or "Error" (MSA-1 = AE) .

3450

17 Transaction LAB-62: Query for Label Delivery Instruction

17.1 Scope

This transaction is used by the Label Broker to query the specimen container labeling instructions from the Label Information Provider.

17.2 Use Case Roles
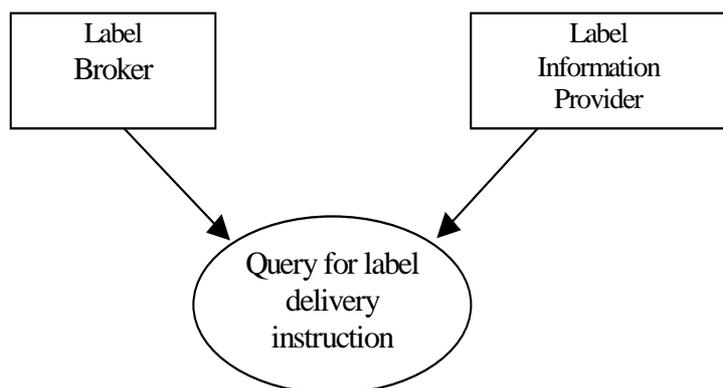
Actor: Label Broker

Role: The Label Broker sends a query to the Label Information Provider in order to get the labeling instructions related to the laboratory test orders for a patient.

3460 **Actor**: Label Information Provider

Role: The Label Information Provider responds to the query with the labeling instructions.

17.3 Referenced Standard

HL7 version 2.5:

17.4 Interaction Diagram
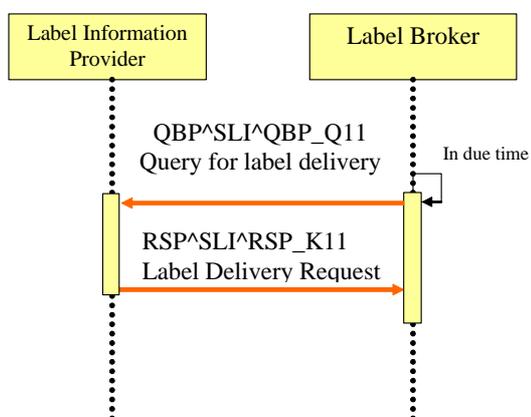
Figure 17-1: Interaction diagram for [LAB-62]

17.5 Message Static Definitions

17.5.1 Trigger Events

QBP(Q11) : Query for specimen container labeling instructions   sent by the Label Broker.
3470   RSP(K11) : Response including the labeling instructions sent by the Label Information Provider.

17.5.2 Message Semantics

Table 17-1: QBP^SLI^QBP_Q11

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
[{SFT}]	Software Segment	O	[0..*]	2
QPD	Query Parameter Definition	R	[1..1]	5
RCP	Response Control Parameter	R	[1..1]	5
[DSC]	Continuation Pointer	O	[0..1]	2

MSH-9 - Message Type (MSG) shall be valued as: QBP^SLI^QBP_Q11

Table 17-2: RSP^SLI^RSP_K11

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
[{SFT}]	Software Segment	O	[0..*]	2
MSA	Message Acknowledgement	R	[1..1]	2
[ERR]	Error	O	[0..1]	2
QAK	Query Acknowledgement	R	[1..1]	5
QPD	Query Parameter Definition	R	[1..1]	5
[	--- PATIENT begin	C	[0..1]	
PID	Patient Identification	R	[1..1]	3
PV1	Patient Visit	O	[0..1]	3
[{OBX}]	Observation related to the patient	O	[0..*]	7
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..1]	7
[{OBX}]	Observation related to specimen	O	[0..*]	7
[{SAC}]	Specimen Container	O	[0..*]	13
{	--- ORDER begin	R	[1..*]	
ORC	Common Order	R	[1..1]	4
[{TQ1}]	Timing/Quantity	RE	[0..1]	4
[	--- OBSERVATION REQUEST begin	O	[0..1]	
OBR	Observation Request	R	[1..1]	4
[TCD]	Test Code Details	O	[0..1]	13
[{OBX}]	Observation Result	O	[0..*]	7
]	--- OBSERVATION REQUEST end			
}	--- ORDER end			
}	--- SPECIMEN end			
]	--- PATIENT end			

MSH-9 - Message Type (MSG) shall have its two first components respectively valued to "RSP" and "K11".

Condition predicate for PATIENT segment group: This segment group is present if and only if the LIP has labeling instructions available matching the query criteria. If not the reply message shall
3480   contain only the first segments from MSH to QPD, the QAK segment indicating with QAK-2 "Query Response Status" valued "NF" (i.e. no data found, no error) that there was no available data matching the query parameters.

17.5.3 QPD Segment

Table 17-3: QPD segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	60	CE	R	[1..1]		01375	Message Query Name
2	32	ST	R	[1..1]		00696	Query Tag
3	80	CK	C	[0..1]		00105	Patient ID
4	250	CX	C	[0..1]		00149	Patient Visit Number
5	22	EI	C	[0..1]		00218	Placer Group Number
6	22	EI	C	[0..1]		00216	Placer Order Number,
7	22	EI	C	[0..1]		00217	Filler Order Number
8	53	DR	C	[0..1]			Search Period

QPD-1 Message Query Name (CE), required
Must be valued "SLI^Specimen Labeling Instructions^IHE_LABTF"

QPD-2 Query Tag (ST), required
Unique to each query message instance. This identifies the query instance. It is used to match the response with the query.

3490   **QPD-3 Patient Identifier,** conditional
Contains a patient unique identifier, as defined in PID-3.

QPD-4 Patient Visit Number, conditional
Contains a patient visit number, as defined in PV1-19.

QPD-5 Placer Group Number, conditional
Contains a placer group number, as defined in ORC-4.

QPD-6 Placer Order Number, conditional
Contains a placer order number, as defined in transaction LAB-1 (OBR-2).

QPD-7 Filler Order Number, conditional
Contains a filler order number, as defined in transaction LAB-1.(OBR-3)

3500   Condition predicate: At least one of the fields QPD-3, QPD4, QPD-5, QPD-6, QPD-7 must be valued. In case QPD-3 or QPD-4 is used and there is more than one pending test order for the patient id or the visit number, it is the responsibility of the application implementing the Label Information Provider Actor to decide whether to pick up one or all of the pending orders. The business rules governing this decision are out of the scope of this Integration Profile.

QPD-8 Search Period (DR), conditional

This field contains a range of date/times

HL7 Component Table - DR – Date/Time Range

SEQ	LEN	DT	OPT	TBL#	COMPONENT NAME	COMMENTS	SEC.REF.
1	26	TS	O		Range Start Date/Time		2.A.77
2	26	TS	O		Range End Date/Time		2.A.77

Condition predicate: This criterion can be used when no order identifier is available, that is, when field QPD-5, QPD-6, QPD-7 are empty. QPD-8 is used in conjunction with QPD-3 or QPD-4.

3510 Use case: It happens that the patient comes to the specimen collection room on another day than the scheduled one. Therefore a range of dates is a convenient criterion if the only information brought by the patient is a patient identifier or a visit identifier.

17.5.4 RCP Segment

Table 17-4: RCP segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	1	ID	R	[1..1]	0091	00027	Query Priority
2	10	CQ	O	[0..1]	0126	00031	Quantity Limited Request
		NM					
		CE					
3	60	CE	R	[1..1]	0394	01440	Response Modality
7	256	ID	O	[0..*]		01594	Segment group inclusion

RCP-1 Query Priority(ID), required

Shall be fixed to "I" (=Immediate).

RCP-2 Quantity Limited Request (CQ), optional

As for the 1st component "Quantity"(NM), Number of records that will be returned in each increment
3520 of the response. If no value is given, the entire response will be returned in a single increment. As for the 2nd component "Units"(CE), "RD"(=Records) is always set. If no value is given, the default is RD.

RCP-3 Response Modality (CE), required

Shall be fixed to "R" (=Realtime).

RCP-7 Segment group inclusion (ID), optional

Specifies those optional segment groups which are to be included in the response. If this field is not valued, all segment groups will be included.

17.6 Expected Actions

The Label Information Provider parses the query parameters, and selects the appropriate pending test
3530 order(s) matching these parameters, according to its own business rules, and builds the response, which is sent back immediately to the Label Broker.

18 Transaction LAB-51: Laboratory Code Set Management

18.1 Scope

This transaction is used by the Code Set Master actor to distribute entire code sets to Code Set Consumer actors. A code set may contain battery, test and observation codes. This transaction is initiated on a scheduled based (e.g. weekly) or whenever the organization of the laboratory changes (e.g. because of the addition/removing of an instrument, specialties).

18.2 Use Case Roles

3540
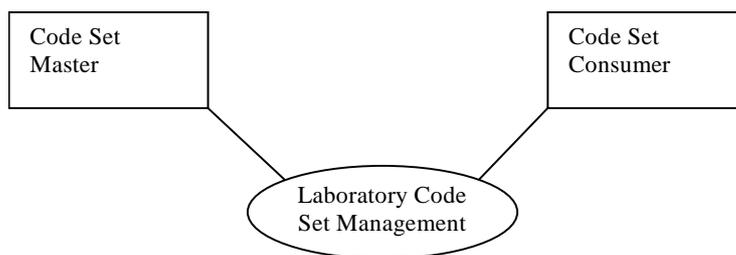
Figure 18-1. Use Case Roles for the Laboratory Code Set Management transaction

Actor: Code Set Master

Role: Sends a full code set.

Actor: Code Set Consumer

Role: Receives a code set, and notifies the Code Set Master of its acceptance or refusal.

18.3 Referenced Standard

HL7 2.5 Chapter 8 (Master Files)

18.4 Interaction Diagram

The interaction diagram shows the flow of message between a Code Set Master and a Code Set
3550   Consumer. Four messages are defined for this transaction:

- MFN^M08 – Master File Notification – Test/Observation (Numeric). This message is used for codes related to individual tests with numeric results. This message should not be used for battery or profile definitions. If the result of the test is a formulaic expression (a calculation) of other tests, MFN^M11 should be used instead of this message.

- MFN^M09 – Master File Notification – Test/Observation (Categorical). This message is used for codes related to individual tests with results that are NOT numeric. This message should not be used for battery or profile definitions. If the result of the test is a formulaic expression of other tests, MFN^M11 should be used instead of this message

- MFN^M10 – Master File Notification – Test/Observation Batteries. This message is used for
3560   codes that identify batteries or profiles. This message should not be used to for individual tests.

- MFN^M11 – Master File Notification – Test/Calculated Observations. This message is used for codes related to individual tests with calculated results. This message should not be used for battery or profile definitions.
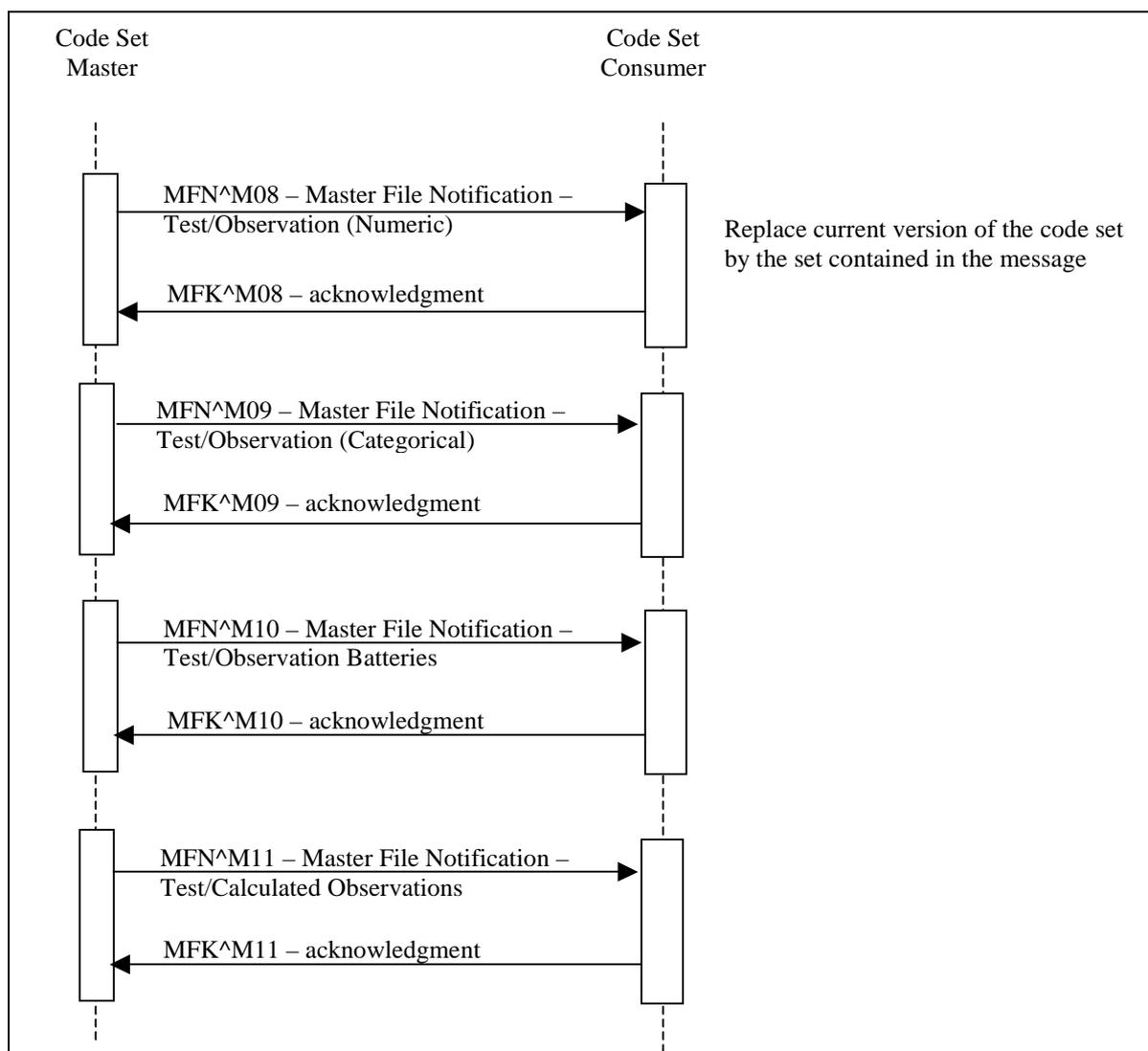
Figure 18-2. Interaction diagram for [LAB-51]

In order to simplify the management of observation codes (OBX-3) and battery codes (OBR-4), the
3570 MFN^M08, MFN^M09 and MFN^M11 messages will be used to distribute observation codes only
(OBX-3), and MFN^M10 will be used to distribute battery codes (OBR-4).

In order to fully synchronize the code sets between the Code Set Master and the Code Set Consumer 4
messages will have to be sent, each of which conveys the definition of part of the overall laboratory
code set. The definitions of atomic tests shall be sent (M08, M09) before the definitions of calculated
tests or batteries (M10, M11).

18.5 Master File Notification – Test/Observation (Numeric)

This message is used to transmit observation codes, i.e. codes sent in the OBX-3 field (Observation
Identifier). Observations must have continuous values (data of type numeric, date, or time stamp).

18.5.1 Trigger Events

3580 MFN^M08 – the Code Set Master sends a full set of observation codes.

18.5.2 Message Semantics

HL7 2.5 Chapter 8 MFN^M08 message. Refer to HL7 Standard for general message semantics. The OM2 segment can be used to transport the Units of Measure if necessary.

Table 18-1: MFN^M08 static definition

Segment	Meaning	Usage	Card.	HL7
MSH	Message Header	R	[1..1]	2
MFI	Master File Identification	R	[1..1]	8
{	--- MASTER FILE ENTRY begin	R	[1..*]	8
MFE	Master File Entry	R	[1..1]	8
OM1	General Segment	R	[1..1]	8
[OM2]	Numeric Observation Segment	O	[0..1]	8
[OM4]	Observations that Require Specimens	O	[0..1]	8
}	--- MASTER FILE ENTRY end			

See section 3 in the present volume 2 for the description of MFI and MFE segments.

MFI-1 Master File Identifier (CE), shall contain the value "OMA" (Numerical Observation Master File).

18.5.3 OM1 – General Segment

Table 18-2: OM1 – General Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	4	NM	R	[1..1]		00586	Sequence Number - Test/Observation Master File
2	250	CE	R	[1..1]		00587	Producer's Service/Test/Observation ID
3	12	ID	O	[0..*]	0125	00588	Permitted Data Types
4	1	ID	R	[1..1]	0136	00589	Specimen Required
5	250	CE	R	[1..1]		00590	Producer ID
7	250	CE	O	[0..*]		00592	Other Service/Test/Observation IDs for the Observation
8	200	ST	R	[1..*]		00593	Other Names
18	1	IS	R	[1..1]	0174	00603	Nature of Service/Test/Observation
19	250	CE	RE	[0..1]	99999	00604	Report Subheader
20	20	ST	RE	[0..1]		00605	Report Display order

OM1-1 Sequence Number – Test/Observation Master File (NM), required, shall contain a sequence number from 1 to n (number of records).

OM1-2 MFN Producer's Service/Test/Observation ID (CE) is required. Only the first three sub-fields (Identifier, Text and Name of Coding System) are required. The last 3 components of the CE data type shall not be valued.

OM1-3 Permitted Data Types (ID), optional, should contain numerical, date or time stamp data types.

3600 **OM1-4 Specimen Required (ID)**, required, contain the value Y if one or more specimen are required to obtain this observation, and N if a specimen is not required.

OM1-5 Producer ID (CE), required, uniquely identifies the service producing the observation. Only the first three sub-fields (Identifier, Text and Name of Coding System) are required.

OM1-7 Other Service/Test/Observation IDs for the Observation (CE) is optional and repeating. It can be used to send mapped/translated codes to the destination system. This field can be used to convey the mapping of local codes to reference code sets such as LOINC or SNOMED CT.

OM1-8 Other Names (CE), required, contains aliases or synonyms for the name in the context of the Order Placer. By default, this field can contain the same value as OM1-2 (2nd sub-field).

OM1-18 Nature of Service/Test/Observation (IS), required, contains the value A (atomic
3610 observation).

OM1-19 Report Subheader (CE), required if known, contains an optional string that defines the preferred header under which this observation should be listed on a standard display.

OM1-20 Report Display Order (ST), required if known, contains an optional string that defines the absolute sort order in which this observation is presented in a standard report or display that contains the many observations.

18.5.4 OM2 – Numeric Observation Segment

Table 18-3: OM2 – Numeric Observation Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
2	250	CE	R	[1..1]		00627	Units of Measure
3	10	NM	RE	[0..*]		00628	Range of Decimal Precision
6	250	RFR	O	[0..*]		00631	Reference (Normal) Range For Ordinal And Continuous Observations

3620 **OM2-2 Units of Measure (CE)**, required. Used only if the test contained in OM1 has numeric results. Contains the customary units of measure for the test.

OM2-3 Range of Decimal Precision (NM), required if known. Used only if the test contained in OM1 has numeric results. Specifies the total length in characters of the field needed to display the observation, and the number of digits displayed to the right of the decimal point. This is coded as a single number in the format <length>.<decimal-digits>. For example, a value of 6.2 implies 6 characters total (including the sign and decimal point) with 2 digits after the decimal point. For integer values, the period and <decimal-digits> portion may be omitted (that is, 5.0 and 5 are equivalent). More than one such mask may be transmitted (separated by repeat delimiters) when it is necessary to define possible multiple display formats.

3630 **OM2-6 Reference (Normal) Range for Ordinal and Continuous Observations**, Optional. This field contains the reference (normal) ranges for "numeric" observations/tests with a nature code of A or C (see OM1-18 - Nature of Service/Test/Observation). The use of this field is discouraged (but not forbidden) by IHE. This field can identify different reference (normal) ranges for different categories of patients according to age, sex, race, and other patient conditions. Reference (normal) ranges however also depend on the Analyzer being used, a factor which isn't included in this field. Without having knowledge of the Analyzer generic statements about reference ranges may be clinically misleading and dangerous.

18.5.5 OM4 Segment: Observations that Require Specimens

3640 The OM4 segment is used to convey information related to the (collection of) specimen required for the test/battery. This information can be used by Order Placers (e.g. at the ward) to collect the specimen.

Table 18-4: OM4 – Observations that Require Specimens

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
3	60	TX	R	[1..1]		00643	Container Description
6	250	CE	O	[0..1]		00646	Specimen

OM4-3 Container Description (TX), required. Used only if OM1-4 contains "Y"; contains a textual description of the type of container used for collection of the sample, e.g. "Red capped tube #2".

OM4-6 Specimen (CE), optional. See SPM-4 for additional information. The actor shall use one and the same vocabulary table for OM4-6 and SPM-4 if the Code Set Master is also an Order Filler actor.

18.5.6 Expected Actions

The Code Set Consumer must replace its corresponding code set by the received code set.

3650 Codes which have been removed from the code set are not to be used by the receiving system any more, from the effective date/time given in the message. Codes which have been removed should not be deleted but be flagged as disabled/invalid for backward compatibility reasons. New added codes are usable from the effective date/time given in the message.

18.6 Master File Notification – Test/Observation (Categorical)

This message is used to transmit the code of observations where the value is free text and other non-numeric data types.

18.6.1 Trigger Events

MFN^M09 – the Code Set Master sends a full set of non-numeric observation codes.

3660 **### 18.6.2 Message Semantics**

HL7 2.5 Chapter 8 MFN^M09 message. Refer to HL7 Standard for general message semantics. The construction of the message is roughly the same as MFN^M08. The OM3 segment can be used to transmit categorical results for a test (such a "high"/"low", or "reactive"/"unreactive"/ "transactive") or to indicate a vocabulary for the results (e.g. SNOMED).

Table 18-5: MFN^M09 static definition

Segment	Meaning	Usage	Card.	HL7
MSH	Message Header	R	[1..1]	2
MFI	Master File Identification	R	[1..1]	8
{	--- MASTER FILE ENTRY begin	R	[1..*]	8
MFE	Master File Entry	R	[1..1]	8
OM1	General Segment	R	[1..1]	8
[	--- MF_TEST_CAT_DETAIL begin	O	[0..1]	8
OM3	Categorical Service/Test/Observation Segment	R	[1..1]	8
[{OM4}]	Observations that Require Specimens	O	[0..*]	8
]	--- MF_TEST_CAT_DETAIL end			
}	--- MASTER FILE ENTRY end			

See section 3 in the present volume 2 for the description of MFI and MFE segments.

MFI-1 Master File Identifier (CE), required, shall contain the value "OMB" (Categorical
3670 Observation Master File).

18.6.2.1.1.1 OM1 – General Segment

Refer to 18.5.3 for the construction of this segment. The difference with the OM1 segment of a MFN^M08 message is:

OM1-3 Permitted Data Types (ID), optional, should contain data types other than numerical, date or time stamp.

18.6.2.1.1.2 OM4 – Observations that Require Specimens

Refer to 18.5.5 for the construction of this segment. There is no difference with the OM4 segment of a MFN^M08 message.

18.6.3 Expected Actions

3680 The Code Set Consumer must replace its corresponding code set by the received code set. . Codes which have been removed from the code set are not to be used by the receiving system any more from the effective date/time given in the message. Codes which have been removed should not be deleted but be flagged as disabled/invalid for backward compatibility reasons. New added codes are usable from the effective date/time given in the message.

18.7 Master File Notification – Test/Observation Batteries

This message is used to transmit battery codes, i.e. codes sent in the OBR-4 field (Universal Service Identifier).

18.7.1 Trigger Events

3690   MFN^M10 – the Code Set Master sends a full set of battery codes.

18.7.2 Message Semantics

HL7 2.5 Chapter 8 MFN^M10 message. Refer to HL7 Standard for general message semantics. The construction of the message is roughly the same as MFN^M08.

Table 18-6 MFN^M10 static definition

Segment	Meaning	Usage	Card.	HL7
MSH	Message Header	R	[1..1]	2
MFI	Master File Identification	R	[1..1]	8
{	--- MASTER FILE ENTRY begin	R	[1..*]	8
MFE	Master File Entry	R	[1..1]	8
OM1	General Segment	R	[1..1]	8
[	--- MF_TEST_BATT_DETAIL begin	RE	[0..1]	8
OM5	Observation Batteries	R	[1..1]	8
[{OM4}]	Observations that Require Specimens	O	[0..*]	8
]	--- MF_TEST_BATT_DETAIL end			
}	--- MASTER FILE ENTRY end			

See section 3 in the present volume 2 for the description of MFI and MFE segments.

MFI-1 Master File Identifier (CE), shall contain the value "OMC" (Observation Batteries Master File).

3700   **18.7.3 OM1 – General Segment**

Refer to 18.5.3 for the construction of this segment. The difference with the OM1 segment of a MFN^M08 message is:

OM1-18 Nature of Service/Test/Observation (IS), required, contains the value P (battery consisting of one or many independent atomic observations), F (functional procedure) and S (superset of batteries or procedure ordered under a single code unit).

18.7.4 OM5 – Observation Batteries

Table X.Y.4.3.2-1. OM5 – Observation Batteries

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
2	250	CE	R	[1..*]		00655	Test/Observations Included within an Ordered Test Battery

OM5-2 Test/Observations Included within an Ordered Test Battery, required, contains the codes and names of all tests/observations included within a single battery.

3710 If the OM1 segment defined serum electrolytes, this field might look like the following:
84132^potassium^AS4~84295^sodium^AS4~82435^chloride^AS4~82374^HCO3^^AS4

18.7.5 OM4 – Observations that Require Specimens

Refer to 19.5.7 for the construction of this segment. There is no difference with the OM4 segment of a MFN^M08 message.

18.7.6 Expected Actions

The Code Set Consumer must replace its corresponding code set by the received code set. . Codes which have been removed from the code set are not to be used by the receiving system any more from the effective date/time given in the message. Codes which have been removed should not be deleted
3720 but be flagged as disabled/invalid for backward compatibility reasons. New added codes are usable from the effective date/time given in the message.

18.8 Master File Notification – Test/Calculated Observation

This message is used to transmit the code of observations where the value is derived from one or more quantities or direct observations.

18.8.1 Trigger Events

MFN^M11 – the Code Set Master sends a full set of calculated observation codes.

18.8.2 Message Semantics

HL7 2.5 Chapter 8 MFN^M11 message. Refer to HL7 Standard for general message semantics. The construction of the message is roughly the same as MFN^M08. The OM6 segment can be used to detail the rule or formula used to determine the value of the test. The OM2 segment can be used to specify the units of measure if the formula results in a numeric value.

Table X.Y.4-1. MFN^M11 static definition

Segment	Meaning	Usage	Card.	HL7
MSH	Message Header	R	[1..1]	2
MFI	Master File Identification	R	[1..1]	8
{	--- MASTER FILE ENTRY begin	R	[1..*]	8
MFE	Master File Entry	R	[1..1]	8
OM1	General Segment	R	[1..1]	8
[				
OM6	Observation calculated from other observations	O	[0..1]	8
OM2	Numeric Observation Segment	O	[0..1]	8
]				
}	--- MASTER FILE ENTRY end			

See section 3 in the present volume 2 for the description of MFI and MFE segments.

MFI-1 Master File Identifier (CE), required, shall contain the value OMD (Calculated Observations Master File).

18.8.3 OM1 – General Segment

Refer to 18.5.3 for the construction of this segment. The difference with the OM1 segment of a MFN^M08 message is:

OM1-18 Nature of Service/Test/Observation (IS), required, contains the value C (single observation calculated via a rule or formula from other independent observations).

18.8.4 Expected Actions

The Code Set Consumer must replace its corresponding code set by the received code set. . Codes which have been removed from the code set are not to be used by the receiving system any more from the effective date/time given in the message. Codes which have been removed should not be deleted but be flagged as disabled/invalid for backward compatibility reasons. New added codes are usable from the effective date/time given in the message.

18.9 Acknowledge Message

3750 Applications that receive HL7 messages defined in the IHE Laboratory Technical Framework shall send acknowledgements using the HL7 original acknowledgement mode. The Master File Application Acknowledgment message is defined in HL7 2.5 Chapter 8. The structure of the acknowledgement messages is the same for all acknowledgements:

Table X.Y.4-5. MFK^M08, MFK^M09, MFK^M10, MFK^M11 static definition

Segment	Meaning	Usage	Card.	HL7
MSH	Message Header	R	[1..1]	2
MSA	Acknowledgment	R	[1..1]	2
[{ERR}]	Error	C	[1..1]	2
MFI	Master File Identification	R	[1..1]	8
{	--- MASTER FILE ENTRY begin	C	[0..*]	8
MFA	Master File ACK Segment	R	[1..1]	8
}	--- MASTER FILE ENTRY end			

The construction of MSH, MSA and ERR segments is defined in section 3.1 of the IHE Laboratory Technical Framework, Volume II. The ERR segment shall be used in case of negative acknowledgement, i.e. when the receiving application sends an error on one Master File entry.

3760 The MASTER FILE ENTRY segment group is conditional upon the presence of errors (see the description of field MFI-6). The segment group shall only be populated with MFA Segment for those master file entries that could NOT be accepted. If the entire batch can be accepted by the receiver then the acknowledgement message shall not contain any MFA segments.

18.9.1 MFA - Master File Acknowledgement Segment

The MFA – Master File Acknowledgment segment is defined in the following table.

Table X.Y.4.5-1. MFA – Master File Acknowledgment Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	3	ID	R	[1..1]	0180	00664	Record-Level Event Code
2	20	ST	R	[1..1]		00665	MFN Control ID
3	26	TS	O	[0..1]		00668	Event Completion Date/Time
4	250	CE	R	[1..1]	0181	00669	MFN Record Level Error Return
5	250	CE	R	[1..1]		01308	Primary Key Value - MFA
6	3	ID	R	[1..1]	0355	01320	Primary Key Value Type - MFA

3770 **MFA-1 Record-Level Event Code (ID)**, required, shall contain the value MAD (add record to master file).

MFA-2 MFN Control ID (ST) is required and contains an identifier that uniquely identifies the change to the record.

MFA-4 MFN Record Level Error Return (CE), required, contains the status of the requested update. The actors of IHE Laboratory Technical Framework should support the following values:

Table X.Y.4-3. MFN record-level error return

Value	Description
S	Successful posting of the record defined by the MFE segment
U	Unsuccessful posting of the record defined by the MFE segment

MFA-5 Primary Key Value – MFA, required, uniquely identifies a record of the code set. It contains the same value as MFE-4.

3780   **MFA-6 Primary Key Value Type - MFA (ID)**, required, contains the value CE (coded element).

18.10 Examples of LAB-51 Messages

18.10.1   Example 1: Numeric Observations

The message below is a Dutch (NLD) language example containing a master file definition for numeric tests. The master file has the version ID "1.2". The (optional) OM4 segment defines the type of container (e.g. "*stolbuis rode dop4*" = red capped blood tube #4) and specimen type (e.g. "BLDV^*volbloed*" = venous blood) which is associated with a test. This information is used by the OP in those cases where the OP is responsible for collecting the sample.

```
3790   MSH|^~\&|OF|LabSystem|OP||20050205094510||MFN^M08^MFN_M08|2106|T|2.5|||||NLD|8859/1|NL|
       MFI|OMA|OF_OMA_NL_1.2|REP|||ER|
       MFE|MAD|1846||1846^CREABL/Creatinine^L|CE|
       OM1|1|1846^CREABL/Creatinine^L|NM|Y|K231^Klinisch Chemisch
       Laboratorium^L|||Creatinine|||||||||A|
       OM2|1|umol/l|6.0||
       OM4|1||stolbuis rode dop4||ml|BLDV^volbloed^HL70487|
       MFE|MAD|1848||1848^CREAUV/Creatinine^L|CE|
       OM1|2|1848^CREAUV/Creatinine^L|NM|Y|K231^Klinisch Chemisch
       Laboratorium^L|||Creatinine|||||||||A|
       OM2|2|mmol/l|6.0||
3800   OM4|2||24-uurs bokaal|||UR^urine^HL70487|
       MFE|…. (other master file entries not shown)
```

Response message:

Note that those additions that are successful are not explicitly acknowledged. Each OM1 segments that is problematic to the receiver causes a MFA segment to be present in the acknowledgement message. In this example, all updates are accepted except for 1848.

```
       MSH|^~\&|OP||OF|LabSystem|20050205094520||MFK^M08^MFK_M01|234443|T|2.5|||||NLD|8859/1|NL|
       MSA|AA|2106|
3810   MFI|OMA|OF_OMA_NL_1.2|REP|||ER|
       MFA|MAD|1848||U^Duplicate ID|1848^CREAUV/Creatinine^L|CE
```

18.10.2   Example 2: Calculated Observation

The message below is a Dutch (NLD) language example containing a master file definition for calculated numeric tests. The calculation algorithm is shown (in textual form) in the OM6 segment.

```
MSH|^~\&|OF|LabSystem|OP||20050205094520||MFN^M11^MFN_M11|2107|T|2.5|||||NLD|8859/1|NL|

MFI|OMD|OF_OMD_NL_1.1|REP|||ER|

MFE|MAD|1849||1849^CLEA/Creatinine clearance^L|CE

OM1|1|1849^CLEA/Creatinine clearance^L|NM|Y|K231^Klinisch Chemisch
Laboratorium^L|||Creatinine clearance|||||||||||C|

OM6|1|(CREAUV * HOEV) / (CREASE * 1440)

OM2|1|ml/min|4.0||

MFE|….  (other master file entries not shown)
```

3820

Response message:

The entire contents of the message are accepted.

```
MSH|^~\&|OP||OF|LabSystem|20050205094530||MFK^M11^MFK_M01|234450|T|2.5|||||NLD|8859/1|NL|

MSA|AA|2107|

MFI|OMD|OF_OMD_NL_1.1|REP|||ER|
```

3830

19 Real World Use Cases

19.1 Guidelines

Each of the real world use cases in this section are to be considered as a template for handling a category of laboratory testing throughout all the transactions of the Laboratory Technical Framework. Only the major steps and interactions are described.

3840 Each use case is described by a storyboard that describes the complete workflow in chronological order, completed by an interaction diagram, and illustrated by the most significant messages of this workflow.

The message descriptions are abbreviated, to focus on the main points of interest.

For brevity, only some of the application acknowledgements are shown.

The actors' names are abbreviated with their initials (OP, OF, AM, ORT). These abbreviations are also used in the MSH-3 (sending application) and MSH-5 (receiving application) fields.

All use cases assume that the placer order is related to a placer group number (ORC-4).

All tests are identified in OBX segments by their LOINC code when available.

Colors point out key information in the messages.

19.2 Two Hematology Batteries on a Blood Specimen

3850 **19.2.1 Storyboard**

This example corresponds to the use case described in Volume 1 as "Externally placed order with specimens unidentified or to be collected by the laboratory". The specimen is not identified by the ordering care unit.

Dr Physician orders two batteries of tests on the same specimen: blood count and differential blood count.

Human actors and organizations participating to the process:

Assigning authority: Abbeville Hospital

Placer: Urology department.

Filler: Cytology laboratory.

3860   Ordering facility: Urology.

Patient: John Ill, Patient hospital identifier: 6543210, Patient visit number: 999888, class = inpatient

Orderer: Dr Uro.

Placer order enterer: Janet Nurse.

Specimen collector: John Collect.

Technician: Marc Techos.

Clinical expert: Jane Cyto.

ID numbers used by the workflow:

ID number	Value	Assigned by
Patient hospital ID	6543210	Admission office (ADT)
Patient visit number	9998888	Admission office (ADT)
Care unit order group	555	Urology department (OP)
Care unit order (1st battery)	9876543	Urology department (OP)
Care unit order (2nd battery)	9876544	Urology department (OP)
Laboratory order (1st battery) idem for work order	456	Cytology laboratory (OF)
Laboratory order (2nd battery) idem for work order	457	Cytology laboratory (OF)
Work Order Step Code (1st battery)	456	Cytology laboratory (AM)
Work Order Step Code (2nd battery)	457	Cytology laboratory (AM)
Specimen	456_1	Cytology laboratory (OF)

3870   **LAB-1 interaction:** The Care Unit collects a specimen related to an order for a blood count and a differential count, and sends the specimen to the chemistry laboratory. The Order Placer sends a message "new order" (NW) accompanying the specimen, to let the laboratory start the testing.

LAB-4, LAB-1 and LAB-3 interactions: The laboratory checks the specimen and schedules the work. An identifier is assigned to the specimen by the Order Filler and the corresponding identification label is printed out. The Order Filler sends a unique work order to the Automation

Manager. The Order Filler notifies both Order Placer and Order Result Tracker of the scheduled work.

LAB-5, LAB-1 and LAB-3 interactions: After technical validation by a laboratory technician (Marc Techos), the Automation Manager sends back all the observations to the Order Filler.

3880 **LAB-1 and LAB-3 interactions:** After clinical validation, the Order Filler notifies the results to the Order Result Tracker, and notifies the status change to the Order Placer.

19.2.2 Interaction Diagram
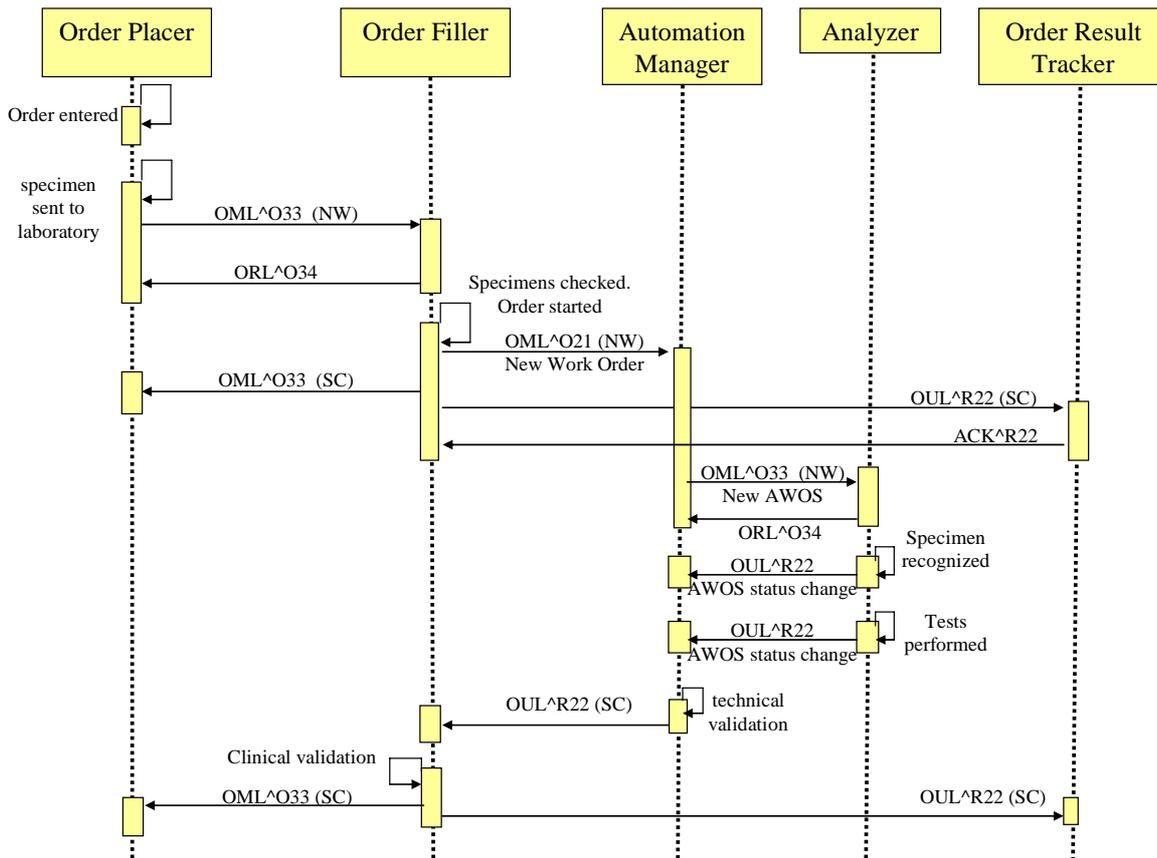
19.2.3 Messages

19.2.3.1 LAB-1 (OP → OF): Message "New order" with one Specimen

A new placer order sent to the Order Filler:

```
MSH|^~\&|OP|Urology|OF|Cytology|200310060820||OML^O33^OML_O33|001|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||||||||9998888
SPM|1|||BLD|||||||P|||||200310060735||||||||||1
ORC|NW|9876543^Urology|||555^Urology
|||||200310060710|^NURSE^JANET|||||||||||Urology^^^^^^FI^^^UR01
TQ1|1|||||||||R
OBR|1|9876543^Urology|||85027^Hemogram and platelet count, automated^C4|
|||||^COLLECT^JOHN||||||^URO^^^^DR
ORC|NW|9876544^Urology|||555^Urology
|||||200310060710|^NURSE^JANET|||||||||||Urology^^^^^^FI^^^UR01
TQ1|1|||||||||R
OBR|1|9876544^Urology|||85009^Differential WBC Count, buffy coat^C4|
|||||^COLLECT^JOHN||||||^URO^^^^DR
```

The related acknowledgement message isn't shown.

19.2.3.2 LAB-4 (OF → AM): Message "New order"

A new work order is sent to the Automation Manager:

```
MSH|^~\&|OF|Cytology|AM|Automation|200310060825||OML^O33^OML_O33|101|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||||||9998888
SPM|1|456_1^Cytology||BLD|||||||||P||||||200310060735|200310060821|||||||||1
ORC|NW|||555^Urology|||||200310060710|^NURSE^JANET|||||||||||||Urology^^^^^^FI^^^UR01
TQ1|1|||||||||R
OBR|1|456^Cytology||85027^Hemogram and platelet count, automated^C4|
|||||^COLLECT^JOHN|||||||^URO^^^^DR
ORC|NW|||555^Urology|||||200310060710|^NURSE^JANET|||||||||||||Urology^^^^^^FI^^^UR01
TQ1|1|||||||||R
OBR|1|457^Cytology||85009^Differential WBC Count, buffy coat^C4|
|||||^COLLECT^JOHN|||||||^URO^^^^DR
```

Acknowledgement sent by the Automation Manager:

```
MSH|^~\&|AM|Automation|OF|Cytology|200310060826||ORL^O34^ORL_O34|301|T|2.5|||||USA||EN
MSA|AA|101
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
SPM|1|456_1^Cytology||BLD|||||||||P||||||200310060735|200310060821|||||||||1
ORC|OK|||555^Urology|SC||||200310060710|^NURSE^JANET|||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||||R
OBR|1|456^Cytology||85027^Hemogram and platelet count, automated^C4|
|||||^COLLECT^JOHN|S|||||^URO^^^^DR
ORC|OK|||555^Urology|SC||||200310060710|^NURSE^JANET|||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||||R
OBR|1|457^Cytology||85009^Differential WBC Count, buffy coat^C4|
|||||^COLLECT^JOHN|S|||||^URO^^^^DR
```

19.2.3.3 LAB-1 (OF → OP): Message "Status changed"

The placer order has been assigned a filler order number, the specimen is available and identified by the laboratory:

```
MSH|^~\&|OF|Cytology|OP|Urology|200310060825||OML^O33^OML_O33|108|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||||||9998888
SPM|1|456_1^Cytology||BLD|||||||P||||||200310060735|200310060821||Y||||||1
ORC|SC|9876543^Urology||555^Urology|IP||||200310060710|^NURSE^JANET|||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||||R
OBR|1|9876543^Urology|456^Cytology|85027^Hemogram and platelet count, automated^C4|
|||||^COLLECT^JOHN|P|||||^URO^^^^DR|||||||||I
ORC|SC|9876544^Urology||555^Urology|IP||||200310060710|^NURSE^JANET|||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||||R
OBR|1|9876544^Urology|457^Cytology|85009^Differential WBC Count, buffy coat^C4|
|||||^COLLECT^JOHN|P|||||^URO^^^^DR|||||||||I
```

The related acknowledgement message isn't shown.

19.2.3.4 LAB-3 (OF->ORT): Message "New Order"

The Order Result Tracker is notified of the creation of the filler order by means of a result message:

```
      MSH|^~\&|OF|Cytology|ORT||200310060825||OUL^R22^OUL_R22|122|T|2.5|||||USA||EN
      PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
3960  PV1|1|I|||||||||||||||||||||9998888
      SPM|1|456_1^Cytology||BLD|||||||P|||||200310060735|200310060821|||Y|||||||1
      OBR|1|9876543^Urology|456^Cytology|85027^Hemogram and platelet count, automated^C4|
      |||||^COLLECT^JOHN|P|||||^URO^^^^DR|||||||||I
      ORC|SC|9876543^Urology||555^Urology|IP||||200310060710|^NURSE^JANET||||||||||||
      Urology^^^^^^FI^^^UR01
      TQ1|1|||||||||R
      OBR|2|9876544^Urology|457^Cytology|85009^Differential WBC Count, buffy coat^C4|
      |||||^COLLECT^JOHN|P|||||^URO^^^^DR|||||||||I
      ORC|SC|9876544^Urology||555^Urology|IP||||200310060710|^NURSE^JANET||||||||||||
3970  Urology^^^^^^FI^^^UR01
      TQ1|1|||||||||R
```

Acknowledgement sent by the Order Results Tracker:

```
      MSH|^~\&|ORT||OF|Cytology|200310060826||ACK^R22^ACK |401|T|2.5|||||USA||EN
      MSA|AA|122
```

19.2.3.5 LAB-21 (AM→ Analyzer): New AWOS

```
      MSH|^~\&|AM|Cytology|LD|Cytology|200506121348||OML^O33^OML_O33|001|T|2.5|||||USA||EN
3980  PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
      PV1|1|I|||||||||||||||||||9998888
      SPM|1|456_1||BLD||||||P|||||200506121330|||||||||1
      ORC|NW|9876543^Urology|||||||200506121315|66622^NURSE^JANET||||||||||||Urology
      TQ1|||||||||R
      OBR||9876543||85027^Hemogram and platelet count, automated^C4|||||||||||||14788^URO
      ORC|NW|9876544^Urology|||||||200506121315|66622^NURSE^JANET||||||||||||Urology
      TQ1|||||||||R
      OBR||9876544||85009^Differential WBC count, buffy coat^C4|||||||||||||14788^URO
```

3990 Acknowledgement sent by the Analyzer:

```
      MSH|^~\&|LD|Cytology|AM|Cytology|200506121349||ORL^O34^ORL_O34|101|T|2.5|||||USA||EN
      MSA|AA|001
      PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
      PV1|1|I|||||||||||||||||||9998888
      SPM|1|456_1||BLD
      ORC|OK|9876543^Urology|||||||200506121349
      OBR||9876543||85027^Hemogram and platelet count, automated^C4
      ORC|OK|9876544^Urology|||||||200506121349
4000  OBR||9876544||85009^Differential WBC count, buffy coat^C4
```

19.2.3.6 LAB-23 (Analyzer → AM): Specimen for AWOS Arrived

```
      MSH|^~\&|LD|Cytology|AM|Cytology|200506121400||OUL^R22^OUL_R22|102|T|2.5|||||USA||EN
      PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
      PV1|1|I|||||||||||||||||||9998888
      SPM|1|456_1||BLD
      OBR||9876543||85027^Hemogram and platelet count, automated^C4|||||||||||||||||||||I
      ORC|SC|9876543^Urology|||||||200506121400
      OBR||9876544||85009^Differential WBC count, buffy coat^C4|||||||||||||||||||||I
```

4010

Acknowledgement not shown.

19.2.3.7 LAB-23 (Analyzer → AM): Tests Performed

```
MSH|^~\&|LD|Cytology|AM|Cytology|200506121410||OUL^R22^OUL_R22|102|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||||||9998888
SPM|1|456_1||BLD
OBR||9876543||85027^Hemogram and platelet count, automated^C4||||||||||||||||||||||||R
ORC|SC|9876543^Urology||||||||200506121410
OBX|1|NM|11156-7^LEUKOCYTES^LN||8.2|10*3/mm3|||||R|||200506121410
OBX|2|NM|11273-0^ERYTHROCYTES^LN||4.08|10*3/mm3|||||R|||200506121410
OBX|3|NM|20509-6^HEMOGLOBIN^LN||13.4|10*3/mm3|||||R|||200506121410
OBX|4|NM|20570-8^HEMATOCRIT^LN||39.7|10*3/mm3|||||R|||200506121410
OBX|5|NM|30428-7^MVC^LN||97|10*3/mm3|||||R|||200506121410
OBX|6|NM|28539-5^MCH^LN||33.0|10*3/mm3|||||R|||200506121410
OBX|7|NM|28540-3^MCHC^LN||33.8|10*3/mm3|||||R|||200506121410
OBX|8|NM|11125-2^PLATELETS^LN||220|10*3/mm3|||||R|||200506121410
ORC|SC|9876544^Urology||||||||200506121410
OBR||9876544||85009^Differential WBC count, buffy coat^C4||||||||||||||||||||||||R
OBX|1|NM|23761-0^NEUTROPHILS/100 LEUKOCYTES^LN||72|%|||||R|||200506121410
OBX|2|NM|26450-7^EOSINOPHILS/100 LEUKOCYTES ^LN||2|%|||||R|||200506121410
OBX|3|NM|26478-8^LYMPHOCYTES/100 LEUKOCYTES ^LN||20|%|||||R|||200506121410
OBX|4|NM|26485-3^MONOCYTES/100 LEUKOCYTES ^LN||6|%|||||R|||200506121410
OBX|5|NM|30180-4^BASOPHILS/100 LEUKOCYTES ^LN||0|%|||||R|||200506121410
```

19.2.3.8 LAB-5 (AM->OF): Message "New Results"

The Automation Manager sends the final results for the work order:

```
MSH|^~\&|AM|Automation|OF|Urology|200310060900||OUL^R22^OUL_R22|308|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||||||9998888
SPM|1|456_1^Cytology||BLD|||||||P||||||200310060735|200310060821||Y||||||1
OBR|1|456^Cytology||85027^Hemogram and platelet count, automated^C4|
|||||^COLLECT^JOHN|P|||||^URO^^^^DR|
||||||200310060832|||F|||||||&TECHOS&MARC^200310060833
ORC|SC||||CM||||200310060710|^NURSE^JANET|||||||||||Urology^^^^^^FI^^^UR01
OBX|1|NM|11156-7^LEUKOCYTES^LN||8.2|10*3/mm3|4-10|N|||F|||200310060830
OBX|2|NM|11273-0^ERYTHROCYTES^LN||4.08|10*6/mm3|10-12|N|||F|||200310060830
OBX|3|NM|20509-6^HEMOGLOBIN^LN||13.4|g/dL|11.5-14.5|N|||F|||200310060830
OBX|4|NM|20570-8^HEMATOCRIT^LN||39.7|%|37-47|N|||F|||200310060830
OBX|5|NM|30428-7^MCV^LN||97|fL|80-95|N|||F|||200310060830
OBX|6|NM|28539-5^MCH^LN||33.0|pg|27-32|N|||F|||200310060830
OBX|7|NM|28540-3^MCHC^LN||33.8|%|30-36|N|||F|||200310060830
OBX|8|NM|11125-2^PLATELETS^LN||220|10*9/L|150-400|N|||F|||200310060830
OBR|2|457^Cytology||85009^Differential WBC Count, buffy coat^C4|
|||||^COLLECT^JOHN|P|||||^URO^^^^DR|
||||||200310060832|||F|||||||&TECHOS&MARC^200310060833
ORC|SC||||CM||||200310060710|^NURSE^JANET|||||||||||Urology^^^^^^FI^^^UR01
OBX|1|NM|23761-0^NEUTROPHILS/100 LEUKOCYTES^LN||72|%||N|||F|||200310060830
OBX|2|NM|26450-7^EOSINOPHILS/100 LEUKOCYTES^LN||2|%||N|||F|||200310060830
OBX|3|NM|26478-8^LYMPHOCYTES/100 LEUKOCYTES^LN||20|%||N|||F|||200310060830
OBX|4|NM|26485-3^MONOCYTES/100 LEUKOCYTES^LN||6|%||N|||F|||200310060830
OBX|5|NM|30180-4^BASOPHILS/100 LEUKOCYTES^LN||0|%||N|||F|||200310060830
```

The related acknowledgement message isn't shown.

19.2.3.9 LAB-1 (OF->OP): Message "Status Changed"

The clinical expert has performed the clinical validation at 09h29. The order is completed:

```
MSH|^~\&|OF|Urology| OP|Urology|200310060930||OML^O33^OML_O33|181|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||||||9998888
SPM|1|456_1^Cytology||BLD|||||||P||||||200310060735|200310060821||Y||||||1
```

```
ORC|SC|9876543^Urology||555^Urology|CM||||200310060710|^NURSE^JANET|||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||||R
OBR|1|9876543^Urology|456^Cytology|85027^Hemogram and platelet count, automated^C4|
||||||^COLLECT^JOHN|P|||||^URO^^^^DR||||||||||F|||||||&CYTO&JANE^200310060929
ORC|SC|9876544^Urology||555^Urology|CM||||200310060710|^NURSE^JANET|||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||||R
OBR|1|9876544^Urology|457^Cytology|85009^Differential WBC Count, buffy coat^C4|
||||||^COLLECT^JOHN|P|||||^URO^^^^DR||||||||||F|||||||&CYTO&JANE^200310060929
```

The related acknowledgement message isn't shown.

19.2.3.10   LAB-3 (OF->ORT): Message "Status Changed"

The clinical expert has performed the clinical validation at 09h29. The order is completed. The results are final:

```
MSH|^~\&|OF|Cytology|ORT||200310060931||OUL^R22^OUL_R22|182|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||||9998888
SPM|1|456_1^Cytology||BLD|||||||P||||||200310060735|200310060821||Y||||||1
OBR|1|9876543^Urology|456^Cytology|85027^Hemogram and platelet count, automated^C4|
||||||^COLLECT^JOHN|P|||||^URO^^^^DR|
||||||200310060929|||F|||||||&CYTO&JANE^200310060929
ORC|SC|9876543^Urology||555^Urology|CM||||200310060710|^NURSE^JANET|||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||||R
OBX|1|NM|11156-7^LEUKOCYTES^LN||8.2|10*3/mm3|4-10|N|||F|||200310060830
OBX|2|NM|11273-0^ERYTHROCYTES^LN||4.08|10*6/mm3|10-12|N|||F|||200310060830
OBX|3|NM|20509-6^HEMOGLOBIN^LN||13.4|g/dL|11.5-14.5|N|||F|||200310060830
OBX|4|NM|20570-8^HEMATOCRIT^LN||39.7|%|37-47|N|||F|||200310060830
OBX|5|NM|30428-7^MCV^LN||97|fL|80-95|N|||F|||200310060830
OBX|6|NM|28539-5^MCH^LN||33.0|pg|27-32|N|||F|||200310060830
OBX|7|NM|28540-3^MCHC^LN||33.8|%|30-36|N|||F|||200310060830
OBX|8|NM|11125-2^PLATELETS^LN||220|10*9/L|150-400|N|||F|||200310060830
OBR|2|9876544^Urology|457^Cytology|85009^Differential WBC Count, buffy coat^C4|
||||||^COLLECT^JOHN|P|||||^URO^^^^DR|
||||||200310060929|||F|||||||&CYTO&JANE^200310060929
ORC|SC|9876544^Urology||555^Urology|CM||||200310060710|^NURSE^JANET|||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||||R
OBX|1|NM|23761-0^NEUTROPHILS/100 LEUKOCYTES^LN||72|%||N|||F|||200310060830
OBX|2|NM|26450-7^EOSINOPHILS/100 LEUKOCYTES^LN||2|%||N|||F|||200310060830
OBX|3|NM|26478-8^LYMPHOCYTES/100 LEUKOCYTES^LN||20|%||N|||F|||200310060830
OBX|4|NM|26485-3^MONOCYTES/100 LEUKOCYTES^LN||6|%||N|||F|||200310060830
OBX|5|NM|30180-4^BASOPHILS/100 LEUKOCYTES^LN||0|%||N|||F|||200310060830
```

The related acknowledgement message isn't shown.

19.3 Test on a Series of Specimens: Glucose Tolerance Study

4120 **19.3.1 Storyboard**

This use case is in the context given by the first general use case presented in Volume 1 "3.1.1: Externally placed order with identified specimens". The ordering care unit thus identifies the specimens.

Dr Physician orders one battery and provides a series of specimen collected at different times. The battery consists of one single test: glucose concentration on blood serum, repeated on a number of specimens, to be performed by the chemistry laboratory. The order is assumed to be part of a group of placer orders identified by the placer group number '666'.

Glucose tolerance is ordered as a single battery requesting for glucose test on an unspecified number of blood serum drawn at different intervals, after initial glucose ingestion". The SPM segments in the
4130 order message indicate the number of specimens, which can vary. The result consists of all the observation performed on each related individual specimen. All specimens produce results, except one unfortunately broken.

Human actors and organizations participating to the process:

Assigning authority:	Memphis Hosp.
Placer:	Entero-gastric department.
Filler:	Chemistry laboratory.
Ordering facility:	Entero-gastric.
Patient:	Adam Everyman Jr, account number: 12345 (check-digit 5 modulo 10), class = outpatient.
4140 Orderer:	Dr Physician, phone number 821, ID number in the hospital 222222.
Placer order enterer:	Nancy Nurse, ID number 222221.
Specimen collector:	M. Bleeder, ID number 1234.
Technician:	Suzy Technician, ID number 333333.
Clinical expert:	Jane Chemistry-Expert, ID number 444444.

ID numbers used by the workflow:

ID number	Value	Assigned by
Patient ID	12345	Admission office (ADT)
Care unit order	12345678	Entero-gastric department (OP)
Care unit order group	666	Entero-gastric department (OP)
1st specimen	123456781	Entero-gastric department (OP)
2nd specimen	123456782	Entero-gastric department (OP)
3rd specimen	123456783	Entero-gastric department (OP)
4th specimen	123456784	Entero-gastric department (OP)
5th specimen	123456785	Entero-gastric department (OP)
Laboratory order	555	Chemistry laboratory (OF)
1st work order	555_1	Chemistry laboratory (OF)
2nd work order	555_2	Chemistry laboratory (OF)
3rd work order	555_3	Chemistry laboratory (OF)
4th work order	555_4	Chemistry laboratory (OF)

LAB-1 interaction: The Care Unit collects the first three specimens related to an order for glucose tolerance, with the high priority 'ASAP', and sends these specimens to the chemistry laboratory. The Order Placer sends a message "new order" (NW) accompanying the first three specimens, to let the laboratory start the testing. OBR-11 "Specimen action code" is valued to "P" (pending specimen) indicating that some specimens for this order are still pending (i.e. not yet collected). The order placer provides an observation reporting the initial quantity of sugar absorbed by the patient.

LAB-4, LAB-1 and LAB-3 interactions: The laboratory checks the specimens and schedules the work. The Order Filler sends the first work orders to the Automation Manager. The Order Filler notifies both Order Placer and Order Result Tracker of the scheduled work, notifying that the third specimen being broken, won't produce any observation. SPM-20 (specimen availability) = 'N' and SPM-21 (specimen reject reason) = 'RB' (broken container). Since this is a timing series, the Order Placer won't replace this specimen. There will simply be a missing point in the final observation graph.

LAB-5, LAB-1 and LAB-3 interactions: After technical validation by , the Automation Manager sends back the first two observations to the Order Filler. Given that the order priority is "ASAP", the Order Filler notifies these partial result to the Order Result Tracker, and notifies the status change to the Order Placer, without waiting for the clinical validation.

LAB-1 interaction: Later on, as the two last specimens are sent to the laboratory, the Order Placer sends an additional message for that order, with the order control "change order request" (XO). This message contains the complete list of specimens. OBR-11 "Specimen action code" is valued to "S", indicating that the specimen collection is complete, and that the laboratory can achieve its work.

LAB-4, LAB-1 and LAB-3 interactions: The laboratory checks the last specimens. The Order Filler sends the last work orders to the Automation Manager. The Order Filler notifies both Order Placer and Order Result Tracker with the progress of the order.

LAB-5 interaction: After technical validation, the Automation Manager sends the last results to the Order Filler.

LAB-1 and LAB-3 interactions: After clinical validation, the Order Filler notifies the final results to the Order Result Tracker, and notifies the status change to the Order Placer.

19.3.2 Interaction Diagram
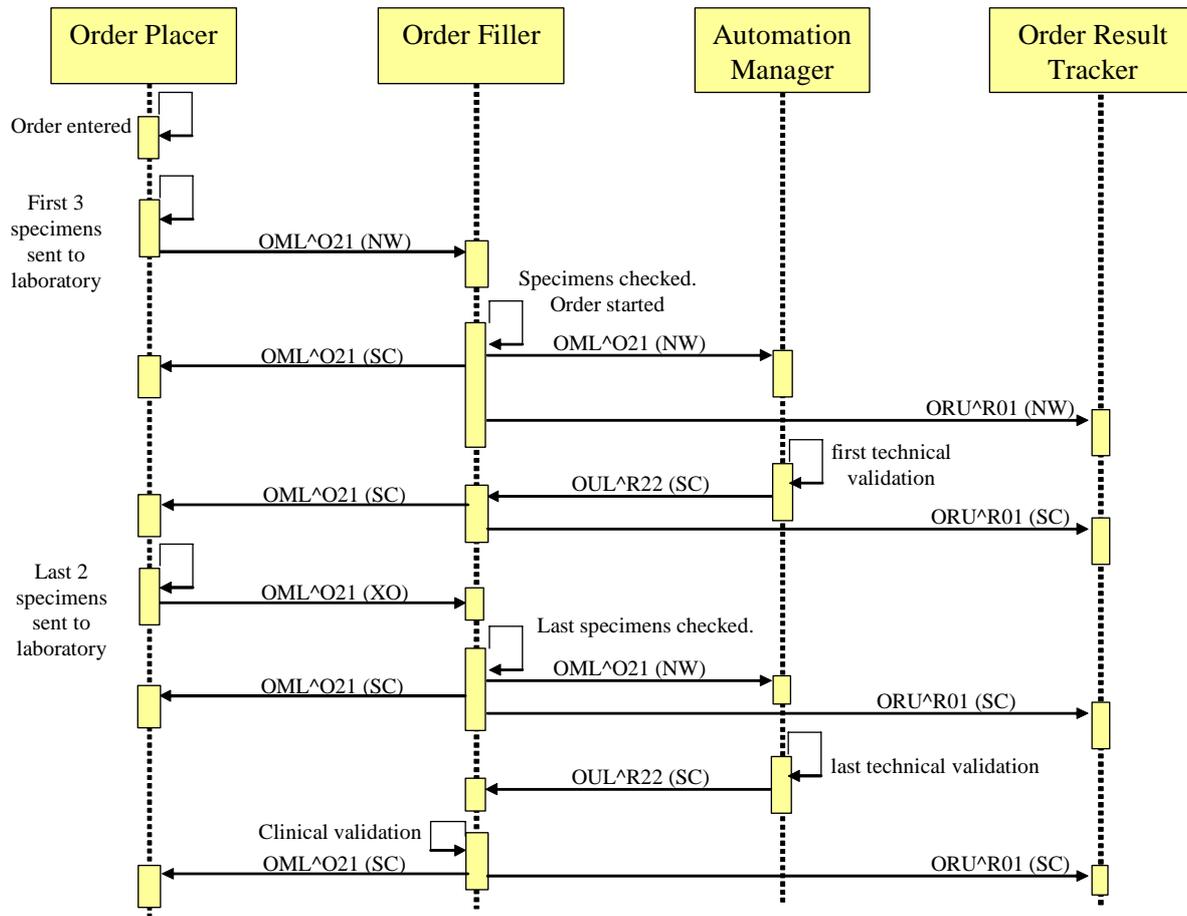
19.3.3 Messages

19.3.3.1 LAB-1 (OP → OF): Message "New order" with the first 3 Specimens

A new placer order sent to the Order Filler: Priority "ASAP" for this placer order. One observation provided by the placer. Three first specimens collected. The other specimens are pending.

4180

```
MSH|^~\&|OP|Entero-gastric|OF|Chemistry|200309060820||OML^O21^OML_O21|
msgOP123|T|2.5|123| |||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||||||12345
ORC|NW|12345678^gastric||666^gastric|||||200309060710|222221^NURSE^NANCY||||||||||||Entero-
gastric^^^^^^FI^^^EG02
TQ1|||||||||A
OBR||12345678^gastric||82951^Glucose Tolerance Test^C4|||||||1234^BLEEDER|
P|||||222222^PHYSICIAN^^^^DR|821
```
4190
```
OBX|1|NM|GLUCOSE||75|g|||||F|||200309060735
SPM|1|123456781^gastric||SER|||||||P|||||200309060735|||||||||1
SPM|2|123456782^gastric ||SER|||||||P|||||200309060755|||||||||1
SPM|3|123456783^gastric ||SER|||||||P|||||200309060815|||||||||1
```

The related acknowledgement message isn't shown.

19.3.3.2 LAB-4 (OF → AM): Message "New order" with the first 2 Specimens

Two new work orders sent to the Automation Manager: Priority ASAP. One observation provided.

```
MSH|^~\&|OF|Chemistry|AM|Automation|200309060825||OML^O21^OML_O21|msgOF101|T|2.5|123||||USA
||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||||||12345
ORC|NW|||666^gastric|||||200309060824|222221^NURSE^NANCY|||||||||||
Entero-gastric^^^^^^FI^^^EG02
TQ1||||||||A
OBR||555_1^chemistry||GLUC^GLUCOSE^L|||||||1234^BLEEDER|S|||||222222^PHYSICIAN^^^^DR|821
SPM|1|123456781^gastric ||SER||||||P|||||200309060735|200309060821|||||||||1
ORC|NW|||666^gastric|||||200309060710|222221^NURSE^NANCY|||||||||||
Entero-gastric^^^^^^FI^^^EG02
TQ1||||||||A
OBR||555_2^chemistry||GLUC^GLUCOSE^L|||||||1234^BLEEDER|S||||| 222222^PHYSICIAN^^^^DR|821
SPM|1|123456782^gastric||SER||||||P|||||200309060755|200309060821|||||||||1
```

The related acknowledgement message isn't shown.

19.3.3.3 LAB-1 (OF → OP): Message "Status changed" with the first 3 Specimens

The placer order has been assigned a filler order number. One specimen is rejected:

```
MSH|^~\&|OF|Chemistry|OP|Entero-gastric|200309060825||OML^O21^OML_O21|msgOF102|
T|2.5|123| |||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||||||12345
ORC|SC|12345678^gastric||666^gastric|IP||||200309060824|222221^NURSE^NANCY ||||||||||||
Entero-gastric^^^^^^FI^^^EG02
TQ1||||||||A
OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance Test^C4||||||
1234^BLEEDER|P|||||222222^PHYSICIAN^^^^DR|821||||||||I
SPM|1|123456781^gastric ||SER||||||P|||||200309060735|200309060821||Y|||||||1
SPM|2|123456782^gastric ||SER||||||P|||||200309060755|200309060821||Y|||||||1
SPM|3|123456783^gastric ||SER||||||P|||||200309060815|200309060821||N|RB|||||1
```

The related acknowledgement message isn't shown.

19.3.3.4 LAB-3 (OF → ORT): Message "New order" with the first 3 Specimens

The Order Result Tracker is notified with the creation of the filler order: The observation related to the 3rd specimen (unavailable) is canceled.

```
MSH|^~\&|OF|Chemistry|ORT||200309060825||ORU^R01^ORU_R01|msgOF103|T|2.5|123||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||||||12345
ORC|SC|12345678^gastric||666^gastric|IP||||200309060824|222221^NURSE^NANCY
||||||||||||Entero-gastric^^^^^^FI^^^EG02
OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance Test^C4||||||
1234^BLEEDER|P|||||222222^PHYSICIAN^^^^DR|821||||||||I
TQ1||||||||A
OBX|1|NM|GLUCOSE||75|g|||||F|||200309060735
SPM|1|123456781^gastric ||SER||||||P|||||200309060735|200309060821||Y|||||||1
SPM|2|123456782^gastric ||SER||||||P|||||200309060755|200309060821||Y|||||||1
SPM|3|123456783^gastric ||SER||||||P|||||200309060815|200309060821||N|RB|||||1
OBX|1|NM|30264-6^GLUCOSE 40M POST DOSE GLUCOSE^LN|||||||X
```

The related acknowledgement message isn't shown.

19.3.3.5 LAB-5 (AM →OF): Message "New results" for the first 2 Work Orders

The Automation Manager sends the two final results for the 2 work orders, technically validated by Suzy TECHNICIAN at 8h33:

```
MSH|^~\&|AM|Automation|OF|Chemistry|200309060833||OUL^R22^OUL_R22|msgAM1|T|2.5|123||||USA||
EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
SPM|1|123456781^gastric ||SER||||||P||||||200309060735|200309060821|||||||||1
OBR||555_1^chemistry||GLUC^GLUCOSE^L||||||1234^BLEEDER
|S|||||222222^PHYSICIAN^^^^DR|821|||||200309060832|||F|||||||
333333&TECHNICIAN&Suzy&&&&&MEMPHIS HOSPITAL^200309060833
OBX|1|NM|14749-6^GLUCOSE^LN||4200|umol/l||N|||F|||200309060830
SPM|2|123456782^gastric||SER||||||P||||||200309060755|200309060821|||||||||1
OBR||555_2^chemistry||GLUC^GLUCOSE^L||||||1234^BLEEDER
|S|||||222222^PHYSICIAN^^^^DR|821|||||200309060832|||F|||||||
333333&TECHNICIAN&Suzy&&&&&MEMPHIS HOSPITAL^200309060833
OBX|1|NM|14749-6^GLUCOSE^LN||6000|umol/l||N|||F|||200309060832
```

The related acknowledgement message isn't shown.

19.3.3.6 LAB-1 (OF → OP): Message "Status Changed"

Some results are available, not clinically validated (i.e. not verified)

```
MSH|^~\&|OF|Chemistry|OP|Entero-gastric|200309060834||OML^O21^OML_O21|msgOF104|
T|2.5|123| |||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward||||||||||||||||12345
ORC|SC|12345678^gastric||666^gastric|A||||200309060834|222221^NURSE^NANCY|
|||||||||||Entero-gastric^^^^^^FI^^^EG02
TQ1||||||||A
OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance
Test^C4|||||||1234^BLEEDER|P|||||222222^PHYSICIAN^^^^DR|821||||||||R
SPM|1|123456781^gastric ||SER||||||P||||||200309060735|200309060821||Y||||||1
SPM|2|123456782^gastric ||SER||||||P||||||200309060755|200309060821||Y||||||1
SPM|3|123456783^gastric ||SER||||||P||||||200309060815|200309060821||N|RB|||||1
```

The related acknowledgement message isn't shown.

19.3.3.7 LAB-3 (OF → ORT): Message "Status Changed"

The two first results are sent, not clinically validated (i.e. not verified):

```
MSH|^~\&|OF|Chemistry|ORT||200309060825||ORU^R01^ORU_R01|msgOF105|T|2.5|123||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||||||12345
ORC|SC|12345678^gastric||666^gastric|A||||200309060834|222221^NURSE^NANCY|
|||||||||||Entero-gastric^^^^^^FI^^^EG02
OBR||12345678^gastric|^chemistry|82951^Glucose Tolerance
Test^C4|||||||1234^BLEEDER|P|||||222222^PHYSICIAN^^^^DR|821||||||||R
TQ1||||||||A
OBX|1|NM|GLUCOSE||75|g|||||F|||200309060735
SPM|1|123456781^gastric ||SER||||||P||||||200309060735|200309060821||Y||||||1
OBX|1|NM|14996-3^GLUCOSE PRE 75 G GLUCOSE PO^LN||4200|umol/l|4000-6100|N|||
R|||200309060830
SPM|2|123456782^gastric ||SER||||||P||||||200309060755|200309060821||Y||||||1
OBX|1|NM|30263-8^GLUCOSE 20M POST DOSE GLUCOSE^LN||6000|umol/l|<7800|N|||
R|||200309060832
SPM|3|123456783^gastric ||SER||||||P||||||200309060815|200309060821||N|RB|||||1
OBX|1|NM|30264-6^GLUCOSE 40M POST DOSE GLUCOSE^LN|| | | |||||X
```
The related acknowledgement message isn't shown.

19.3.3.8 LAB-1(OP → OF): Message "Change Order/Service Request"

The last 2 specimens have been collected and are sent to the laboratory:

```
MSH|^~\&|OP|Entero-gastric|OF|Chemistry|200309060900||OML^O21^OML_O21|msgOP124|
T|2.5|123| |||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward||||||||||||||||12345
ORC|XO|12345678^gastric|||666^gastric|||||200309060855|222221^NURSE^NANCY| ||||||||||||Entero-
gastric^^^^^^FI^^^EG02
TQ1|||||||||A
OBR||12345678^gastric||82951^Glucose Tolerance Test^C4|||||||1234^BLEEDER|S||||||
222222^PHYSICIAN^^^^DR|821
OBX|1|NM|GLUCOSE||75|g|||||F|||200309060735
SPM|1|123456781^gastric ||SER||||||P||||||200309060735|||||||||1
SPM|2|123456782^gastric ||SER||||||P||||||200309060755|||||||||1
SPM|3|123456783^gastric ||SER||||||P||||||200309060815|||||||||1
SPM|4|123456784^gastric ||SER||||||P||||||200309060835|||||||||1
SPM|5|123456785^gastric ||SER||||||P||||||200309060855|||||||||1
```

The related acknowledgement message isn't shown.

19.3.3.9 LAB-4 (OF → AM): Message "New order" with the last 2 Specimens

Two new work orders sent to the Automation Manager:

```
MSH|^~\&|OF|Chemistry|AM|Automation|200309060905||OML^O21^OML_O21|msgOF106|T|2.5|123|
|||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward||||||||||||||||12345
ORC|NW|||666^gastric|||||200309060904|222221^NURSE^NANCY||||||||||||
Entero-gastric^^^^^^FI^^^EG02
TQ1|||||||||A
OBR||555_4^chemistry ||GLUC^GLUCOSE^L||||||1234^BLEEDER| S||||||222222^PHYSICIAN^^^^DR|821
SPM|1|123456784^gastric ||SER||||||P||||||200309060835|200309060902|||||||||1
ORC|NW|||666^gastric|||||200309060904|222221^NURSE^NANCY||||||||||||
Entero-gastric^^^^^^FI^^^EG02
TQ1|||||||||A
OBR||555_5^chemistry ||GLUC^GLUCOSE^L||||||1234^BLEEDER|S||||| 222222^PHYSICIAN^^^^DR|821
SPM|1|123456785^gastric ||SER||||||P||||||200309060855|200309060902|||||||||1
```

The related acknowledgement message isn't shown.

19.3.3.10 LAB-1 (OF → OP): Message "Status changed" with all Specimens

All the specimens have been checked by the laboratory staff.

```
MSH|^~\&|OF|Chemistry|OP|Entero-gastric|200309060905||OML^O21^OML_O21|msgOF107|
T|2.5|123| |||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward||||||||||||||||12345
ORC|SC|12345678^gastric|||666^gastric|A||||200309060904|222221^NURSE^NANCY|
|||||||||||Entero-gastric^^^^^^FI^^^EG02
TQ1|||||||||A
OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance test^C4||||||
1234^BLEEDER|P|||||222222^PHYSICIAN^^^^DR|821|||||||||R
SPM|1|123456781^gastric ||SER||||||P||||||200309060735|200309060821||Y||||||1
SPM|2|123456782^gastric ||SER||||||P||||||200309060755|200309060821||Y||||||1
SPM|3|123456783^gastric ||SER||||||P||||||200309060815|200309060821||N|RB|||||1
SPM|4|123456784^gastric ||SER||||||P||||||200309060835|200309060902||Y||||||1
SPM|5|123456785^gastric ||SER||||||P||||||200309060855|200309060902||Y||||||1
```
The related acknowledgement message isn't shown.

19.3.3.11   LAB-3 (OF → ORT): Message "Status Changed"

The last two specimens have been received. All the work is scheduled:

```
MSH|^~\&|OF|Chemistry|ORT||200309060905||ORU^R01^ORU_R01|msgOF108|T|2.5|123||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward||||||||||||||||12345
ORC|SC|12345678^gastric|||666^gastric|A||||200309060904|222221^NURSE^NANCY|||||||||||Entero-
gastric^^^^^^FI^^^EG02
OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance Test^C4||||||
1234^BLEEDER|S|||||222222^PHYSICIAN^^^^DR|821||||||||R
TQ1||||||||A
OBX|1|NM|GLUCOSE||75|g|||||F|||200309060735
SPM|1|123456781^gastric ||SER|||||||P||||||200309060735|200309060821||Y||||||1
OBX|1|NM|14996-3^GLUCOSE PRE 75 G GLUCOSE PO^LN||4200|umol/l|4000-6100|N|||
R|||200309060830
SPM|2|123456782^gastric ||SER|||||||P||||||200309060755|200309060821||Y||||||1
OBX|1|NM|30263-8^GLUCOSE 20M POST DOSE GLUCOSE^LN||6000|umol/l|<7800|N|||
R|||200309060832
SPM|3|123456783^gastric ||SER|||||||P||||||200309060815|200309060821||N|RB|||||1
OBX|1|NM|30264-6^GLUCOSE 40M POST DOSE GLUCOSE^LN|| | |||||X
SPM|4|123456784^gastric ||SER|||||||P||||||200309060835|200309060902||Y||||||1
SPM|5|123456785^gastric ||SER|||||||P||||||200309060855|200309060902||Y||||||1
```

The related acknowledgement message isn't shown.

19.3.3.12   LAB-5 (AM →OF): Message "New results" for the last 2 Work Orders

The Automation Manager sends the two final results for the 2 work orders, technically validated by Suzy TECHNICIAN at 9h12.

```
MSH|^~\&|AM|Automation|OF|Chemistry |200309060912||OUL^R22^OUL_R22|msgAM2|
T|2.5|123||||USA ||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
SPM|1|123456784^gastric ||SER|||||||P||||||200309060835|200309060902||||||||1
OBR||555_4^chemistry||30266-1^GLUCOSE 1.6H POST DOSE GLUCOSE^LN||||||1234^BLEEDER|
S|||||222222^PHYSICIAN^^^^DR|821|||||200309060911|||F|||||||
333333&TECHNICIAN&Suzy&&&&&MEMPHIS HOSPITAL^200309060912
OBX|1|NM|14749-6^GLUCOSE^LN||7200|umol/l||N|||F|||200309060910
SPM|2|123456785^gastric ||SER|||||||P||||||200309060855|200309060902||||||||1
OBR||555_5^chemistry ||GLUC^GLUCOSE^L||||||1234^BLEEDER|S|||||
222222^PHYSICIAN^^^^DR|821|||||200309060911|||F|||||||
333333&TECHNICIAN&Suzy&&&&&MEMPHIS HOSPITAL^200309060912
OBX|1|NM|14749-6^GLUCOSE^LN||7100|umol/l||N|||F|||200309060911
```

The related acknowledgement message isn't shown.

19.3.3.13   LAB-1 (OF → OP): Message "Status Changed"

Jane CHEMISTRY-EXPERT has performed the clinical validation at 9h29. The order is completed.

```
MSH|^~\&|OF|Chemistry|OP|Entero-gastric|200309060930||OML^O21^OML_O21|msgOF109|
T|2.5|123|||  |USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward||||||||||||||||12345
ORC|SC|12345678^gastric|||666^gastric|CM||||200309060929|222221^NURSE^NANCY|||||||||||Entero
-gastric^^^^^^FI^^^EG02
TQ1||||||||A
OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance Test^C4||||||
1234^BLEEDER|S|||||222222^PHYSICIAN^^^^DR|821|||||200309060929|||F|||||||
444444&CHEMISTRY-EXPERT&Jane&&&&&MEMPHIS HOSPITAL^200309060929
```

```
4420   SPM|1|123456781^gastric ||SER||||||P|||||200309060735|200309060821||Y||||||1
       SPM|2|123456782^gastric ||SER||||||P|||||200309060755|200309060821||Y||||||1
       SPM|3|123456783^gastric ||SER||||||P|||||200309060815|200309060821||N|RB|||||1
       SPM|4|123456784^gastric ||SER||||||P|||||200309060835|200309060902||Y||||||1
       SPM|5|123456785^gastric ||SER||||||P|||||200309060855|200309060902||Y||||||1
```

The related acknowledgement message isn't shown.

19.3.3.14   LAB-3 (OF → ORT): Message "Status Changed"

Jane CHEMISTRY-EXPERT has performed the clinical validation at 9h29. The order is
4430 **completed. The results are final.**

```
MSH|^~\&|OF|Chemistry|ORT||200309060930||ORU^R01^ORU_R01|msgOF110|T|2.5|123||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||||12345
ORC|SC|12345678^gastric||666^gastric|CM||||200309060929|222221^NURSE^NANCY|||||||||||Entero
-gastric^^^^^^FI^^^EG02
OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance Test^C4||||||
1234^BLEEDER|S|||||222222^PHYSICIAN^^^^DR|821|||||200309060929|||F|||||||
444444&CHEMISTRY-EXPERT&Jane&&&&&&MEMPHIS HOSPITAL^200309060929
TQ1|||||||||A
4440   OBX|1|NM|GLUCOSE||75|g|||||F|||200309060735
SPM|1|123456781^gastric ||SER||||||P|||||200309060735|200309060821||Y||||||1
OBX|1|NM|14996-3^GLUCOSE PRE 75 G GLUCOSE PO^LN||4200|umol/l|4000-6100|N|||
F|||200309060830
SPM|2|123456782^gastric ||SER||||||P|||||200309060755|200309060821||Y||||||1
OBX|1|NM|30263-8^GLUCOSE 20M POST DOSE GLUCOSE^LN||6000|umol/l|<7800|N|||
F|||200309060832
SPM|3|123456783^gastric ||SER||||||P|||||200309060815|200309060821||N|RB|||||1
OBX|1|NM|30264-6^GLUCOSE 40M POST DOSE GLUCOSE^LN|||||||X
SPM|4|123456784^gastric ||SER||||||P|||||200309060835|200309060902||Y||||||1
4450   OBX|1|NM|14756-1^GLUCOSE 1H POST DOSE GLUCOSE^LN||7200|umol/l|<7800|N|||
F|||200309060910
SPM|5|123456785^gastric ||SER||||||P|||||200309060855|200309060902||Y||||||1
OBX|1|NM|30265-3^GLUCOSE 1.3H POST DOSE GLUCOSE^LN||7100|umol/l|<7800|N|||
F|||200309060911
```

The related acknowledgement message isn't shown.

19.4 Battery with 2 Specimens: Creatinine clearance

4460 **19.4.1 Storyboard**

This example corresponds to the use case described in Volume 1 as "Externally placed order with specimens unidentified or to be collected by the laboratory". The specimens are not identified by the ordering care unit.

Dr Nephro orders one battery of one test: a creatinine clearance.

The battery consists of a procedure applied on two specimen type, serum and 24 hour urine. At the end of the 24 hour urine collection process, the specimen collector mesures the collected urine volume, records the duration of collection, takes a urine sample from the 24 hours collection and draws a serum sample from the patient.

The order is assumed to be part of a group of placer orders identified by the placer group number
4470 '777'.

Human actors and organizations participating to the process:

Assigning authority: Abbeville Hospital
Placer: Nephrology department.
Filler: Chemistry laboratory.
Ordering facility: Nephrology.
Patient: John Ill, Patient hospital identifier: 6543210, Patient visit number: 999888, class = inpatient
Orderer: Dr Nephro.
4480 Placer order enterer: Janet Nurse.
Specimen collector: John Collect.
Technician: Marc Techos.
Clinical expert: Jane Chemistry.

ID numbers used by the workflow:

ID number	Value	Assigned by
Patient hospital ID	6543210	Admission office (ADT)
Patient visit number	9998888	Admission office (ADT)
Care unit order group	777	Nephrology department (OP)
Care unit order	9876543	Nephrology department (OP)
Laboratory order (1st battery) idem for work order	654	Chemistry laboratory (OF)
Specimen Serum	654_1	Chemistry laboratory (OF)
Specimen Urine	654_2	Chemistry laboratory (OF)

LAB-1 interaction: The Care Unit processes the specimen collection related to an order for a creatinine clearance, and sends the notified or measured values and the specimens to the chemistry laboratory. The Order Placer sends a message "new order" (NW) accompanying the specimen, to let the laboratory start the testing.

LAB-4, LAB-1 and LAB-3 interactions: The laboratory checks the specimens and schedules the work. An identifier is assigned to the specimens by the Order Filler and the corresponding identification labels are printed out. The Order Filler sends a unique work order to the Automation Manager. The Order Filler notifies both Order Placer and Order Result Tracker of the scheduled work.

LAB-5, LAB-1 and LAB-3 interactions: After technical validation by a laboratory technician (Marc Techos), the Automation Manager sends back all the observations to the Order Filler.

LAB-1 and LAB-3 interactions: After clinical validation, the Order Filler notifies the results to the Order Result Tracker, and notifies the status change to the Order Placer. The last interaction in transaction LAB-3 shows a a negative acknowledgement and a repetition of the message followed by the final positive acknowledgement.

19.4.2 Interaction Diagram
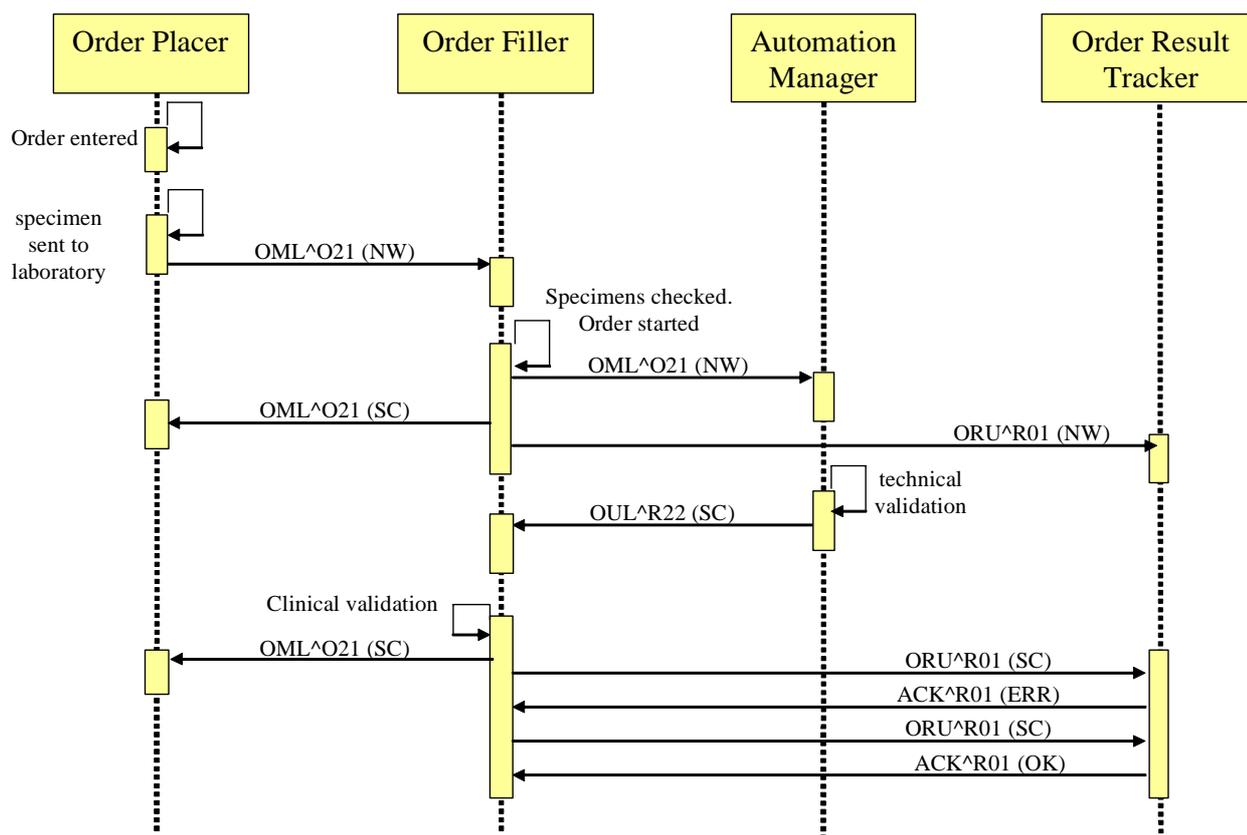
19.4.3 Messages

19.4.3.1 LAB-1 (OP → OF): Message "New order" with one Specimen

A new placer order sent to the Order Filler:

```
MSH|^~\&|OP|Nephrology|OF|Chemistry|200310060820||OML^O21^OML_O21|001|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I||||||||||||||||||9998888
ORC|NW|9876543^Nephro||777^Nephro|||||200310060710|^NURSE^JANET||||||||||||
Nephrology^^^^^^FI^^^NE03
TQ1|1||||||||R
OBR|1|9876543^Nephro||82575^Creatinine clearance^C4||||||^COLLECT^JOHN|S||||| ^NEPHRO^^^^DR
OBX|1|NM|13362-9^URINE COLLECTION DURATION^LN||24|hr|||||F|||200309060735
OBX|2|NM|19153-6^URINE SPECIMEN VOLUME^LN||2500|ml|||||F|||200309060735
SPM|1|||SER|||||||P|||||200310060735|||||||||1
SPM|2|||UR|||||||P|||||200310060735|||||||||1
ORC|NW|||777^Nephro|||||200310060710|^NURSE^JANET||||||||||||| Nephrology^^^^^^FI^^^NE03
OBR|2|98765432^Nephro||11502-2^LABORATORY REPORT.TOTAL^LN|
```

The related acknowledgement message isn't shown.

19.4.3.2 LAB-4 (OF → AM): Message "New order"

A new work order is sent to the Automation Manager:

```
MSH|^~\&|OF|Chemistry|AM|Automation|200310060825||OML^O21^OML_O21|011|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I||||||||||||||||||9998888
ORC|NW|||777^Nephro |||||200310060710|^NURSE^JANET||||||||||||| Nephrology^^^^^^FI^^^NE03
TQ1|1||||||||R
OBR|1|654^chemistry||82575^Creatinine clearance^C4||||||^COLLECT^JOHN|S||||| ^NEPHRO^^^^DR
OBX|1|NM|13362-9^URINE COLLECTION DURATION^LN||24|hr|||||F|||200309060735
OBX|2|NM|19153-6^URINE SPECIMEN VOLUME^LN||2500|ml|||||F|||200309060735
SPM|1|654_1^chemistry||SER|||||||P|||||200310060735|200310060821|||||||||1
SPM|2|654_2^chemistry||UR|||||||P|||||200310060735|200310060821|||||||||1
```

The related acknowledgement message isn't shown.

19.4.3.3 LAB-1 (OF → OP): Message "Status Changed"

The placer order has been assigned a filler order number, the specimen is available and identified by the laboratory:

```
MSH|^~\&|OF|Chemistry|OP|Nephrology|200310060825||OML^O21^OML_O21|012|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I||||||||||||||||||9998888
ORC|SC|9876543^Nephro||777^Nephro|IP||||200310060710|^NURSE^JANET||||||||||||
Nephrology^^^^^^FI^^^NE03
TQ1|1||||||||R
OBR|1|9876543^Nephro|654^chemistry|82575^Creatinine clearance^C4|
|||||^COLLECT^JOHN|P|||||^NEPHRO^^^^DR|||||||||I
SPM|1|654_1^chemistry||SER|||||||P|||||200310060735|200310060821||Y||||||1
SPM|2|654_2^chemistry||UR|||||||P|||||200310060735|200310060821||Y||||||1
```

The related acknowledgement message isn't shown.

19.4.3.4 LAB-3 (OF->ORT): Message "New Order"

The Order Result Tracker is notified with the creation of the filler order:

```
MSH|^~\&|OF|Chemistry|ORT||200310060825||ORU^R01^ORU_R01|013|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I||||||||||||||||||9998888
ORC|SC|9876543^Nephro||777^Nephro|IP||||200310060710|^NURSE^JANET|||||||||||
Nephrology^^^^^^FI^^^NE03
OBR|1|9876543^Nephro|654^chemistry|82575^Creatinine clearance^C4|
|||||^COLLECT^JOHN|P|||||^NEPHRO^^^^DR|||||||||I
TQ1|1||||||||R
SPM|1|654_1^chemistry||SER|||||||P||||||200310060735|200310060821||Y||||||1
SPM|2|654_2^chemistry||UR|||||||P||||||200310060735|200310060821||Y||||||1
OBX|1|NM|13362-9^URINE COLLECTION DURATION^LN||24|hr|||||F|||200309060735
OBX|2|NM|19153-6^URINE SPECIMEN VOLUME^LN||2500|ml|||||F|||200309060735
```

The related acknowledgement message isn't shown.

19.4.3.5 LAB-5 (AM->OF): Message "New Results"

The Automation Manager sends the final results for the work order:

```
MSH|^~\&|AM|Automation|OF|Nephrology|200310060900||OUL^R22^OUL_R22|3331|T|2.5|||||
USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I||||||||||||||||||9998888
SPM|1|654_1^chemistry||SER|||||||P||||||200310060735|200310060821||Y||||||1
OBR|1|654^chemistry||82575^Creatinine clearance^C4|||||||^COLLECT^JOHN|
P|||||^NEPHRO^^^^DR|||||||200310060832|||F|||||||&TECHOS&MARC^200310060833
OBX|1|NM|15045-8^SERUM CREATININE^LN||93|umol/l|50-100|N|||F|||200310060830
SPM|2|654_2^chemistry||UR|||||||P||||||200310060735|200310060821||Y||||||1
OBR|1|654^chemistry||82575^Creatinine clearance^C4|||||||^COLLECT^JOHN|
P|||||^NEPHRO^^^^DR|||||||200310060832|||F|||||||&TECHOS&MARC^200310060833
OBX|1|NM|14684-5^24H URINE CREATININE ^LN||7.06|mmol|8-16 (/24hr)|L|||F||| 200310060830
OBX|2|NM|2164-2^CREATININE CLEARANCE^LN||52.7|ml/min|88-174|L||S|F|||200310060830
```

The related acknowledgement message isn't shown.

19.4.3.6 LAB-1 (OF->OP): Message "Status Changed"

The clinical expert has performed the clinical validation at 09h29. The order is completed:

```
MSH|^~\&|OF|Nephrology|OP|Nephrology|200310060930||OML^O21^OML_O21|014|T|2.5|||||
USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I||||||||||||||||||9998888
ORC|SC|9876543^Nephro||777^Nephro|CM||||200310060710|^NURSE^JANET|||||||||||
Nephrology^^^^^^FI^^^NE03
TQ1|1||||||||R
OBR|1|9876543^Nephro|654^chemistry|82575^Creatinine clearance^C4|
|||||^COLLECT^JOHN|P|||||^NEPHRO^^^^DR|||||||||F|||||||&CYTO&JANE^200310060929
SPM|1|654_1^chemistry||SER|||||||P||||||200310060735|200310060821||Y||||||1
SPM|2|654_2^chemistry||UR|||||||P||||||200310060735|200310060821||Y||||||1
```

The related acknowledgement message isn't shown.

19.4.3.7 LAB-3 (OF->ORT): Message "Status Changed"

The clinical expert has performed the clinical validation at 09h29. The order is completed. The results are final:

```
MSH|^~\&|OF|Chemistry|ORT||200310060931||ORU^R01^ORU_R01||015|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||9998888
ORC|SC|9876543^Nephro||777^Nephro|CM||||200310060710|^NURSE^JANET|||||||||||
Nephrology^^^^^^FI^^NE03
OBR|1|9876543^Nephro|654^chemistry |82575^Creatinine clearance^C4||||||| ^COLLECT^JOHN
|P|||||^NEPHRO^^^^DR|||||||200310060929|||F||||||| &CYTO&JANE^200310060929
TQ1|1||||||||R
OBX|1|NM|2164-2^CREATININE CLEARANCE^LN||52.7|ml/min|88-174|L||S|F|||200310060830
SPM|1|654_1^chemistry||SER|||||||P||||||200310060735|200310060821||Y|||||||1
OBX|1|NM|15045-8^SERUM CREATININE^LN||93|umol/l|50-100|N|||F|||200310060830
SPM|2|654_2^chemistry||UR|||||||P||||||200310060735|200310060821||Y|||||||1
OBX|1|NM|13362-9^URINE COLLECTION DURATION^LN||24|hr|||||F|||200309060735
OBX|2|NM|19153-6^URINE SPECIMEN VOLUME^LN||2400|ml|||||F|||200309060735
OBX|3|NM|14684-5^24H URINE CREATININE^LN||7.06|mmol|8-16 (/24hr)|L|||F||| 200310060830
ORC|SC|||777^Nephro|||||200805191100
OBR|2|98765432^Nephro|6542^chemistry|11502-2^LABORATORY REPORT.TOTAL^LN||||||||||||||||||||||
||F
OBX|1|RP|11502-2^LABORATORY REPORT.TOTAL^LN||file://hserv/lr/lr12345678.pdf||||||F||P
```

Negative acknowledgement sent by the Order Results Tracker:
The ERR-4 = 'E' indicates that the message could not be integrated. The ERR-3 HL7 error code = 206 informs of the cause: a database locked. The MSA-1 = 'AR' says that the incoming message has been application-rejected. In this particular case, the rejection is not related to a value not acceptable in the MSH segment, therefore the sender should repeat its message later.

```
MSH|^~\&|ORT||OF|Cytology|200310060932||ACK^R01^ACK|401|T|2.5|||||USA|EN
MSA|AR|015
ERR|||206^Application record locked|E
```

Repetition of the same result message by the Order Filler, one minute later

```
MSH|^~\&|OF|Chemistry|ORT||200310060931||ORU^R01^ORU_R01||015|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||9998888
ORC|SC|9876543^Nephro||777^Nephro|CM||||200310060710|^NURSE^JANET|||||||||||
Nephrology^^^^^^FI^^NE03
OBR|1|9876543^Nephro|654^chemistry |82575^Creatinine clearance^C4||||||| ^COLLECT^JOHN
|P|||||^NEPHRO^^^^DR|||||||200310060929|||F||||||| &CYTO&JANE^200310060929
TQ1|1||||||||R
OBX|1|NM|2164-2^CREATININE CLEARANCE^LN||52.7|ml/min|88-174|L||S|F|||200310060830
SPM|1|654_1^chemistry||SER|||||||P||||||200310060735|200310060821||Y|||||||1
OBX|1|NM|15045-8^SERUM CREATININE^LN||93|umol/l|50-100|N|||F|||200310060830
SPM|2|654_2^chemistry||UR|||||||P||||||200310060735|200310060821||Y|||||||1
OBX|1|NM|13362-9^URINE COLLECTION DURATION^LN||24|hr|||||F|||200309060735
OBX|2|NM|19153-6^URINE SPECIMEN VOLUME^LN||2400|ml|||||F|||200309060735
OBX|3|NM|14684-5^24H URINE CREATININE^LN||7.06|mmol|8-16 (/24hr)|L|||F||| 200310060830
ORC|SC|||777^Nephro|||||200805191100
OBR|2|98765432^Nephro|6542^chemistry|11502-2^LABORATORY REPORT.TOTAL^LN||||||||||||||||||||||
||F
OBX|1|RP|11502-2^LABORATORY REPORT.TOTAL^LN||file://hserv/lr/lr12345678.pdf||||||F||P
```

Positive acknowledgement sent by the Order Results Tracker:
```
MSH|^~\&|ORT||OF|Cytology|200310060935||ACK^R01^ACK|401|T|2.5|||||USA|EN
MSA|AA|015
```

19.5 Microbiology with Two Specimens and Three Germs Identified

19.5.1 Storyboard

This storyboard illustrates the use of transaction LAB-2 to notify generated batteries at the Order Filler level (i.e. antibiotic susceptibilities, within the same placer group number).

Dr Physician orders Microscopy and Culture for two different specimens collected from the same patient. The first specimen is Mid Stream Urine and the second one is Pus taken from a wound on patient's left toe. Since several batteries could be performed on each specimen (e.g. Microscopy and Culture, identification of organism, Antibiotic Susceptibility) the Order Placer transmits an
4670 OML^O33 message. Since both specimens are part of the same prescription, they are grouped via the Placer Group Number '777'.

The patient is an Outpatient in Emergency ward.

We presume that all tests are performed manually and that results are directly entered by the laboratory technician in the Order Filler system, there is then neither LAB-4, nor LAB-5 transaction in this story board. We also presume that results for observations related to the urine specimen are transferred as soon they are available, whilst the Clinical Expert desires to review results related to other specimen types before they are released.

In this storyboard, a CIS application implements both Actors Order Placer and Order Result Tracker, which suppresses the need for OML messages "Status Change" from OF to OP.

4680 **Human actors and organizations participating to the process:**

Assigning authority:	Memphis Hosp 1
Placer:	Emergency Ward
Filler:	Microbiology
Ordering facility:	Emergency Ward
Patient:	Adam Everyman Jr, account number: 12345 (check-digit 5 modulo 10), class = outpatient.
Order placed by:	Dr PHYSICIAN, phone number 821, ID number in the hospital 222222.
Placer order enterer:	Nancy NURSE, ID number 222221
Specimen collector:	Nancy NURSE, ID number 222221
4690 Technician:	Terry BACK, ID number 333231
Clinical expert:	Mike ROSCOP, ID number 444642.

ID numbers used by the workflow:

ID number	Value	Assigned by
Patient ID	12345	Admission office (ADT)
Care unit order for Urine Spec.	12345679	Emergency Ward (OP)
Care unit order for Pus Spec.	12345670	Emergency Ward (OP)
Care unit order group	777	Emergency Ward (OP)
1st specimen	123456791	Emergency Ward (OP)
2nd specimen	123456701	Emergency Ward (OP)
Laboratory order for the Urine	MSU0309922	Microbiology laboratory (OF)
Laboratory order for the PUS	PUS0300666	Microbiology laboratory (OF)

Day 1 at 8:10 LAB-1 interaction: The two specimens are collected and transmitted to the Microbiology laboratory in Routine. The Order Placer sends a message "new order" (NW) to the order placer.

Day 1 at 8:20 LAB-3 interaction: The laboratory checks the specimens and schedules the work. The Order Filler notifies Order Result Tracker of the scheduled work.

4700

Day 1 at 14:46 LAB-3 interaction: After Microscopy for the Urine Specimen is achieved, the Order Filler notifies these partial results to the Order Result Tracker without waiting for the clinical validation.

Day 2 at 09:40 LAB-2 and LAB-3 interactions: The following day, the Urine culture is positive, the laboratory adds Organism identification and Antibiotic Susceptibility test for this specimen. The Order Filler requires a Placer Order Number to the Order Placer for the added tests (Transaction LAB-2) and notifies this action to the Order Result Tracker via transaction LAB-3.

Day 2 at 09:45 LAB-2 and LAB-3 interactions: The result of Microscopy and Culture is positive for the Pus specimen, the clinical expert has validated these preliminary results and the laboratory adds Organism identification and Antibiotic Susceptibility test for this specimen. The Order Filler requires a Placer Order Number to the Order Placer for the added tests (Transaction LAB-2) and it

4710   notifies this action to the Order Result Tracker via transaction LAB-3.

Day 3 at 11:32 LAB-3 interaction: The next day, organism identification and Antibiotic Susceptibility tests are achieved; final results are transmitted to the Order Result Tracker after the clinical validation has been performed..

19.5.2 Interaction Diagram
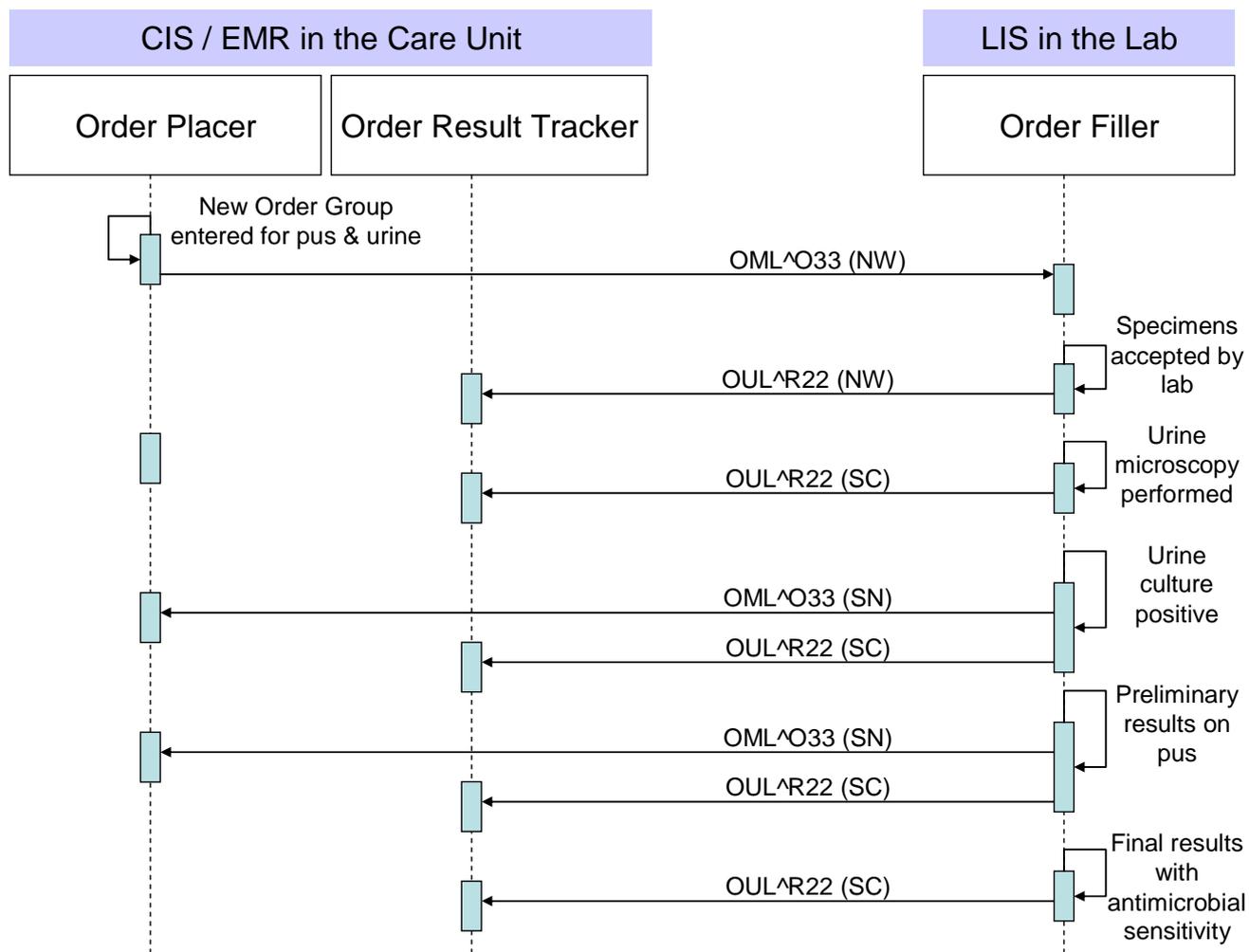
19.5.3 Messages

19.5.3.1 LAB-1 (OP → OF): Message "New order" with Two Specimens

Day 1 at 8:10 A new placer order sent to the Order Filler.

```
MSH|^~\&|OP|Emergency Ward|OF|Microbiology|200309060810||OML^O33^OML_O33|msgOP123|
T|2.5|123 ||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||||12345
SPM|1|123456791^Emergency||MSU^Mid Stream Urine^L|||||||P|||||| 200309060800|||||||||1
ORC|NW|12345679^Emergency|||777^Emergency|||||200309060800|222221^NURSE^NANCY|||||||||||Emer
gency Ward^^^^^^FI^^^EW00
TQ1|||||||||R
OBR|1|12345679^Emergency||87086^Urine Microscopy and Culture^C4|||||||S|||||
222222^PHYSICIAN^^^^DR|
SPM|2|123456701^Emergency||PUS||||TOE|LEFT||P||||||200309060805|||||||||1
ORC|NW|12345670^Emergency|||777^Emergency|||||200309060800|222221^NURSE^NANCY|||||||||||Emer
gency Ward^^^^^^FI^^^EW00
TQ1|||||||||R
OBR|1|12345670^Emergency||87040^Microscopy and Culture^C4|||||||222221^NURSE^NANCY
|S|||||222222^PHYSICIAN^^^^DR|
```

The related acknowledgement message isn't shown.

19.5.3.2 LAB-3 (OF → ORT): Message "New Order"

Day 1 at 8:20 The Order Result Tracker is notified with the creation of the filler order:

```
MSH|^~\&|OF|Microbiology|ORT||200309060820||OUL^R22^OUL_R22|msgOF12|T|2.5|123||||
USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||||12345
SPM|1|123456791^Emergency||MSU^Mid Stream
Urine^L|||||||P||||||200309060800|200309060818||Y|…
OBR|1|12345679^Emergency|MSU0309922^Micro|87086^Urine Microscopy and Culture^C4|||||||
|||||222222^PHYSICIAN^^^^DR|
ORC|SC|12345679^Emergency|||777^Emergency|IP|||||200309060818|||||||||||||
Emergency Ward^^^^^^FI^^^EW00
SPM|2|123456701^Emergency||PUS||||TOE|LEFT||P||||||200309060805|200309060818||Y|…
OBR|1|12345670^Emergency|PUS0300666^Micro|87040^Microscopy and
Culture^C4||||||222221^NURSE^NANCY ||||||222222^PHYSICIAN^^^^DR|
ORC|NW|12345670^Emergency|||777^Emergency|IP|||||200309060818|||||||||||||
Emergency Ward^^^^^^FI^^^EW00
```

The related acknowledgement message isn't shown.

19.5.3.3 LAB-3 (OF → ORT): Message "Status Changed"

Day 1 at 14:46 Urine Microscopy results are sent, not clinically validated (i.e. not verified):

```
MSH|^~\&|OF|Microbiology|ORT||200309061446||OUL^R22^OUL_R22|msgOF14|T|2.5|123||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||||12345
SPM|1|123456791^Emergency||MSU^Mid Stream
Urine^L|||||||P||||||200309060800|200309060818||Y|…
OBR|1|12345679^Emergency|MSU0309922^Micro|87086^Urine Microscopy and Culture^C4|||||||
|||||222222^PHYSICIAN^^^^DR|||||||||MB|A
ORC|SC|12345679^Emergency|||777^Emergency|A|||||200309060818|||||||||||||
Emergency Ward^^^^^^FI^^^EW00
```

```
TQ1||||||||R
OBX|1|CE|20453-7^Epithelial Cells^LN||value|||N|||R|||200309061445| |333231^BACK^TERRY
OBX|2|NM|20455-2^Leukocytes^LN||value|/ml||N|||R|||200309061445| |333231^BACK^TERRY
OBX|3|NM|32776-7^Erythrocytes^LN||value|/ml||N|||R|||200309061445| |333231^BACK^TERRY
OBX|4|CE|24124-0^Casts^LN||value|||N|||R|||200309061445||333231^BACK^TERRY
OBX|5|NM|699-9^Organism Count^LN||value|/ml||N|||R|||200309061445| |333231^BACK^TERRY
OBX|6||20430-5^Culture^LN|||||N|||I|||200309070935||333231^BACK^TERRY
```

4780

The related acknowledgement message isn't shown.

19.5.3.4 LAB-2(OF → OP): Message "Send Order Number"

Day 2 at 9:40 Urine Culture is positive with two microorganisms detected, not identified yet., Reflex tests Organism Identification and two Antimicrobial Susceptibility batteries are added. For each, a placer order number is requested from the Order Placer, within Placer Group Number 777^Emergency.

4790
```
MSH|^~\&|OF|Microbiology|OP|Emergency Ward|200309070940||OML^O33^OML_O33|msgOF15|
T|2.5|123 ||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward||||||||||||||||12345
SPM|1|123456791^Emergency||MSU^Mid Stream
Urine^L||||||P|||||200309060800|200309060818||Y|…
ORC|SN|||777^Emergency|||||200309070938|333231^BACK^TERRY|||||||||||
Emergency Ward^^^^^^FI^^^EW00
OBR|1||MSU03099221^Micro|87088^Organism Identification^C4|||||||
G|||||222222^PHYSICIAN^^^^DR||||||||MB
ORC|SN|||777^Emergency|||||200309070938|333231^BACK^TERRY|||||||||||Emergency
```
4800
```
Ward^^^^^^FI^^^EW00
OBR|2||MSU03099222^Micro|87186^Antibiotic Susceptibility^C4|||||||
G|||||222222^PHYSICIAN^^^^DR||||||||MB
ORC|SN|||777^Emergency|||||200309070938|333231^BACK^TERRY|||||||||||Emergency
Ward^^^^^^FI^^^EW00
OBR|3||MSU03099223^Micro|87186^Antibiotic Susceptibility^C4|||||||
G|||||222222^PHYSICIAN^^^^DR||||||||MB
```


Acknowledgement sent by the Order Placer:
4810
```
MSH|^~\&|OP|Emergency Ward|OF|Microbiology|200309070940||ORL^O34^ORL_O34|msgOP123|T|2.5|123
||||USA||EN
MSA|AA|msgOF15
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
SPM|1|123456791^Emergency||MSU^Mid Stream
Urine^L||||||P|||||200309060800|200309060818||Y|…
ORC|NA|12345681^Emergency||777^Emergency|||||200309070938|333231^BACK^TERRY|||||||||||Emerg
ency Ward^^^^^^FI^^^EW00
OBR|1|12345681^Emergency|MSU03099221^Micro|87088^Organism Identification^C4|||||||
```
4820
```
G|||||222222^PHYSICIAN^^^^DR||||||||MB
ORC|NA|12345682^Emergency||777^Emergency|||||200309070938|333231^BACK^TERRY|||||||||||Emerg
ency Ward^^^^^^FI^^^EW00
OBR|2|12345682^Emergency|MSU03099222^Micro|87186^Antibiotic Susceptibility^C4|||||||
G|||||222222^PHYSICIAN^^^^DR||||||||MB
ORC|NA|12345683^Emergency||777^Emergency|||||200309070938|333231^BACK^TERRY|||||||||||Emerg
ency Ward^^^^^^FI^^^EW00
OBR|3|12345683^Emergency|MSU03099223^Micro|87186^Antibiotic Susceptibility^C4|||||||
G|||||222222^PHYSICIAN^^^^DR||||||||MB
```

4830

19.5.3.5 LAB-3 (OF → ORT): Message "Status Changed"

Day 2 at 09:42 Results for Urine Microscopy and Culture are released. Organism Identification and Antibiotic Susceptibility tests have been added

Note: The Order Placer has acknowledged transaction LAB-2 and an Order Placer Number has been added to each test added by the laboratory

```
MSH|^~\&|OF|Microbiology|ORT||200309070942||OUL^R22^OUL_R22|msgOF16|T|2.5|123||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||||12345
SPM|1|123456791^Emergency||MSU^Mid Stream Urine^L|||||||P||||||200309060800|
200309060818||Y|…
OBR|1|12345679^Emergency|MSU0309922^Micro|87086^Urine Microscopy and Culture^C4|||||||
|||||222222^PHYSICIAN^^^^DR||||||||MB|R
ORC|SC|12345679^Emergency||777^Emergency|A||||200309060818||||||||||||
Emergency Ward^^^^^^FI^^^EW00
TQ1|||||||||R
OBX|1|CE|20453-7^Epithelial Cells^LN||value|||N|||R||200309061445| |333231^BACK^TERRY
OBX|2|NM|20455-2^Leukocytes^LN||value|/ml||N|||R||200309061445| |333231^BACK^TERRY
OBX|3|NM|32776-7^Erythrocytes^LN||value|/ml||N|||R||200309061445| |333231^BACK^TERRY
OBX|4|CE|24124-0^Casts^LN||value|||N|||R|||200309061445||333231^BACK^TERRY
OBX|5|NM|699-9^Organism Count^LN||value|/ml||N|||R||200309061445| |333231^BACK^TERRY
OBX|6|CE|20430-5^Culture^LN||2ORG^Two Organisms^L|||N|||R|||200309070935|
|333231^BACK^TERRY
OBR|2|12345681^Emergency|MSU03099221^Micro|87088^Organism Identification^C4|||||||
G|||||222222^PHYSICIAN^^^^DR||||||||MB|S
ORC|SC|12345681^Emergency||777^Emergency|IP||||200309070938|333231^BACK^TERRY|||||||||||Eme
rgency Ward^^^^^^FI^^^EW00
OBR|3|12345682^Emergency|MSU03099222^Micro|87186^Antibiotic Susceptibility^C4|||||||
G|||||222222^PHYSICIAN^^^^DR||||||||MB|S
ORC|SC|12345682^Emergency||777^Emergency|IP||||200309070938|333231^BACK^TERRY|||||||||||Eme
rgency Ward^^^^^^FI^^^EW00
OBR|4|12345683^Emergency|MSU03099223^Micro|87186^Antibiotic Susceptibility^C4|||||||
G|||||222222^PHYSICIAN^^^^DR||||||||MB|S
ORC|SC|12345683^Emergency||777^Emergency|IP||||200309070938|333231^BACK^TERRY|||||||||||Eme
rgency Ward^^^^^^FI^^^EW00
```

The related acknowledgement message isn't shown.

19.5.3.6 LAB-2(OF → OP): Message "Send Order Number"

Day 2 at 9:45 Culture for Pus specimen is positive, reflex tests Organism Identification and Antibiotic Susceptibility are added. For each, a placer order number is requested from the Order Placer, within Placer Group Number 777^Emergency.

```
MSH|^~\&|OF|Microbiology|OP|Emergency Ward|200309070945||OML^O33|msgOF18|T|2.5|123
||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||||12345
SPM|1|123456701^Emergency||PUS||||TOE|LEFT||P||||||200309060805|200309060818||Y|…
ORC|SN|||777^Emergency|||||200309070941|333231^BACK^TERRY||||||||||||
Emergency Ward^^^^^^FI^^^EW00
OBR|1||PUS03006661^Micro|87088^Organism Identification^C4|||||||
G|||||222222^PHYSICIAN^^^^DR||||||||MB
ORC|SN|||777^Emergency|||||200309070941|333231^BACK^TERRY||||||||||||
Emergency Ward^^^^^^FI^^^EW00
OBR|2||PUS03006662^Micro|87186^Antibiotic Susceptibility^C4|||||||
G|||||222222^PHYSICIAN^^^^DR||||||||MB
```

Acknowledgement sent by the Order Placer:

```
MSH|^~\&|OP|Emergency Ward|OF|Microbiology|200309070945||ORL^O34^ORL_O34|msgOP124|T|2.5|
123||||USA||EN
MSA|AA|msgOF18
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
SPM|1|123456701^Emergency||PUS||||TOE|LEFT||P||||||200309060805|200309060818||Y|…
ORC|NA|12345685^Emergency||777^Emergency|||||200309070941|333231^BACK^TERRY|||||||||||Emerg
ency Ward^^^^^^FI^^EW00
OBR|1|12345685^Emergency||PUS03006661^Micro|87088^Organism Identification^C4|||||||
G|||||222222^PHYSICIAN^^^^DR||||||||MB
ORC|NA|12345686^Emergency||777^Emergency|||||200309070941|333231^BACK^TERRY|||||||||||||Emerg
ency Ward^^^^^^FI^^EW00
OBR|2|12345686^Emergency||PUS03006662^Micro|87186^Antibiotic
Susceptibility^C4|||||||G|||||222222^PHYSICIAN^^^^DR|||||||MB
```

19.5.3.7 LAB-3 (OF → ORT): Message "Status Changed"

Day 2 at 09:45 The Clinical Expert has validated the preliminary results of Microscopy and culture for the Pus Specimen.

Note: Although the Culture is positive, the result status is not "Final" other Organisms may grow during the next 24 hours. Results of culture will be considered as final on Day 3 after 48 hours of incubation.

```
MSH|^~\&|OF|Microbiology|ORT||200309070945||OUL^R22^OUL_R22|msgOF19|T|2.5|123|||||
USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward||||||||||||||||12345
SPM|1|123456701^Emergency ||PUS||||TOE|LEFT||P||||||200309060805|200309060818||Y|…
OBR|1|12345670^Emergency|PUS0300666^Micro|87040^Microscopy and
Culture^C4|||||||222221^NURSE^NANCY
||||||222222^PHYSICIAN^^^^DR|||||||||MB|P|||||||444642&ROSCOP&Mike^200309070944
ORC|SC|1234567O^Emergency||777^Emergency|A||||200309060818|||||||||||||
Emergency Ward^^^^^^FI^^EW00
OBX|1|NM|32761-9^Leukocytes^LN||value|||N|||F|||200309061125||333231^BACK^TERRY
OBX|2|NM|32762-7^Epithelial Cells^LN||value|||N|||F|||200309061125| |333231^BACK^TERRY
OBX|3|CE|20430-5^Culture^LN||POS^Positive^L|||N|||P|||200309070935| |333231^BACK^TERRY
OBR|2|12345685^Emergency|PUS03006661^Micro|87088^Organism Identification^C4|||||||  G|||||
|||||||MB|S
ORC|SC|12345685^Emergency||777^Emergency|IP||||200309070941|333231^BACK^TERRY|||||||||||Eme
rgency Ward^^^^^^FI^^EW00
OBR|3|12345686^Emergency|PUS03006662^Micro|87186^Antibiotic Susceptibility^C4|||||||  G|||||
|||||||MB|S
ORC|SC|12345686^Emergency||777^Emergency|IP||||200309070941|333231^BACK^TERRY|||||||||||Eme
rgency Ward^^^^^^FI^^EW00
```

The related acknowledgement message isn't shown.

19.5.3.8 LAB-3 (OF → ORT): Message "Status Changed"

Day 3 at 11:32 Mike ROSCOP has performed the clinical validation at 11h30. Final results are
transmitted.

Note: This message is conforming to the requirements given in section 3.11 "Microbiology Reporting Rules". In particular: Grouping of the results per microorganism using Observation Sub-ID (OBX-4), and association of antimicrobial sensitivity and microorganism identified, based on the parent/child mechanism: Parent Result (OBR-26) & Parent (OBR-29). Classification of the results (OBX) below an OBR per microorganism.

```
MSH|^~\&|OF|Microbiology|ORT||200309081132||OUL^R22^OUL_R22|msgOF21|T|2.5| 123||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
```

```
       PV1|1|O|Ward|||||||||||||||||12345
       SPM|1|123456791^Emergency||MSU^Mid Stream
4950   Urine^L||||||||P||||||200309060800|200309060818||Y|…
       OBR|1|12345679^Emergency|MSU0309922^Micro|87086^Urine Microscopy and Culture^C4|||||||
       ||||||222222^PHYSICIAN^^^^DR||||||||MB|F||||||444642&ROSCOP&Mike^200309081130
       ORC|SC|12345679^Emergency||777^Emergency|CM||||200309060818|||||||||||||Emergency
       Ward^^^^^^FI^^^EW00
       TQ1||||||||||R
       OBX|1|CE|20453-7^Epithelial Cells^LN||value|||N|||F||200309061445| |333231^BACK^TERRY
       OBX|2|NM|20455-2^Leukocytes^LN||value|/ml||N|||F||200309061445|…
       OBX|3|NM|32776-7^Erythrocytes^LN||value|/ml||N|||F|||200309061445|…
4960   OBX|4|CE|24124-0^Casts^LN||value|||N|||F|||200309061445||333231^BACK^TERRY
       OBX|5|NM|699-9^Organism Count^LN||value|/ml||N|||F|||200309061445|…
       OBX|6|CE|20430-5^Culture^LN||2ORG^Two Organisms^L|||N|||F|||200309070935|…
       OBR|2|12345681^Emergency|MSU03099221^Micro|87088^Organism Identification^C4|||||||| |||||
       |||||||||MB|F|||||||444642&ROSCOP&Mike^200309081130
       ORC|SC|12345681^Emergency||777^Emergency|CM||||200309070938|333231^BACK^TERRY|||||||||||Eme
       rgency Ward^^^^^^FI^^^EW00
       OBX|1|ST|11475-1^Micro organism identified^LN|1|E. Coli|||N|||F|||…
       OBX|2|ST|11475-1^Micro organism identified^LN|2|Strepto D|||N|||F|||…
       OBR|3|12345682^Emergency|MSU03099222^Micro|87186^Antibiotic Susceptibility^C4
       ||||||||||||||||||MB|F|11475-1&Micro organism identified&LN^1^E. Coli|||
4970   12345681&Emergency^MSU03099221&Micro|||444642&ROSCOP&Mike^200309081130
       ORC|SC|12345681^Emergency||777^Emergency|CM||||200309070938|333231^BACK^TERRY|||||||||||Eme
       rgency Ward^^^^^^FI^^^EW00
       OBX|1|SN|18861-5^Amoxicillin^LN|1|>=^0.512|µg/ml||R|||F|||200309081107|…
       OBX|2|SN|18864-9^Ampicillin^LN|1|<^0.128|µg/ml||I|||F|||200309081107|…
       OBX|3|SN|18952-2^Nalidixate^LN|1|>=^2.0|µg/ml||R|||F|||200309081107|…
       OBX|4|SN|18956-3^Norfloxacin^LN|1|value|µg/ml||I|||F|||200309081107|…
       OBX|5|SN|18928-2^Gentamicin^LN|1|<^0.032|µg/ml||S|||F|||200309081107|…
       OBX|6|SN|25596-8^Fosfomycine^LN|1|<^0.1|µg/ml||S|||F|||200309081107|…
       OBX|7|SN|18955-5^Nitrofuranton^LN|1|<^0.25|µg/ml||S|||F|||200309081107|…
4980   OBR|4|12345683^Emergency|MSU03099223^Micro|87186^Antibiotic Susceptibility^C4
       |||||||||||||||||||||MB|F|11475-1&Micro organism identified&LN^2^Strepto D|||
       12345681&Emergency^MSU03099221&Micro |||444642&ROSCOP&Mike^200309081130
       OBX|8|SN|18965-4^Penicillin G^LN|2|<^0.5|µg/ml||S|||F|||200309081107|…
       OBX|9|SN|18861-5^Amoxicillin^LN|2|value|µg/ml||S|||F|||200309081107|…
       OBX|10|SN|18864-9^Ampicillin^LN|2|value|µg/ml||S|||F|||200309081107|…
       OBX|11|SN|18928-2^Gentamicin^LN|2|value|µg/ml||R|||F|||200309081107|…
       OBX|12|SN|18917-5^Doxycycline^LN|2|value|µg/ml||R|||F|||200309081107|…
       OBX|13|SN|18919-1^Erythromycin^LN|2|value|µg/ml||R|||F|||200309081107|…
       OBX|14|SN|18974-6^Rifampicin^LN|2|value|µg/ml||S|||F|||200309081107|…
4990   OBX|15|SN|18938-1^Lincomycin^LN|2|value|µg/ml||R|||F|||200309081107|…
       SPM|2|123456701^Emergency||PUS||||TOE|LEFT||P|||||200309060805|200309060818||Y|…
       OBR|1|12345670^Emergency|PUS0300666^Micro|87040^Microscopy and
       Culture^C4||||||222221^NURSE^NANCY
       ||||||222222^PHYSICIAN^^^^DR||||||||MB|F||||||444642&ROSCOP&Mike^200309081130
       ORC|SC|12345670^Emergency||777^Emergency|CM||||200309060818|||||||||||||Emergency
       Ward^^^^^^FI^^^EW00
       OBX|1|CE|32761-9^Leukocytes^LN||value|||N|||F|||200309060830
       OBX|2|CE|32762-7^Epithelial Cells^LN||value|||N|||F|||200309060830| |333231^BACK^TERRY
       OBX|3|CE|20430-5^Culture^LN||POS^Positive^L|||N|||F|||200309070935|… |333231^BACK^TERRY
5000   OBR|2|12345685^Emergency|PUS03006661^Micro|87072^Organism Identification^C4|||||||||||||
       ||||||||MB|F|||||||444642&ROSCOP&Mike^200309081130
       ORC|SC|12345685^Emergency||777^Emergency|CM||||200309070941|333231^BACK^TERRY|||||||||||Eme
       rgency Ward^^^^^^FI^^^EW00
       OBX|1|ST|21020-3^Micro organism identified^LN|1|Staph Aureus|||N|||F| ||200309080830|…
       OBR|3|12345686^Emergency|PUS03006662^Micro|87186^Antibiotic Susceptibility^C4|||||||||||||
       ||||||MB|F|21020-3&Micro organism identified&LN^1^Staph Aureus|||
       12345685&Emergency^PUS03006661&Micro|||444642&ROSCOP&Mike^200309081130
       ORC|SC|12345686^Emergency||777^Emergency|CM||||200309070938|333231^BACK^TERRY|||||||||||Eme
       rgency Ward^^^^^^FI^^^EW00
5010   OBX|1|SN|18928-2^Gentamicin^LN|1|value|µg/ml||S|||F|||200309080830|…
       OBX|2|SN|18996-9^Tobramycin^LN|1|value|µg/ml||R|||F|||200309080830|…
       OBX|3|SN|18954-8^Netilmicin^LN|1|value|µg/ml||S|||F|||200309080830|…
       OBX|4|SN|18959-7^Ofloxacin^LN|1|value|µg/ml||S|||F||200309080830|…
       OBX|5|SN|18917-5^Doxycycline^LN|1|value|µg/ml||S|||F|||200309080830|…
```

```
OBX|6|SN|19000-9^Vancomycin^LN|1|value|µg/ml||S|||F|||200309080830|…
OBX|7|SN|18974-6^Rifampicin^LN|1|value|µg/ml||S|||F|||200309080830|…
OBX|8|SN|25596-8^Fosfomycine^LN|1|value|µg/ml||S|||F|||200309080830|…
```

The related acknowledgement message isn't shown.

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19.6 First Example for Barcode Labeling (LBL)

19.6.1 Storyboard

1. Dr. Yamada examines the patient (ID: 1111222) and orders liver function tests and blood count through the HIS terminal.
2. The patient goes to the blood collecting room.
3. The receptionist for blood collecting checks the test orders and accepts the reception through the HIS terminal.
4. The HIS sends the label information to the barcode labeling robotic system.
5. The robotic system issues the containers with barcode label.
6. The blood collector takes blood of the patient.

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Human actors and organizations participating to the process:

Assigning authority:	Suzuki national hospital
Placer:	Enter-gastric department
Label Broker:	LBL system
Ordering facility:	Enter-gastric department
Patient:	Taro Toyota, Patient hospital identifier: 1111222, Patient visit number: 3333444, class = outpatient
Orderer:	Dr. Yamada. ID number 14789

ID numbers used by the workflow:

ID number	Value	Assigned by
Patient hospital ID	1111222	Admission office (ADT)
Patient visit number	3333444	Admission office (ADT)
Observation Order Code: liver function test	1234561	Enter-gastric department (OP)
Observation Order Code: Blood count	1234562	Enter-gastric department (OP)

19.6.2 Interaction Diagram
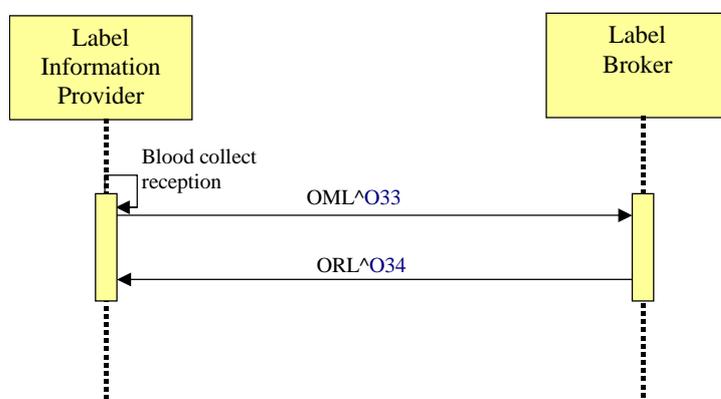
19.6.3 Messages

LAB-61(LIP→LB): New Label Delivery Request transmitted to the LB

```
MSH|^~\&|LIP|Enter-gastric department|LB|LBL system
|200701121348||OML^O33^OML_O33|001|P|2.5|||||USA||EN
PID|1||1111222^^^Suzuki National Hospital^PI||Toyota^Taro^^^^^L|19810101|M
PV1|1|O|||||||||||||||||||3333444
SPM|1|1234560001||001^Venous blood|||||||P||||||20070112|||||||||1|021^Chemistry
ORC|NW|1234561|||||||200701121348|14789^Yamada^Jiro||14789^Yamada^Jiro|||||051^Enter-
gastric department
TQ1||||||||||R
OBR||1234561||17432^liver function^local|||||6.0|||||||14789^Yamada^Jiro
SPM|1|1234560002||001^Venous blood|||||||P||||||20070112|||||||||1|015^hematology
ORC|NW|1234562|||||||200701121348|14789^Yamada^Jiro||14789^Yamada^Jiro|||||051^Enter-
gastric department
TQ1||||||||||R
OBR||1234562||18655^blood count^local|||||2.0|||||||14789^Yamada^Jiro
```

The related acknowledgement message isn't shown.

19.7 Second Example for Barcode Labeling (LBL)

19.7.1 Storyboard

1. Dr. Yamada examines the patient (ID: 1111222) and orders liver function tests and blood count through the HIS terminal.
2. The patient goes to the blood collecting room.
3. The patient inserts his ID card to the reception machine for blood collecting.
4. The barcode labeling robotic system sends the query for label delivery to the HIS
5. The HIS sends the label information back to the barcode labeling robotic system.
6. The robotic system issues the containers with barcode label.
7. The blood collector takes blood of the patient.

Human actors and organizations participating to the process:

|	
Assigning authority:	Suzuki national hospital
Placer:	Enter-gastric department
Label Broker:	LBL system
Ordering facility:	Enter-gastric department
Patient:	Taro Toyota, Patient hospital identifier: 1111222, Patient visit number: 3333444, class = outpatient
Orderer:	Dr. Yamada. ID number 14789

ID numbers used by the workflow:

ID number	Value	Assigned by
Patient hospital ID	1111222	Admission office (ADT)
Patient visit number	3333444	Admission office (ADT)
Observation Order Code（liver function test）	1234561	Enter-gastric department (OP)
Observation Order Code（Blood count）	1234562	Enter-gastric department (OP)

19.7.2 Interaction Diagram
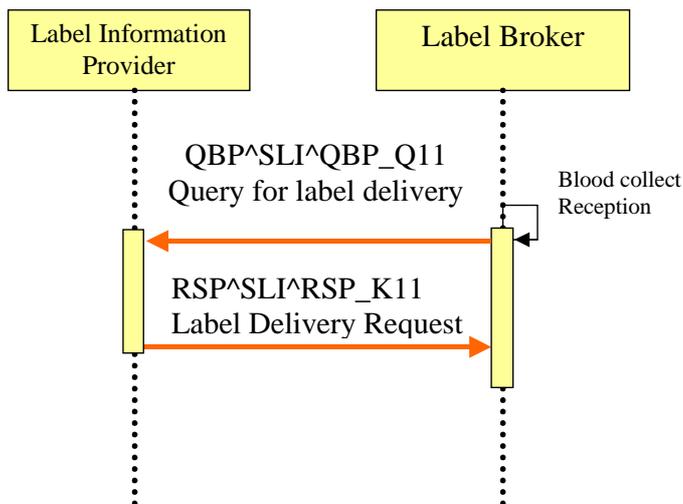
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19.7.3 Messages

LAB-62 (LB→LIP): Query for label delivery

```
MSH|^~\&|LB|LBL system |LIP|Enter-gastric department |200701121348||
QBP^SLI^QBP_Q11|001|P|2.5|||||USA||EN
QPD|SLI^Specimen Labeling Instructions^IHE_LABTF|0001|1111222
RCP|I||R
```

5080 ### LAB-62 (LIP→LB): Label Delivery Request transmitted to the LB

```
MSH|^~\&|LIP|Enter-gastric department|LB|LBL system |200701121348||
RSP^SLI^RSP_K11|001|P|2.5|||||USA||EN
PID|1||1111222^^^Suzuki National Hospital^PI||Toyota^Taro^^^^^L|19810101|M
PV1|1|O||||||||||||||||||3333444
SPM|1|1234560001||001^Venous blood|||||||P||||||20070112|||||||||1|021^Chemistry
ORC|NW|1234561|||||||200701121348|14789^Yamada^Jiro||14789^Yamada^Jiro|||||051^Enter-
gastric department
TQ1|||||||||R
OBR||1234561||17432^liver function^local|||||6.0|||||||14789^Yamada^Jiro
SPM|1|1234560002||001^Venous blood|||||||P||||||20070112|||||||||1|015^hematology
ORC|NW|1234562|||||||200701121348|14789^Yamada^Jiro||14789^Yamada^Jiro|||||051^Enter-
gastric department
TQ1|||||||||R
OBR||1234562||18655^blood count^local|||||2.0|||||||14789^Yamada^Jiro
```

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Appendix A: Relationship between Transactions, Messages, Events

The following tables list all the combinations of message types and trigger events that can be used by each Transaction on IHE Laboratory Framework.

OML, ORL, ORU and OUL message types use a primary trigger event stored in second component of MSH-9, which describes the message structure (O21, O22, O33, O34, O35, O36, R01, R22, R23), and a secondary trigger event stored in ORC-1 (Order Control), which actually is the real world trigger event. The "Event type" column is formatted "primary event/secondary event". For these, the "Event type" column is formatted: primary event/secondary event.

For ORU and OUL message types the content of the field OBR-25 (Results Status) gives a precision on the global status of the results of the order. The values of this field are shown in an additional column in the tables for transaction LAB-3 and LAB-5.

Transaction LAB-1: Placer Order Management

Transaction definition	Message type	Trigger event	Event type	HL-7 Ver2.5
Placing a new order (OP -> OF)	OML	Laboratory Order Message (Battery Centric)	O21/NW	Chapter 4
		Laboratory Order for multiple orders related to a single specimen	O33/NW	
		Laboratory Order for multiple orders related to a single container of a specimen	O35/NW	
Application response to a new order message (OF -> OP)	ORL	General laboratory order response message to any OML	O22/OK O22/UA	
		Laboratory order response message to a multiple order related to a single specimen OML	O34/OK O34/UA	
		Laboratory order response message to a single container of a specimen OML	O36/OK O36/UA	
Order or battery canceled by Order Filler (OF -> OP)	OML	Laboratory Order Message (Battery Centric)	O21/OC	
		Laboratory Order for multiple orders related to a single specimen	O33/OC	
		Laboratory Order for multiple orders related to a single container of a specimen	O35/OC	
Order Placer application response to order or battery canceled by Order Filler (OP -> OF)	ORL	General laboratory order response message to any OML	O22/OK O22/UA	
		Laboratory order response message to a multiple order related to a single specimen OML	O34/OK O34/UA	
		Laboratory order response message to a single container of a specimen OML	O36/OK O36/UA	
Status Changed (OF -> OP)	OML	Laboratory Order Message (Battery Centric)	O21/SC	
		Laboratory Order for multiple orders related to a single specimen	O33/SC	
		Laboratory Order for multiple orders related to a single container of a specimen	O35/SC	

Transaction definition	Message type	Trigger event	Event type	HL-7 Ver2.5
Application response to a status changes (OP -> OF)	ORL	General laboratory order response message to any OML	O22/OK O22/UA	
		Laboratory order response message to a multiple order related to a single specimen OML	O34/OK O34/UA	
		Laboratory order response message to a single container of a specimen OML	O36/OK O36/UA	
Order service replace request by Order Placer (OP -> OF)	OML	Laboratory Order Message (Battery Centric)	O21/RP	
		Laboratory Order for multiple orders related to a single specimen	O33/RP	
		Laboratory Order for multiple orders related to a single container of a specimen	O35/RP	
Order Filler application response to order service replace request by Order Placer (OF -> OP)	ORL	General laboratory order response message to any OML	O22/RQ O22/UM	
		Laboratory order response message to a multiple order related to a single specimen OML	O34/RQ O34/UM	
		Laboratory order response message to a single container of a specimen OML	O36/RQ O36/UM	
Order replaced by Order Filler (OF -> OP)	OML	Laboratory Order Message (Battery Centric)	O21/RU	
		Laboratory Order for multiple orders related to a single specimen	O33/RU	
		Laboratory Order for multiple orders related to a single container of a specimen	O35/RU	
Order placer application response to order replaced by Order Filler (OP -> OF)	ORL	General laboratory order response message to any OML	O22/RQ O22/UM	
		Laboratory order response message to a multiple order related to a single specimen OML	O34/RQ O34/UM	
		Laboratory order response message to a single container of a specimen OML	O36/RQ O36/UM	
Cancel order request by Order Placer (OP -> OF)	OML	Laboratory Order Message (Battery Centric)	O21/CA	
		Laboratory Order for multiple orders related to a single specimen	O33/CA	
		Laboratory Order for multiple orders related to a single container of a specimen	O35/CA	
Order Filler application response to cancel request by Order Placer (OF -> OP)	ORL	General laboratory order response message to any OML	O22/CR O22/UC	
		Laboratory order response message to a multiple order related to a single specimen OML	O34/CR O34/UC	
		Laboratory order response message to a single container of a specimen OML	O36/CR O36/UC	

Transaction LAB-2: Filler Order Management

Transaction definition	Message type	Trigger event	Event type	HL-7 Ver2.5
Send order / service number request (OF -> OP)	OML	Laboratory Order Message (Battery Centric)	O21/SN	Chapter 4
		Laboratory Order for multiple orders related to a single specimen	O33/SN	
		Laboratory Order for multiple orders related to a single container of a specimen	O35/SN	
Acknowledgement to order / service number request (OP -> OF)	ORL	General laboratory order response message to any OML	O22/NA or O22/UA	
		Laboratory order response message to a multiple order related to a single specimen OML	O34/NA or O34/UA	
		Laboratory order response message to a single container of a specimen OML	O36/NA or O36/UA	

Transaction LAB-3: Order Results Management

Transaction definition	Message type	Trigger event	Event type	OBR-25 status	HL-7 Ver2.5
Reception of specimen(s) (no results available, procedure incomplete)	OUL	Unsolicited specimen centered observation message	R22/SC	I	Chapter 7
	ORU	Unsolicited order centered observation message	R01/SC	I	
Some or all of the results available Not validated yet.	OUL	Unsolicited specimen centered observation message	R22/SC	R	
	ORU	Unsolicited order centered observation message	R01/SC	R	
Preliminary: Some of results available, validated.	OUL	Unsolicited specimen centered observation message	R22/SC	P	
	ORU	Unsolicited order centered observation message	R01/SC	P	
Final: All results available, validated	OUL	Unsolicited specimen centered observation message	R22/SC	F	
	ORU	Unsolicited order centered observation message	R01/SC	F	
Correction of final results results	OUL	Unsolicited specimen centered observation message	R22/SC	C	
	ORU	Unsolicited order centered observation message	R01/SC	C	
Deletion of battery/test in a filler order (no results available)	OUL	Unsolicited specimen centered observation message	R22/SC	X	
	ORU	Unsolicited order centered observation message	R01/SC	X	
Addition of a battery/test in an order (but not done)	OUL	Unsolicited specimen centered observation message	R22/SC	S	
	ORU	Unsolicited order centered observation message	R01/SC	S	

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Transaction LAB-4: Work Order Management

Transaction definition	Message type	Trigger event	Event type	HL-7 Ver2.5
Order Filler issues the new order (test request) (OF -> AM)	OML	Laboratory order message	O21/NW	Chapter 4
		Laboratory order for multiple orders related to a single specimen	O33/NW	
		Laboratory order for multiple orders related to a single container of a specimen	O35/NW	
Automation Manager responds to new order (AM -> OF)	ORL	General laboratory order response message to any OML	O22/OK O22/UA	
		Laboratory order response message to a multiple order related to single specimen OML	O34/OK O34/UA	
		Laboratory order response message to a single container of a specimen OML	O36/OK O36/UA	
Order Filler replaces the order (test request) (OF -> AM)	OML	Laboratory order message	O21/RP	
		Laboratory order for multiple orders related to a single specimen	O33/RP	
		Laboratory order for multiple orders related to a single container of a specimen	O35/RP	
Automation Manager responds to replace order (AM -> OF)	ORL	General laboratory order response message to any OML	O22/RQ O22/UM	
		Laboratory order response message to a multiple order related to single specimen OML	O34/RQ O34/UM	
		Laboratory order response message to a single container of a specimen OML	O36RQ O36UM	
Order Filler cancels the order (test request) (OF -> AM)	OML	Laboratory order message	O21/CA	
		Laboratory order for multiple orders related to a single specimen	O33/CA	
		Laboratory order for multiple orders related to a single container of a specimen	O35/CA	
Automation Manager responds to cancel order (AM -> OF)	ORL	General laboratory order response message to any OML	O22/CR O22/UC	
		Laboratory order response message to a multiple order related to single specimen OML	O34/CR O34/UC	
		Laboratory order response message to a single container of a specimen OML	O36/CR O36/UC	

Transaction LAB-5: Test Results Management

| Transaction definition	Message type	Trigger event	Event type	OBR-25 status	HL-7 Ver2.5
Automation Manager transmits the reception of specimen(s) / container(s) (no results available, procedure incomplete)	OUL	Unsolicited Specimen Oriented Observation Message	R22/SC	I	Chapter 7
		Unsolicited Specimen Container Oriented Observation Message	R23/SC	I	
Automation Manager transmits some (or all) of the results not yet validated	OUL	Unsolicited Specimen Oriented Observation Message	R22/SC	R	
		Unsolicited Specimen Container Oriented Observation Message	R23/SC	R	
Automation Manager transmits the preliminary results (some of results available, validated) (AM -> OF)	OUL	Unsolicited Specimen Oriented Observation Message	R22/SC	P	
		Unsolicited Specimen Container Oriented Observation Message	R23/SC	P	
Automation Manager transmits the final results (all results available, validated)	OUL	Unsolicited Specimen Oriented Observation Message	R22/SC	F	
		Unsolicited Specimen Container Oriented Observation Message	R23/SC	F	
Automation Manager transmits the correction of final results	OUL	Unsolicited Specimen Oriented Observation Message	R22/SC	C	
		Unsolicited Specimen Container Oriented Observation Message	R23/SC	C	

Appendix B: Implementation Notes for POCT1-A DML

5120   The transactions LAB-30 and LAB-31 between the actors POCRG and POCDM rely on ***Device Messaging Level*** interface defined in Appendix B of the standard POCT1-A.. In this ***DML*** interface the POCRG actor is called the "***Device***" and the POCDM actor is called "***Observation Reviewer***".

All messages of DML are encoded in XML (eXtended Markup Language). The syntax of each of these messages is defined by a DTD (Document Type Definition).

The ***Device*** communicates with the ***Observation Reviewer*** through an ***Access Point***, which can be part of a ***Device*** persistently connected to the network, or be a subsystem that consolidates data from one or more ***Devices*** onto an established communication link with the ***Observation Reviewer*** (POCDM).
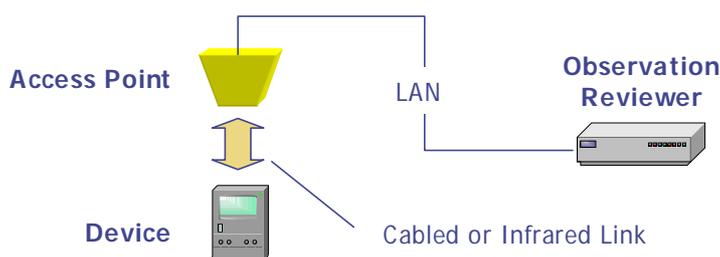
5130   **Figure B-1: Excerpt from POCT1-A**

The IHE LPOCT profile does not describe the protocol between the ***Device*** and the ***Access Point***, and recommends that manufacturers refer to and adopt the standard POCT1-A specification for this layer.

The IHE LPOCT profile describes the use of the DML, which is the top layer of the interface between the ***Device*** (POCRG actor) and the ***Observation Reviewer*** (POCDM actor). The lower layer protocols are not described in this IHE profile. IHE recommends the use of the MLLP transport protocol between the Device Access Point and the POCDM, as this protocol is used by all profiles of IHE Laboratory Technical Framework.

B.2 IHE usages for DML

5140   The conventions of usage in the DML interface from POCT1-A are the same as those defined for HL7 messages in section 2.2.1 of this volume (R, RE, O, C, X).

B.3 Conversations and Topics

Appendix B of POCT1-A defines two terms:

Conversation: A prescribed flow of messages between the Device and Observation Reviewer, having both an initialization and a termination phase. A Conversation is made up of a series of 'Topics.'

Topic: The flow of messages to exchange a complete set of data within a Conversation (e.g., Observations, Device Events). A Topic is composed of a series of 'Messages.'

The IHE LPOCT Profile describes only the Topic ***Observations*** which is used by Transactions LAB-
5150   30 and LAB-31. It is assumed that the systems implementing a POCRG actor or a POCDM actor support the other Topics listed below, according to the standard POCT1-A.

POCT1-A "basic profile" for transaction LAB-31

To support Transaction LAB-31 of LPOCT Integration profile, a **Device** (POCRG actor) and an **Observation Reviewer** (POCDM actor) must support at least the "**Basic Profile**", as defined in Appendix B section 4.1 of POCT1-A.. This "**Basic Profile**" specifies a minimum set of "**Topics**" that Devices and Observation Reviewers must support. These Topics are:

- Hello
- Device Status
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- Observations
- Terminate
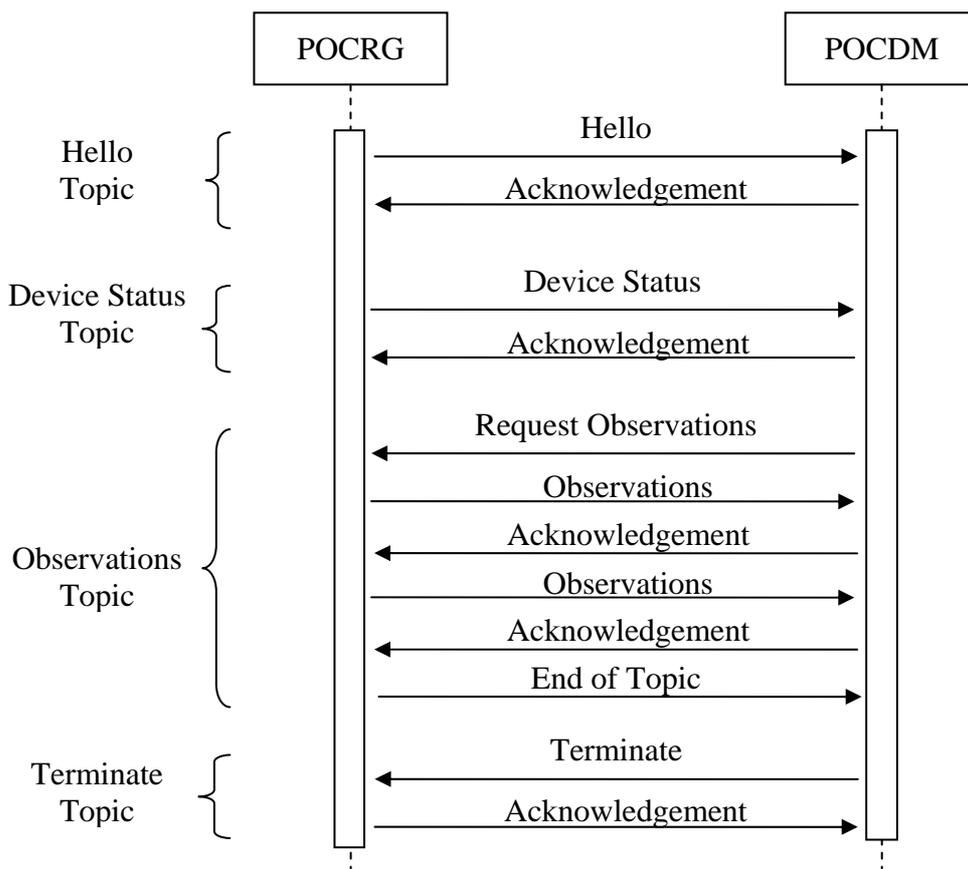
Figure B-2. Error-Free Basic Profile Flow, POCT1-A – Appendix B

The "Terminate" topic can also be performed in reverse, with the POCRG sending a Terminate message and the POCDM acknowledging it. This termination can occur at any time.

Continuous Mode to support Transactions LAB-30 and LAB-31

To support the "Patient Identity Checking" option of this Profile (i.e. the transaction LAB-30 between POCRG and POCDM) the *Device* (POCRG) and the *Observation Reviewer* (POCDM) must support
5170   the "*Continuous Mode*", as defined in Appendix B of POCT1-A.. This *Continuous Mode* requires that Devices and Observation Reviewers support a more complete set of *Topics*:

- Hello
- Device Status
- Directives (with at least START_CONTINUOUS Directive)
- Observations
- Keep Alive
- Termination
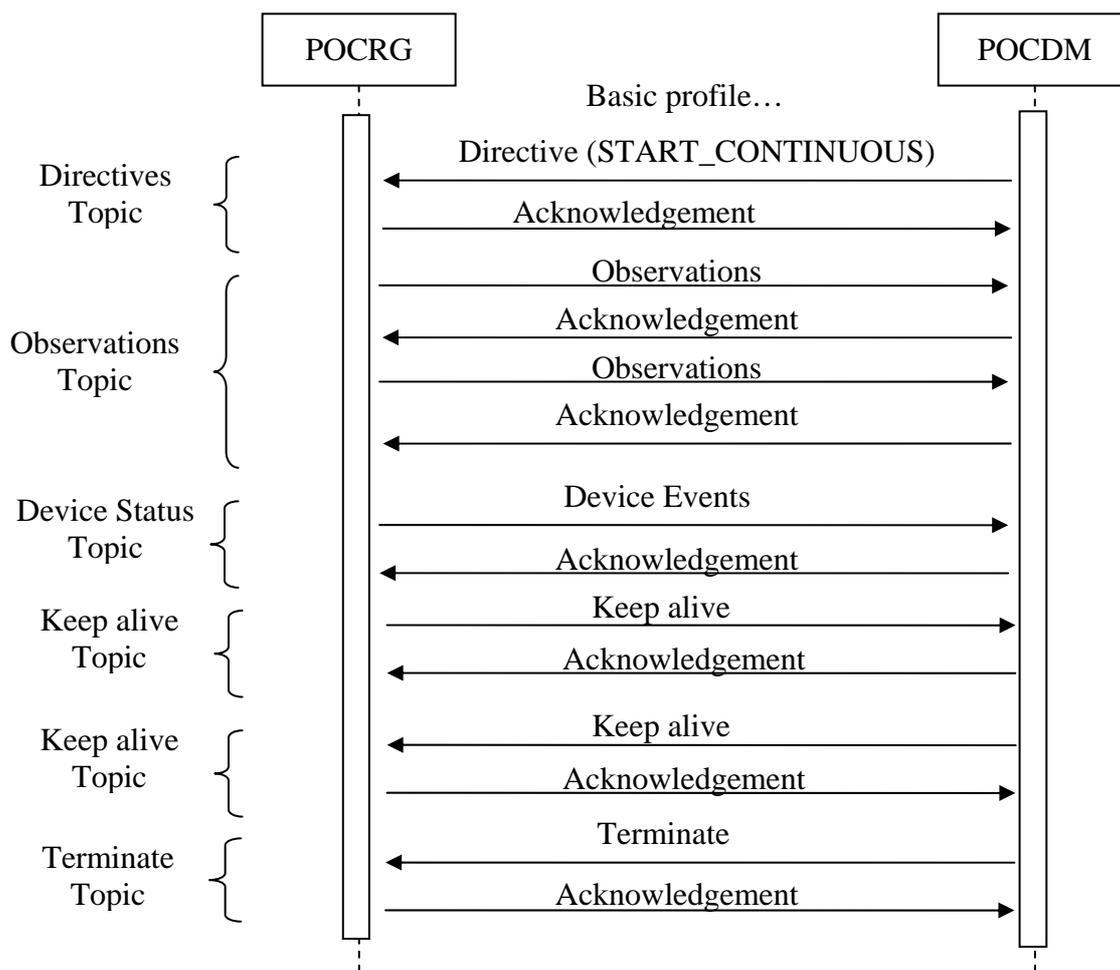
Figure B-3: Ideal Continuous Mode Message Flow, POCT1-A – Appendix B

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B.4 Characteristics of DML Messages

Notation

DML messages are encoded in XML. As any XML document, a DML message is a hierarchic tree. The POCT1-A standard uses the following representation for this hierarchic structure:
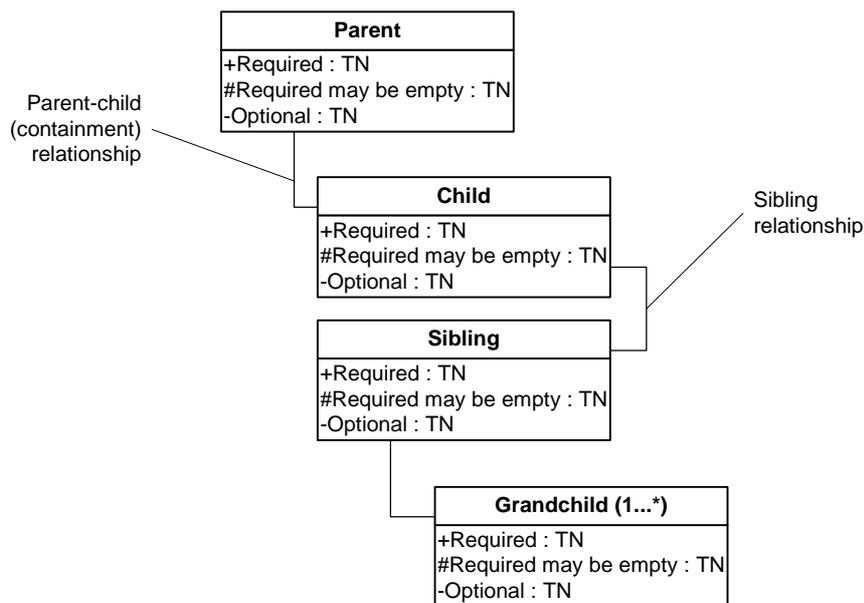
Figure B-4 Message Model Example, excerpt from POCT1-A – appendix B

Each element is represented as an object. Object cardinality is noted as part of the object name:
- (0…1) – zero or one instance
- (0…*) – zero or more instances
- (1…*) – one or more instances
- The absence of a cardinality notation indicates one, and only one, instance.

The component of the object are sub-elements of the XML element.
- sub-elements preceded by '+' are Required
- sub-elements preceded by a '-' are Optional
- sub-elements preceded by '#' are Required if available (may be empty if there is no relevant data (which corresponds to the "RE" usage code).
-

Use of the Header Object in DML Messages

5200 Every message of the DML starts with a mandatory Header object encoded with the XML **<HDR>** element. This IHE profile defines the following usage for this object:

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
message_type	CV	X	[0..0]	A code made up of the message name and trigger value. Examples: "OBS.R01", "ACK.R01". This field is redundant with the root element of the message. It is not supported by IHE.
control_id	ST	R	[1..1]	A string guaranteed to uniquely identify this message instance throughout the conversation
version_id	ST	R	[1..1]	Set to "POCT1" for all messages that adhere to this standard
creation_dttm	TS	R	[1..1]	The sender's time when the message was sent.
encoding_chars	ST	X	[0..0]	Not used by IHE

Example of the beginning of a message of the Hello Topic:

```
<HEL.R01>
    <HDR>
        <HDR.control_id V="10001"/>
        <HDR.version_id V="POCT1"/>
        <HDR.creation_dttm V="2001-11-01T16:30:00-08:00"/>
    </HDR>
    …
```

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Hello Topic in DML

The Hello Topic contains two messages: The Hello message sent by the *Device* (POCRG) and the acknowledgement message sent by the *Observation Reviewer* (POCDM).

A Device sends the Hello message only once as the first message in a Conversation. This message identifies the *Device*, its capabilities, its status, and the *Access Point* with its unique network address and port number.

- The root element of this message is **<HEL.R01>**

- The header element of this message, is mike in any message **<HDR>**

- The element representing the *Device* (POCRG) is **<DEV>**

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- The element representing the *Device* capabilities is **<DCP>**

- The element representing the *Device* static capabilities is **<DSP>**

- The element representing the *Access Point* is **<AP>**

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OBJECT MODEL	XML DTD FRAGMENT

	<!ELEMENT HEL.R01 (HDR, DEV, AP?)>
	
	<!ELEMENT HDR (HDR.message_type?, HDR.control_id,
	   HDR.version_id, HDR.creation_dttm,
	   HDR.encoding_chars?)>
	
	<!ELEMENT DEV (DEV.device_id, DEV.vendor_id?,
	   DEV.manufacturer_name?, DEV.hw_version?,
	   DEV.sw_version?, DEV.device_name?, DEV.vmd_name?,
	   DEV.vmd_id?, DCP?, DSC?)>
	
	<!ELEMENT DCP (DCP.application_timeout,
	   DCP.vendor_specific?)>
	
	<!ELEMENT DSC (DSC.connection_profile_cd,
	   DSC.topics_supported_cd*, DSC.directives_supported_cd*,
	   DSC.max_message_sz)>
	
	<!ELEMENT AP (AP.ap_id, AP.port_nbr)>

Figure B-5: Hello Message Model, excerpt from POCT1-A – appendix B

Example of Hello message taken from POCT1-A – appendix B:

```
<HEL.R01>
    <HDR>
        <HDR.control_id V="10001"/>
        <HDR.version_id V="POCT1"/>
        <HDR.creation_dttm V="2001-11-01T16:30:00-08:00"/>
    </HDR>
    <DEV>
        <DEV.device_id V="0A-00-19-00-00-00-23-84"/>
        <DEV.vendor_id V="BCHMX"/>
        <DEV.model_id V="8000A"/>
        <DEV.serial_id V="42367C"/>
        <DEV.manufacturer_name V="Biochemtronix"/>
        <DEV.hw_version V="8000A-C"/>
        <DEV.sw_version V="2001-10-04"/>
        <DEV.device_name V="ICU-4 Glucose"/>
        <DCP>
            <DCP.application_timeout V="60"/>
        </DCP>
        <DSC>
            <DSC.connection_profile_cd V="SA"/>
            <DSC.topics_supported_cd V="DTV"/>
            <DSC.topics_supported_cd V="OP_LST"/>
            <DSC.directives_supported_cd V="SET_TIME"/>
            <DSC.directives_supported_cd V="LOCK"/>
            <DSC.directives_supported_cd V="UNLOCK"/>
            <DSC.max_message_sz V="800"/>
        </DSC>
    </DEV>
    <AP>
        <AP.ap_id V="00-10-9D-FF-FF-23-45-67"/>
        <AP.port_nbr V="0"/>
    </AP>
</HEL.R01>
```

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B.5 Main Data Types in DML for Transactions LAB-30 and LAB-31

PN – Person name

The PN data type is used to communicate the elements of a person's name. This data type may carry:

- One single attribute "V" that contains a formatted for display version of the name.

- Any of the child elements described below.

ELEMENT	USE
GIV	The given name component
MID	The middle name component
FAM	The family name component
PFX	A prefix component (e.g., "Dr.")
SFX	A suffix component (e.g., "Ph.D")
DEL	A delimiter character used to separate components

Example: The following XML fragment illustrates how the **OPR.name** field can be used to encode the operator "Dr. John Ebert."

```
<OPR.name V="Dr. John Ebert">
    <FAM V="Ebert"/>
    <GIV V="John"/>
    <PFX V="Dr."/>
    <SFX V="MD"/>
</OPR.name>
```

PQ – Physical Quantity

The PQ data type is used to communicate a measured value, with the units of measure. The attributes this data type may use are described in the following table. Either the 'V' and the 'U' attributes or the 'NULL' attribute must be specified.

Table 72. PQ Data Type Attributes

FIELD	REQUIRED	USE
V	No	Contains the string representation of the value (1)
U	No	Indicates the units of measure for the value (2)
NULL	No	Indicates one of the values from **Table 70**

(1) Trailing zeros may be used in the 'V' attribute to indicate precision.

(2) The HL7 "ISO+" units code set, defined in a section of the HL7 v2.5 specification, comprises the default values for the PQ units attribute. This specification defines an abbreviation for a single case unit (ISO 2955-83) plus extensions, which do not collide with ISO abbreviations.

Example of a pCO2 value of 71.1 mmHg: `<OBS.value V="71.1" U="mmHg"/>`

Example of a patient's height value of 1.85 m: `<PT.height V="1.85" U="m"/>`

TS – Point in time

This data type is used to communicate a point in time. This data type may use one and only one of these two alternative attributes:

'V':   String representation of a point in time: YYYY-MM-DDTHH:MM:SS.SSxOH:OM

Where:

YYYY = four-digit year;
MM = two-digit month of the year;
DD = two-digit day of the month;
HH = 24-hour representation of the hour;
MM = minute;
SS.SS = second (optional decimal digits may follow the '.' separator);
x = '+' if time is GMT *plus* offset; '-' if time is GMT *minus* offset;

OH = hours offset from GMT; and

OM = minutes offset from GMT.

'NULL':   One of the values from Table 70:

5300   Example: The following XML fragment illustrates how a device could communicate that an observation was made on June 1, 2005 at 5:09:10 PM, in the time zone of Tokyo that is nine hours prior to GMT: <SVC.observation_dttm V="2005-06-01T17:09:10+09:00"/>

Table 70: Null Code Values

VALUE	USE
NI	No Information
NA	Not Applicable
UNK	Unknown
NASK	Not Asked
ASKU	Asked But Unknown
NAV	Not Available
OTH	Other
PINF	Positive Infinity
NINF	Negative Infinity