Chicago Training Exercise Requirements

The training group will be broken into two halves, development and quality assurance. Each of these halves will be further dividend into teams of two. The development teams will be responsible to make a system that demonstrates how an HL7 message would be accepted and processed. The quality assurance teams will be responsible for reviewing the demonstration systems and verifying if the meet a basic standard developed by each group.

This document defines the requirements and roles for each team. They are listed here in one document so that the Quality Assurance teams

# Development Teams

Each development group, made up of two software developers, will be responsible to create a functional software process than can accept, read and respond to HL7 vaccination update (VXU) messages. The requirements are as follows:

## Accept the this NIST Test Message

Functionality will be built around a selection of NIST test message. The interface must be able to accept these three messages:

MSH|^~\&|Test EHR Application|X68||NIST Test Iz Reg|201207010822||VXU^V04^VXU\_V04|NIST-IZ-019.00|P|2.5.1|||AL|ER

PID|1||Q-73221^^^NIST MPI^MR||Mercer^Jirra^Emmanuelle^^^^L||20100907|F

ORC|RE||IZ-783278^NDA|||||||||57422^RADON^NICHOLAS^^^^^^NDA^L

RXA|0|1|20120816||141^Influenza^CVX|0.25|mL^milliliters^UCUM||00^New immunization record^NIP001||||||K5094SC|20121216|SKB^GlaxoSmithKline^MVX|||CP|A

RXR|IM^Intramuscular^HL70162|RA^Right Arm^HL70163

OBX|1|CE|64994-7^Vaccine funding program eligibility category^LN|1|V05^VFC eligible - Federally Qualified Health Center Patient (under-insured)^HL70064||||||F|||20120701|||VXC40^Eligibility captured at the immunization level^CDCPHINVS

OBX|2|CE|30956-7^vaccine type^LN|2|88^Influenza, unspecified formulation^CVX||||||F

OBX|3|TS|29768-9^Date vaccine information statement published^LN|2|20120702||||||F

OBX|4|TS|29769-7^Date vaccine information statement presented^LN|2|20120814||||||F

ORC|RE||IZ-783281^NDA|||||||||57422^RADON^NICHOLAS^^^^^^NDA^L

RXA|0|1|20110216||10^IPV^CVX|999|||01^Historical information - source unspecified^NIP001

ORC|RE||IZ-783282^NDA|||||||||57422^RADON^NICHOLAS^^^^^^NDA^L

RXA|0|1|20120816||120^DTaP-Hib-IPV^CVX|0.5|mL^milliliters^UCUM||00^New immunization record^NIP001||||||568AHK11|20121216|PMC^sanofi pasteur^MVX|||CP|A

RXR|IM^Intramuscular^HL70162|RA^Right Arm^HL70163

OBX|1|CE|64994-7^Vaccine funding program eligibility category^LN|1|V05^VFC eligible - Federally Qualified Health Center Patient (under-insured)^HL70064||||||F|||20120701|||VXC40^Eligibility captured at the immunization level^CDCPHINVS

OBX|2|CE|30956-7^vaccine type^LN|2|107^DTaP^CVX||||||F

OBX|3|TS|29768-9^Date vaccine information statement published^LN|2|20070517||||||F

OBX|4|TS|29769-7^Date vaccine information statement presented^LN|2|20120816||||||F

OBX|5|CE|30956-7^vaccine type^LN|3|89^Polio^CVX||||||F

OBX|6|TS|29768-9^Date vaccine information statement published^LN|3|20111108||||||F

OBX|7|TS|29769-7^Date vaccine information statement presented^LN|3|20120816||||||F

OBX|8|CE|30956-7^vaccine type^LN|4|17^Hib^CVX||||||F

OBX|9|TS|29768-9^Date vaccine information statement published^LN|4|20111108||||||F

OBX|10|TS|29769-7^Date vaccine information statement presented^LN|4|20120816||||||F

MSH|^~\&|Test EHR Application|X68||NIST Test Iz Reg|201207010822||VXU^V04^VXU\_V04|NIST-IZ-013.00|P|2.5.1|||AL|ER

PID|1||MR-67323^^^NIST MPI^MR||Fleming^Chad^^^^^L||20100830|M

ORC|RE||9999^CDC

RXA|0|1|20120815||03^MMR^CVX|999||||||||||||00^Parental Refusal^NIP002||RE

MSH|^~\&|Test EHR Application|X68||NIST Test Iz Reg|201207010822||VXU^V04^VXU\_V04|NIST-IZ-016.00|P|2.5.1|||AL|ER

PID|1||MR-11891^^^NIST MPI^MR||Wolfe^Aron^^^^^L||20010907|M

ORC|RE||9999^CDC

RXA|0|1|20110215||998^No vaccine administered^CVX|999||||||||||||||NA

OBX|1|CE|59784-9^Disease with presumed immunity^LN|1|38907003^Varicella infection^SCT||||||F

## Read and Verify Contents

The interface must sensitive to a certain number of conditions. To be sensitive means that the interface must recognize the conditions and take the appropriate action. Please note that the actions taken are not necessarily the “correct” or “right” action as actual classifications vary by IIS. In addition, this is not a complete list error conditions or problems that an IIS should be sensitive to.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test** | **Field** | **Condition** | **Action** | **Configurable** |
| 1 | MSH-4 | Value is missing | Error |  |
| 2 | MSH-4 | Value is not X68 | Error |  |
| 3 | MSH-12 | Value is not 2.5.1 | Warning |  |
| 4 | MSH-12 | Value is not a recognized HL7 version, such as 2.3.1, 2.4, 2.5.1, 2.6, or 2.7 | Error | Values recognized |
| 5 | PID-5 | Last name is missing | Error |  |
| 6 | PID-6 | Mother’s maiden name is missing | Warning or Error | Action |
| 7 | PID-7 | Date of birth is not a valid date | Error |  |
| 8 | PID-10 | Race code is not a currently accepted value | Warning |  |
| 9 | PID-10 | Race code is a recognized, but has been deprecated | Warning |  |
| 10 | PID-10 | Race code is not a recognized or valid value | Warning |  |
| 11 | PID-10 | Race code is missing | Warning |  |
| 12 | RXA-3 | Value is missing | Error |  |
| 13 | RXA-3 | Value is before patient’s date of birth | Error |  |
| 14 | RXA-4 | Value is missing | No error or warning |  |
| 15 | RXA-5 | CVX code is not recognized | Error |  |
| 16 | RXA-5.3 | Code table name is not recognized but CVX code is recognized as a valid code CVX code | Warning |  |
| 17 | RXA-5.3 | CVX code is not ‘08’ (Hep B, adolescent or pediatric) and vaccination was given on patient’s birth day | Warning |  |
| 18 | RXA-7.3 | Code table for unit measurement is not recognized but the unit is mL | Warning |  |
| 19 | RXA-9 | Value is not recognized | Error |  |
| 20 | RXA-9 | The value is missing | Error |  |
| 21 | RXA-9 | The value is missing when the value in RXA-5 is 998 | No Error or Warning |  |
| 22 | RXA-9 | The value is missing when the value of RXA-20 indicates the vaccination was refused | No Error or Warning |  |
| 23 | RXA-20 | The value is empty when RXA-18 indicates a refusal reason | Error |  |
| 24 | RXA-15 | The lot number is missing for an administered vaccination | Warning |  |
| 26 | RXA-15 | The lot number is missing for a historical vaccination | No Error or Warning |  |
| 27 | OBX-3 | There are no OBX under an administered vaccination indicating a LOINC code of 64994-7 (Vaccine funding program eligibility category.) | Warning |  |
| 28 | OBX-3 | Value is not recognized | Warning | Values recognized |
| 29 | ZZZ | An unrecognized custom Z segment is inserted in the message | No Error or Warning |  |
| 30 | PID-5 | In second repeat the patient’s adopted name is listed | No Error or Warning |  |

Please note that this list is long and that it may not be possible to implement every check. Please focus on implementing the largest number as possible and if one of the checks becomes particularly difficult, please skip it.

### Action

For each issues, when encountered, the ACK should include one of three things:

* An ERR segment with an Error designation.
* An ERR segment with a Warning designation
* An ERR segment with an Informational designation or no ERR segment at all

### Configurable

If an issue is configurable, this simply means that it can be easily changed. The quality assurance team may request that a new value, originally not known to the development team, be accepted during testing. Or that a particular issue be converted from a warning to an error or vice-versa. The technical solution should be capable of making these types of rapid changes. (For the purposes of this exercise the “configuration” can be made in code and require a re-compile, but it should still be easy to make for the development team.)

## Generate a Proper Acknowledgement

The interface must be able to immediately return an acknowledgement indicating the full list of errors and warnings encountered. This return acknowledgement should contain enough information that the quality assurance team can immediately determine if the interface identified the issue. The acknowledgment message should have the following characteristics:

* Should definitively indicate if the message was processed or not, allowing the data quality team to know if the message should be fixed and resent or not.
* Should indicate all possible issues that can be determined from the message, and not just the first encountered.
* Should be formatted according to HL7 2.5.1 standards.

## Application Interface

The development team may choose any type of interface to accept the message. The following are ideal:

* A simple web page form that takes a single field MESSAGEDATA and returns the acknowledgement in plain text format.
* A simple TLEP web service interface that takes the Message Data parameter and returns the acknowledgement.

Otherwise these interfaces would work as well:

* A user interface, such as a web page or application dialog box, that allows the user to paste, submit and then review the resulting acknowledgement box.
* A command line program that read a file with the HL7 VXU message and creates another with the response.

Whatever interface is created, do not add support for authentication and verification.

## Choice of Technology

Each team may determine their use of software technology. The following are preferred (in no particular order):

* .NET or ASP
* Java
* PHP
* Javascript (client side, browser based)

The team should prefer technologies that best meet the following criteria:

* Very well understood by at least one of the team members.
* Does not require team to learn any new software tools or paradigms.
* Solution simple and easy to follow by an average software developer familiar with modern programming languages.

## Third Party Software

It is possible to code a simple solution without the use of third party software, but teams may choose to use open source applications (e.g. HAPI) to parse the VXU’s and to create the ACKs. No matter what solution is chosen, only select solutions that at least one of the team members is very familiar with and has already used in the past. There is not enough time today for teams to adopt new technologies. In addition, no third party proprietary API’s should be used. Final solution should be easily sharable with the wider community.

## Use Your Skill Set

Create code that uses your current skill set. There is not enough time to learn new API’s, new methods of solving problems, or to implement untried paradigms.

## Focus on Readability of Code

Focus on writing code that does the following:

* Has a lot of comments about what the software is trying to do.
* Is organized in the best way possible for someone reading it later to following the thought process.
* Prefer use of standardized methods that are easier for most people to understand over technics that are more efficient but more difficult to follow.

## Time Limit

The demonstration HL7 interface process must be complete and operational by 4:00 pm today. This gives each team only four hours to create a working system.

# Quality Assurance Teams

Each Quality Assurance team will be responsible to create a test plan.

## Develop Testing Plan

The testing plan must be able to verify the 30 tests listed in the development section. For this exercise the testing plan will simply be a set of HL7 messages with a description of expected results. An optimal test plan will have the following attributes:

* The test plan should as compact and succinct as possible.
* All 30 tests must be addressed.
* A single test message can (and should, if possible) test multiple issues.

## Verification of Test Cases

Each test case should be submitted against the NIST version 2 “Context-free Validation” engine to verify that the only issues the message has are related to the items being tested.

## Resources

|  |  |
| --- | --- |
| NIST Test Cases | <http://hl7v2-iz-testing.nist.gov/mu-immunization/>   * Select “Context-based Validation” * Expand list of test cases in tree and select innermost node * Test case should open, click “Select” button in upper right corner * Click “Load Example” button |
| CDC Guidance | <http://www.cdc.gov/vaccines/programs/iis/technical-guidance/hl7.html>   * CDC Implementation Guide * HL7 2.5.1 Test Cases |