Interface and HL7 Testing in an IIS Platform Migration: Guidance for Planning and Execution

Considerations to inform HL7 planning and testing

This document will guide you through the planning and execute phases of HL7 interface transition as it relates to migrating to a new IIS platform. Within the planning phase of an IIS platform migration project, a critical task is to decide how to manage and test the transition from the HL7 interfaces with the existing platform to the new one. A properly managed process will ensure high data quality and ensure familiarity with the data quality tools, processes and reports available from the new platform. The IIS program should have a quality goal of error-free messages and a target maximum percentage of the accepted messages with warnings in order to allow data submission into production.

During the execute phase, the IIS program should work with its new vendor to learn how the new HL7 interface works. The onboarding team should learn how to set up an HL7 interface for a provider, understand what onboarding tools are available, and discern what the business rules are for processing HL7 messages, especially in special circumstances such as deletes, updates and modifications to a patient record. Becoming familiar with and testing the new onboarding procedures are critical to ensuring the IIS team is familiar and comfortable with the new "way of doing business" but also so that communications with providers/data submitters are accurate, precise and clear.

Instructions

- Use with the corresponding **IIS Migration Planning Worksheet** in the Plan phase to think about and document your approaches to HL7 testing and transitioning provider interfaces.
- Use in the Execute phase: Review and discuss responses to planning questions and execute considerations with your selected vendor.

Helpful hints

- **Bolded text** (as used above) indicates that the resource referenced is available elsewhere in the IIS Migration Toolkit.

phii.org/migration-toolkit

Summary of key questions and considerations

Plan phase: key questions

1. What is the status of interfaces in the current system?
2. How can we leverage the migration as an opportunity to improve the quality of data submissions to the IIS?
3. What messaging formats do you want to support in the new IIS?
4. What transport methods do you want to support in the new IIS?
5. When will current production data exchange partners be re-validated for query and/or submission to the new IIS?
6. Who will support testing?
7. How do sites currently enroll to be a data exchange partner?
8. What are opportunities to improve the current onboarding process?
9. Will the role of HIE(s) as it relates to IIS onboarding/data transfer potentially change with a new IIS system?
10. How do you envision maintaining data flow at go-live?

Execute phase: key considerations

- Keep providers informed of interface transition and testing plans.
- Learn any new onboarding tools and/or HL7 data quality reports in the new IIS.
- Connect the new IIS to the AIRA AART tool.
- Test the new IIS HL7 interface business rules.
- Understand how provider sites are authenticated.
- Migrate data to support HL7 testing.
- Test existing systems in the new interface.
- Develop and beta test the provider onboarding workflow.
- Train providers on data quality reports.

Plan: Address key HL7 and interoperability questions

The following questions should be addressed when assessing the state of existing interfaces and in determining an optimal approach to transition those interfaces to the new platform. Consider the information below and document your planned approach in the **IIS Platform Migration Planning Worksheet**.

1. What is the status of interfaces in the current system?

Take stock of interfaces in place in the current system. For each interface, identify the format and transport in use and the type of messages being submitted (vaccine updates and/or queries). Messaging volume, type of provider and EHR system are also helpful information to inform interface migration plans.

- What additional interfaces are needed with other systems, agencies and/or departments, e.g., vital records; shared master patient index; surveillance systems; Women, Infants, and Children (WIC) program(s), etc.?

    - Sometimes these interfaces are not HL7 messages but other secure data exchange file sharing protocols. This maybe a good time to meet with these programs to determine specifically how data may be shared with the new IIS.

2. How can we leverage the migration as an opportunity to improve the quality of data submitted to our IIS?

The migration to a new IIS is an opportune time to improve the quality of data submitted to the IIS as provider interfaces will need to be re-validated in the new system. Use this time to communicate messaging requirements to providers, such as submission of data in required fields, data in fields that are required but may be empty, and desirable but optional data. See the **Sample Provider Interface Letter** for a sample communication that can be adapted to communicate messaging requests to your providers.

3. What messaging formats do you want to support in the new IIS?

Determine if 2.3.1 interfaces will continue to be supported or if these providers will have to move to 2.5.1 with the IIS migration. Best practice indicates that a move to a new IIS platform is an opportune time to comply with the national standard of version 2.5.1.

- Will you mandate that all current interfaces migrate to HL7 2.5.1 Release 1.5 or will you support older versions and releases of HL7?
- This is a good time to review the number of interfaces submitting older HL7 messages such as 2.3.1 or 2.4. Communicate with the providers who are submitting these messages and determine the impact to move them to 2.5.1 format. Determine if this is a heavy lift or expense for the provider to support 2.5.1 HL7 messaging.

4. Which transport method(s) do you want to support with the new IIS?

The most common transport methods used for IIS HL7 messaging are the CDC WSDL, web service and HTTP Post/REST. When connecting with a health information exchange system, common transports can include web services and SFTP, Direct, VPN and MLLP.

Among the planning questions to decide early on are:

- Will the migration result in a URL change, or will a new user ID and password for authentication be required for transport?
- Will providers be able to manage this change without vendor support or extra costs?

The local implementation guide should be updated and posted to the program's website for any provider or vendor to prepare and follow prior to the migration.

5. When will current production data exchange partners be re-validated for query and/or submission to the new IIS?

Another consideration is when and how to re-onboard/re-validate existing interfaces and whether these users will need to re-register. The new HL7 platform may address different errors than the current interface. In addition, the acknowledgement messages (ACKs) should be assessed as they may be different in the new platform and need to be communicated to the interface users so they are aware of what to expect from the new platform.

The following questions can guide your planning:

- Will re-validation be done at the healthcare organization or the EHR/vendor level?

  - o Re-validation at the healthcare organization level may take more time, but may also capture issues with the EHR user interface or end user error populating fields in the EHR with inaccurate information, thus sending invalid information in the HL7 message.
  - o Re-validation at the EHR vendor level will take less time, but each version of the electronic health record product should be reviewed. Example: Some providers may have Epic version 1.2 and others may be using version 2.4.

- Where will the re-validation take place? In the new IIS test environment so that these sites can be moved to production at the time of go-live?
- Which provider interfaces will be tested initially?

  - o Consider prioritizing providers based on: current message structure/warnings, type of practice, size of practice (number of immunizations administered on a monthly basis) or by electronic health record vendor.
  - o If there are providers who have vendor support and previously onboarded to your former platform with minimal or no issues, they could be asked to test your new onboarding process as pilot sites.
  - o However, providers with limited vendor support may need more support from the IIS staff during the onboarding process and, therefore, should not be left for

last in the onboarding queue as the additional assistance may delay your overall timeline to migrate to the new system.

6. Who will support interface testing in the new IIS?

Re-validating provider data submissions in the new IIS is a significant undertaking. Will you need to bring in additional staff to help with this task? Consider training these individuals on HL7 testing in advance so they are ready to help with this effort.

7. How do sites currently enroll to become a data exchange partner with the current IIS?

When enrolling new sites for data exchange, the IIS creates an authentication code for the site to share data via HL7. These codes may be the site ID, or they may be another unique identifier such as a PIN. Determine if the existing authentication codes can be migrated to or re-used with the new IIS, or if a new enrollment process must occur for the new IIS.

8. What are opportunities to improve the current onboarding process?

Consider opportunities to implement a more streamlined and efficient onboarding process as part of the migration project.

- Do you have standard operating procedures documented for the current onboarding process? This would be a good time to review procedures and refine/update if needed. The **Standard Operating Procedures Template** is available to help with this process. You could also conduct a business process mapping session to document the current process and identify opportunities for improvement. The **Business Process Mapping Swimlane Template** may be used for this purpose.

9. Will the role of HIE(s) as it relates to IIS onboarding/data transfer potentially change with a new IIS system?

Health information exchanges (HIEs) are being implemented throughout the country with varying relationships to their IIS. HIEs are collaborative efforts that focus on secure health data exchange at a community, regional or statewide level. They provide new ways for stakeholders (providers, labs, hospitals, payers, public health agencies, pharmacies, patients/citizens) to receive and send data. It is important for the IIS to be engaged with HIE leadership when planning a migration to determine the appropriate approach for electronic data exchange between the two entities.

Sample considerations of this relationship include:

- Determining how data will be transported from providers to the IIS through the HIE.
- Determining the timelines and expectations for the IIS to connect to the HIE.
- Identifying if the IIS vendor have sufficient experience connecting with an HIE, and what level of support can they provide based on the contract.

10. How do you envision maintaining data flow at go-live?

- When do you stop receiving HL7 data in the current system to migrate the data to the new system?
- Will you allow HL7 messages to continue to be submitted to the old IIS, and will the old IIS store/hold this information until the migration is complete and then process the information in the new IIS after migration?
- If the facility stops sending HL7 messages to the old IIS, has a date been determined when they should turn the interface back on to re-submit these messages to the new IIS?

Execute: Address key questions and considerations for testing

1. Keep providers informed of interface transition and testing plans

As with any project, effective communication and change management are critical. The providers will need to be kept informed of the requirements to move their existing interface or establish a new one in the new platform. This may create some resistance, which will have to be anticipated and addressed proactively, such as including meaningful statements of the value to providers of going through this change.

If re-onboarding/re-validation is required during migration, providers will also appreciate being alerted as to how long the process will take, even if it is an estimate. Once the program determines how to prioritize the providers' requests, this should be communicated to IIS staff and to providers for transparency and visibility into the process. On average, it is suggested to allow three months before migration to begin working with providers on their interface testing.

2. Take time to learn the new system, including tools and/or reports that may be used in the provider onboarding process.

Consider reaching out to other programs using the same platform to hear how they use the tools and reports available to them to support onboarding and data quality monitoring.

3. Connect the new IIS to the AIRA AART Tool.

A good way to do an initial test of the new IIS HL7 interface is to utilize AIRA's Aggregate Analysis Reporting Tool (AART). Connect your new system to AART as soon as possible to help you learn the new interface and ensure it is aligned with national standards. You can have your production system and your new system connected with AART; AIRA will use your current production system for measurement until you are ready to fully transition to your new system.

Review changes needed with your new vendor and determine the impact of these changes on the existing interfaces. To use the AART tool, register for access at http://app.immregistries.org/aart/home.

4. Test the new IIS HL7 interface business rules to understand how HL7 processing interacts with other IIS functionality.

In addition to connecting with AART to see how HL7 interface functionality aligns with national standards, you can also run test HL7 messages to identify how the new IIS's business rules will process different types of messages. The **IIS HL7 Test Scenario and Test Message Workbook** contains scenarios and corresponding messages to test deletes, updates, refusals, immunity, NDC codes and lot decrementing. Run these test messages to ensure that the HL7 interface processes messages as expected.

For example, business rules related to lot decrementing may include:

- The lot number must be available in inventory for deduction to occur.
- The lot number and manufacturer in the message must match inventory for the deduction to occur.
- The funding source must be available in the HL7 message for inventory deduction to occur.

Knowing these rules and having them documented are important when resolving data quality issues with providers or their vendors.

5. Understand how provider sites are authenticated for HL7 messaging in the new IIS.

Another question to resolve is whether the current user authentication codes can be used with the new IIS. If so, how will that information migrate to the new IIS? When and how can that information migrate to the test environment?

If a new enrollment is required for existing interfaces, consider these steps:

1. Start early in the migration process to set up the HL7 interfaces in the new IIS.
2. When setting up a new HL7 interface, work with your new vendor to fully understand the impact of data ownership as data are sent to the IIS. For instance, can a health system submit data for individual clinical sites in their organization? How does this data flow impact reminder-recall notifications, inventory deduction and coverage rates at the clinic level?
3. Share this information with all the providers who have an existing interface.
4. Give providers plenty of time to work with their vendors to add and test the new URL and authentication codes before going live.

6. Migrate data to support HL7 testing.

When preparing to test existing HL7 interfaces, plan to work with your new IIS vendor to migrate the following data to the test database:

- Provider site information – all the required information when enrolling a site and HL7 interface authentication codes
- HL7 profiles – interface settings in the current IIS for a provider site
- Patient demographic and immunization data – needed for QBP testing

7. Test existing interfaces in the new system.

The following steps can be taken to test VXU and QBP HL7 messages from providers in the new platform:

VXU message testing

The sample HL7 VXU message testing workflow in Figure 1 provides an overview of the processes for testing VXU messages from existing interfaces with or without migrated data. To test VXU submissions, it is important to have the interface profiles established in the new IIS. The submission of HL7 data will add the patient information to the new IIS. The testing steps in this workflow are outlined below.

Figure 1. VXU testing workflow
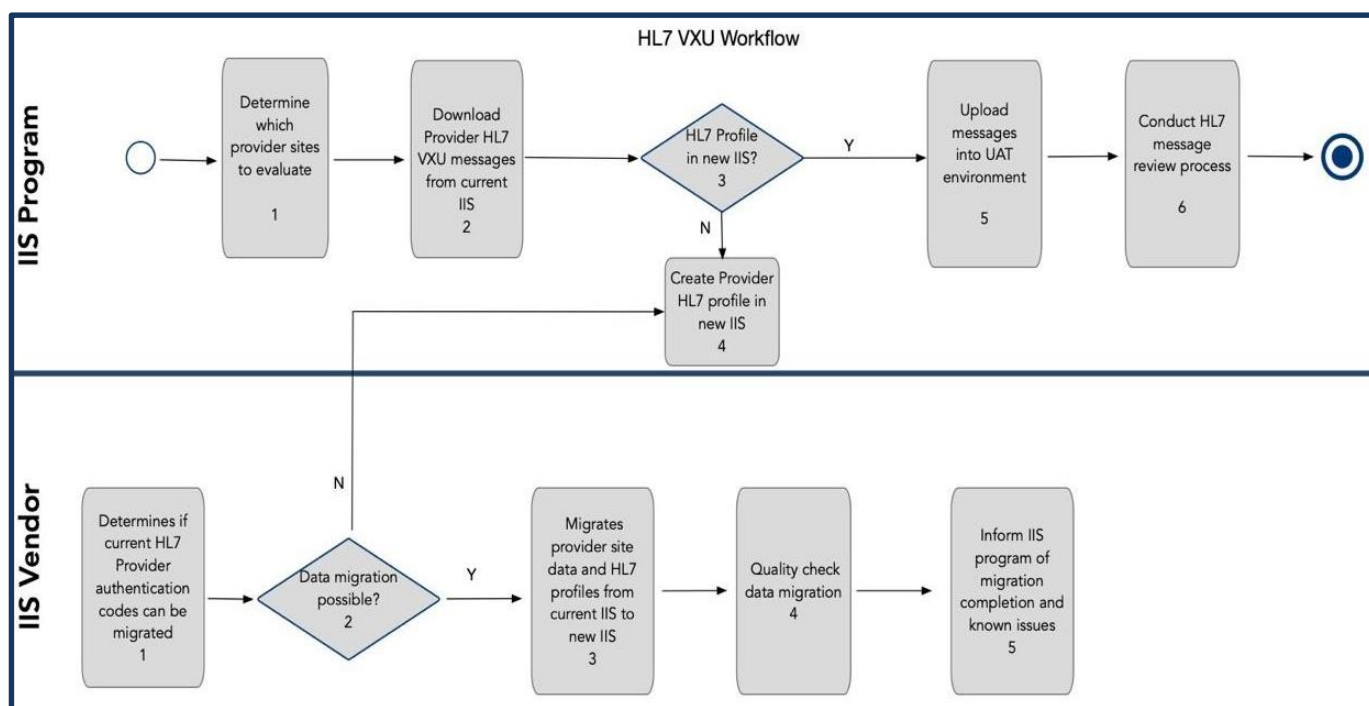
1. Determine the provider sites you want to evaluate.

2. Extract a batch of VXUs from the designated provider site from your current system.

5. Import messages into the test environment.

6. Review messages:

- Are any rejected?
- Are any rejections because of a failure to set up the interface correctly in the new IIS?
- Are any rejections a result of missing required data elements?

- o If yes, is this happening in the current IIS?
- o If no, why are the messages being rejected in the new IIS?

- Evaluate messages accepted with warnings.

  - o Determine whether the warnings are acceptable.

    - If not, is it an issue with the ACK settings in the new interface?

  - o Are the warnings different from the current IIS interface settings, and does the provider need to be informed of these differences?
  - o Should the provider site address these warnings before going live in the new IIS?

QBP message testing

The sample HL7 QBP message testing workflow in Figure 2 provides an overview of the processes for testing QBP messages from existing interfaces with or without migrated data. For QBP testing, the new IIS will need to have HL7 interface profiles established and patient data at the clinic level to query against for a response message to be returned. The testing steps in this workflow are outlined below.

Figure 2. QBP testing workflow
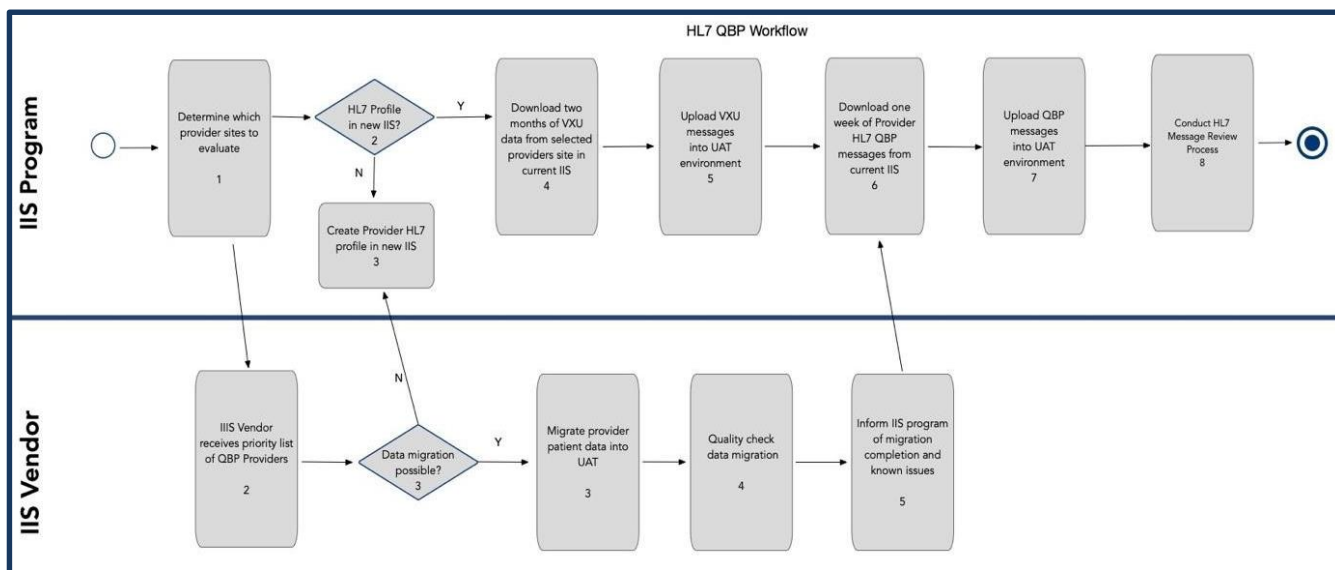
- Migrate or establish HL7 interface profiles for clinics prioritized for QBP testing.
- Migrate patient information for clinics selected for QBP testing from the old IIS. If patient data cannot be migrated in time for testing, it is important to have the ability to extract two months' worth of VXU messages from the current IIS, for prioritized clinics, and the capability to upload the data into the new IIS for QBP testing. Without patient data, QBP messages will not return a history and forecast on a patient for evaluation.

- If migration of patient data cannot happen before QBP testing, follow this process:

    1. Download two months of VXU data from a provider site in the current IIS.

        a. Example: Extract September and October VXUs from a clinic in the old IIS.

    2. Upload VXU data into the new IIS.
    3. Download one or two weeks of queries from the same provider site in the current IIS.

        a. Example: Download one to two weeks of queries from the clinic in the month of November. Extract the query data on a date close to the date of VXU extraction timeframe for best results.

    4. Upload QBP data into the new IIS.
    5. Review findings (likely 10 to 12 matches will result for review using this process).

8. Develop and beta test the provider onboarding workflow.

It is expected that the new IIS will have onboarding tools as part of its functionality to evaluate incoming messages in terms of data quality attributes of accuracy, completeness and timeliness. Learn how to use the new onboarding tools and modify the current onboarding procedures to include them. Also consider using the NIST tools for onboarding.

Once you have developed your new onboarding workflow, you can beta test the process during this phase and modify the new workflow and procedures as needed.

9. Train providers on data quality reports.

- Are there HL7 data quality reports in the new IIS for provider access?

    o If yes, how will you train providers on the use of these reports?

What are the program's expectations for the providers to generate or review HL7 error reports - daily, weekly or monthly?

Appendix

Related resources

Onboarding Consensus Based Recommendations

Source: AIRA

This document is intended for both technical and programmatic staff that make up IIS onboarding teams and program administrators responsible for the allocation of onboarding resources. EHR vendors, providers and health information exchange (HIE) partners may also find this document informative. Material is divided into two primary sections:

1. Process – Improvements and Recommendations
2. Implementation – Considerations and Recommendations.

Content was developed and validated with input from all major onboarding partners.

NIST HL7 Message Tester

Source: National Institute of Standards and Technology

NIST has built and continues to develop a toolkit that supports the testing of HL7 V2 message interfaces based on the concept of message profiles.

Overview of NIST Message Validation Tools

Source: AIRA and CDC

This document provides an overview of the NIST immunization testing tool suite.

Message Quality Evaluation (MQE) Tool

Source: AIRA

The Message Quality Evaluation tool is the product of a collaboration between several IIS. It offers an open source application to measure and monitor the quality of incoming data. This application can be downloaded and installed by any IIS and provides reports and metrics to assist managers in prioritizing data quality interventions.

Data Validation Guide for the IIS Onboarding Process

Source: AIRA

This guide covers steps in the onboarding process, implementation considerations including roles, and examples from IIS across the country.

Guidance for HL7 ACK Messages to Support Interoperability

Source: AIRA

This guidance for IIS covers HL7 acknowledgement messaging using the V2.5.1 standard.

SOAP Web Services

Source: The Centers for Disease Control and Prevention (CDC)

The Transport Layer Expert Panel, in support of their recommendation of SOAP (Simple Object Access Protocol) as the standard for immunization data exchange, have developed resources to support software interface engineers and technical project managers with implementations of SOAP as a common web service interface.