

Project Overview:

Logician Ambulatory EMR System
Sparrow Laboratory System Interface Development and Testing
Summer 2001 – December 2002

1. **Agreement to Develop the Interface** (Winter 2001)
2. **“Building the Information Superhighway”**: Testing the Communications Infrastructure Between MSU HealthTeam and Sparrow Health System (5% of time/effort)
 - a. Hardware
 - b. Software
 - c. Procedures
 - d. Testing
 - i. Connectivity
 - ii. Speed of data transmission
 - iii. System reliability
 - iv. Security of data transmission
3. **Planning meetings and assignments of roles and responsibilities for interface development** (November 2001; 3% of time/effort)
 - a. Sparrow representatives: Tom Shockey, Jeanne Montgomery, Jackie Bolenbaugh
 - b. Olin representative: Barbara Forney
 - c. HT-IS representatives: David Cowes, Shawn Pohl
4. **Generate/edit/validate cross-reference tables**: (30% of time/effort)
 - a. Ensure that the correct test result is placed in the correct location (patient chart, laboratory flowsheet)
 - b. Make sure that the physician/provider identifiers in Sparrow lab system accurately match the identity of the provider in the Logician EMR, so results end up on the right provider’s desktop
5. **Programming** (20% of time/effort)
 - a. Sparrow programming
 - i. Convert Sparrow lab results into an electronic format (standard HL-7 message generation)
 - ii. Format must be consistently and accurately readable by MSU HT software
 - b. MSU HT programming
 - i. Build a program that accepts standard HL-7 message
 - ii. “Clean up” messages by removing redundancy and improving organization
6. **Interface Testing** (40% of time/effort)
 - a. Technology (see *Appendix A*)
 - i. Making sure that the electronic processes consistently deliver all of the results that should come across the interface promptly, accurately and reliably

- ii. Excluding accidental delivery of unsolicited laboratory results that do not belong in the EMR (non-HealthTeam patients).
 - iii. Making sure the received lab test results get attached to the correct patient's electronic chart and go to the correct provider's inbox for review and signature
 - iv. Verifying that corrected results and canceled tests are handled appropriately, with overwriting of inaccurate results and appropriate notification of canceled tests.
 - v. Ensuring that test results that are linked to a flowsheet always end up in the right place in the flowsheet with all data correct.
 - b. Policies and procedures
 - i. Assignment of responsibilities for maintenance of hardware, software, networking, security, and reliability of interface
 - ii. Training and supervision of personnel to insure data quality and accessibility
 - iii. Updating provider lists, tests, methods, normal ranges
 - iv. Monitoring, troubleshooting and continuous improvement
 - c. Testing sequence
 - i. Transfer of simulated lab test results across interface with detailed inspection for data accuracy
 - ii. Transfer of live (real) data into a Logician "test" database with detailed inspection; results inspected directly in the EMR for accuracy, attachment to correct patient, provider, clinic location, flowsheet result
 - iii. Repeated cycles of
 - 1. cross-reference table editing ⇔
 - 2. programming ⇔ testing

7. Pre-production meetings (November-December 2002; 2% of time/effort)

- a. Identify potential risk management issues
 - i. HIPAA
 - ii. Screening and triage of abnormal lab results (e.g., by staff nurses)
 - iii. Home use EMR use, impact of choosing to access or not for on-call telephone care.
- b. Timing of going paperless, dual electronic + paper report interval
- c. Approve discarding paper during transition that simply duplicates results in the EMR
- d. Developing written clinical workflows for misrouted lab reports (non-HT patient, HT patients seen in non-HT settings, wrong provider, wrong clinic, name alerts, hospitalized patients not yet assigned to ambulatory HT site, etc.)
- e. Defining Sparrow procedures for system maintenance, provider updating, etc.
- f. Phase 2A training review (analogous to radiology reports)
- g. Communication plan to HT providers and staff (e-mail, web, flyers)
- h. Establishing mechanism for giving feedback, getting information or assistance (phone support, e-mail, web site, EMR implementation staff)

8. Certification of "Readiness for Go-Live" (December 2002)

- a. Technical issues adequately addressed
- b. Human processes identified

- c. Personnel policies and procedures in place with evidence of compliance monitoring/handling
9. **GO-LIVE** (scheduled for **December 18, 2002**)
- a. All clinics up on Phase 2A receive electronic results
 - i. Brief paper printout interval to confirm systems working in each clinic
 - ii. Paper results can be discarded if accurate and no substantive comments, instructions, or orders are written on them...otherwise they should be signed and sent to medical records
 - b. Clinics not yet trained for Phase 2A will receive paper only until training is complete and clinic goes live for Phase 2A
 - c. Providers should check Logician desktop inbox frequently and regularly.
 - d. All lab results must be signed
 - e. Electronic triage of abnormal test results by nurses is possible (can inspect desktop of providers they work with and view results), but signing remains the responsibility of the responsible provider.

Appendix A

Testing of the Sparrow Interface

Details of Testing:

- David Cowes and Jeanne Montgomery set up the line between Sparrow and MSU and performed bulk testing of records coming across from Sparrow.
- All paper reports received in the Family Practice clinic were compared against the electronic document in the EMR for approximately six months.

Included in this comparison were:

- Checked to insure that the ordering provider listed on the paper document matched the ordering provider that received the document on his/her desktop and the responsible provider listed for the document.
 - Checked to insure that the patient listed on the paper report received the documents in their chart.
 - Checked to insure the correct collection time/date show on the electronic document.
 - Checked to insure that the correct normal ranges show up for every result on every test.
 - Checked to insure that any notes that appeared on Sparrow's paper report showed up in appropriately on the electronic document.
 - Checked to insure that the results on Sparrow's paper report matched every result on the electronic document.
 - Checked to insure that abnormal status show up in the electronic document appropriately.
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- Every result that exists in the cross-reference file (results to be placed in the flowsheet) was tested a minimum of one time per result to insure that it was placed in the correct observation value in the flowsheet.
 - Miscellaneous tests/results were tested that were not included in the cross-reference file from above or were not included in the testing from Family Practice. These tests were chosen to try to simulate all of the different types of test results that we could possibly get results on. This group included tests that are sent out to different labs like Mayo (Sparrow calls these tests "sendouts").
 - Cancellation of tests that have already been resulted, tests that were partially resulted and tests that had not been resulted yet were accommodated for and tested extensively. This was tested using many different types of tests/results along with many different ways of canceling tests and/or results.

Appendix B

Monitoring the Sparrow Interface

Monitoring of the Interface:

The person responsible for data validation will monitor all errors, warning messages and notes in the LinkLogic activity log.

Among some of the more common warning messages to be monitored are:

Warning #1102 – Document overlay was attempted but did not succeed. This warning shows that document overlay did not work for a particular document. This will happen only if procedures were not followed at Sparrow lab. There will be two separate documents in the patients chart for the same test with the same collection date/time. The second document will usually have corrected and more current information.

Warning #4118 – No cross-reference for this result code was found. This warning will be very common and tells the user that this result is not going to be placed into the flowsheet because it is not in the cross-reference file.

Warning #1069 – Units did not match cross-reference file units. This warning is telling us that the units that came across with this result does not match the units specified in the cross-reference file. This will require a phone call to Sparrow to find out if there have been any changes in the reporting for this test/result.

Warning #1112 – Cannot CC document, unknown user. This warning should only happen if the “copy to” provider is not a Logician user. The “copy to” provider will still receive their copy of the report in their normal way.

Warning #1073 – Null observation value in import file. This tells us that the observation (result) came over without a value. This sometimes happens when the reporting facility (Sparrow) types the result in the note or comment field. This will still show up in the document.

Warning #2062 – Unknown care provider. The EMR system did not recognize the Sparrow ID number that was sent in the message. The document will be placed on the desktop of the responsible provider.

Warning #1050 – Could not disperse observation due to lower priority result status. This warning tells us that a preliminary was sent after a final or a final after a corrected.

Appendix C

Expectations from Sparrow

(This information is intended for Sparrow's Technical Staff)

Corrected results in standard HL7 formatting

In order for document overlay to work correctly, standard HL7 must be used for corrected results. If standard HL7 is not used, the message will create a new document unrelated to the original. **It is the responsibility of Sparrow to supply the following for any corrected results** in the electronic (HL7) message. The HL7 message can contain more OBX segments (results), but at a minimum will have the original OBX segments included in the corrected test/result message in the original order with the original test/result codes. In addition to this the following must also be true:

ORC-5 – Requisition number must be the requisition number of the original order.

OBR-5, OBX-4 – Test codes must be the same on the corrected as they are on the original.

There can be additional results/OBX segments, but there cannot be any missing.

OBR-8 – Collection date must be the same on the corrected result as on the original message.

OBR-15 – Specimen received date and time must be the same on the corrected report as on the original.

OBX-12 – Status must be a 'C' for corrected on the result that has been changed.

Tests or Results that are cancelled

Changes were made to the interface on the Sparrow side and the MSU side to accommodate any cancelled tests. This includes tests that have and have not been resulted.

Sparrow will need to follow all of the rules listed above for Corrected results with the following exceptions when there is a test cancelled for any reason:

OBR-26 – Status will contain an 'X'.

OBX-12 – Results status will contain a 'D' on all OBX segments.

If the test has not been resulted, Sparrow will send one OBX segment with the result value (OBX-6) of 'CANCELLED'.

If the test has been resulted, Sparrow will send the maximum number of OBX segments allowed for that particular test code.

Incorrect source facility (ordering provider) chosen

If a source facility is entered incorrectly and then changed back to one of our doctors, we will not receive results by HL7 or paper unless someone manually sends it from Sparrow. It is possible that MSU would not receive a result in paper or electronic form in this case.

- It is the responsibility of Sparrow to create and route an HL7 message to MSU if the source facility has been changed from the original requisition.

Adding information to a test that has been resulted

On some tests, the result information is placed into the test comment field after the test has been resulted out. (ex. Smear to pathologist) It is possible that MSU would not receive an updated result in paper or electronic form if procedures are not followed by Sparrow lab staff.

- **It is the responsibility of Sparrow** to create and route a new HL7 message to MSU with any changes to the patient, test and/or result in the form of comments, notes, values or information that could be deemed important to the interpretation of the results for a patient.

Maintaining test codes and methods

- **Sparrow is responsible** for informing MSU of any changes, additions or deletions to tests, methods or result codes a minimum of five working days before the change is actually made in the Sparrow system.
- When MSU brings up a new clinic on the EMR, there will be new tests needed in the cross-reference file. **Sparrow is responsible** for cooperating with the process of cross-referencing Sparrow test codes to Logician test codes.

Maintaining source facilities (ordering providers)

Currently, Sparrow filters the HL7 messages that are sent to MSU by source facility (ordering provider).

- If a provider is added to the HealthTeam that will be ordering tests from Sparrow, this will need to be communicated to – at a minimum – the HealthTeam IS person responsible for the cross-reference tables, the Sparrow person responsible for enabling the Sparrow ID in ALG and the Sparrow person responsible for adding the Sparrow ID to the interface table enabling it to come across the interface.

Sparrow Upgrades or planned downtime

Major upgrades to the Sparrow system could adversely affect the SRL interface on the MSU side of things. Any major upgrade to the Sparrow system needs to allow for sufficient testing to be done between Sparrow and MSU. Sparrow will provide cooperation and assistance with this testing. In addition to this any Sparrow planned downtime that could adversely affect HL7 messages being sent to MSU will be communicated to MSU no later than five working days before the downtime is scheduled.

Bloodbank (BLB) tests

In order for results to go into the EMR correctly, some customization was done to tests that have BLB as a department. The following has been assumed for all tests that show ‘BLB’ as the department in the HL7 message. Tests are to be sent over one test (OBR) at a time. This test will have two results (OBX) with the same result code for each OBX. The first OBX contains heading information and the second will have a requisition number followed by two spaces and then the actual result. This is assumed for **ALL** BLB tests. *Changes to Sparrow’s resulting procedures for Bloodbank results must be communicated to MSU no later than five working days before this change is put into production in the Sparrow system.*

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OBR|1|RU 16215308061102^ALG|RU 16215308^ALG|1610^*ABO GROUP AND RH
TYPE*^ALG^A^N|||200206111100|||||200206111242|LAV7^^LAVENDER TOP
T|00959^ABBOTT, CATHLEEN
MD|||162153||200206111433||BLB|F||001^^^200206111100^^R^U|1234P|||||200206111100|
OBX|1|ST|SH1610101^GROUP AND TYPE^^0010000100|1|REQUEST #-----ABO RH-----
-----||||F|N^|200206111433|||
OBX|2|ST|SH1610101^GROUP AND TYPE^^0010000100|2|061120021402 AB POS|
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Microbiology/SendOuts/Miscellaneous tests

In order for results to go into the EMR correctly, some customization was done to tests that come over with multiple OBX segments that have the same test code. These tests are mainly Microbiology and “sendouts”, but are not limited to the two. On these tests the OBX segments are combined into one OBX result. If the result is large, the result is transferred into an NTE segment. This is done because of the limitations with the result field. The result field will hold up to 2000 characters, the NTE segment will hold up to 64K of data. MSU will be informed of any major changes to Sparrow’s “sendout” or microbiology resulting practices with adequate time for testing.

HL7 message format

Sparrow agrees to send HL7 messages in the format documented in the HL7 definitions listed on <http://35.9.86.49/HL7%20Definitions/Forms/AllItems.htm>.