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# Summary

This specification details the high level functions needed to close the loop for the iSanté - OpenELIS interconnect. Six new functions are required in iSanté and six new functions are required in OpenELIS.

None of these functions appear to be optional with the possible exception of the test catalog synchronization (see the discussion of that below) and the pending orders user interfaces. The estimate doesn’t really include documentation or a training plan, though based on current experience, both would be essential.

Caution: This is a high-level specification that does not fill in all critical details. It is assumed that developers responsible for each function will provide more specifics and that necessary review by stakeholders is undertaken to gain approval for the approaches proposed.

Technical Note: The services described here can work without authentication if both iSanté and OpenELIS are running on the same server. If not, cross domain server-side authentication will be necessary. This would need to be configured case by case, unless we were willing to use a default password throughout Haiti, similar to how the patient search service currently works. For the initial design, we can assume there is only a one-to-one relationship between iSanté and OpenELIS. In any case, we ought to implement all services in the same way if possible, either along the lines of the existing patient search service, or using curl as we do with patient transfer in iSanté [is the results interface also done this way?].

All aspects of the specification should be reviewed, improved upon, expanded, and corrected by everyone involved.

# iSanté Functions

## Lab Form/User Interface

This interface replaces the existing iSanté [HIV] lab form as well as the lab orders section of the primary care and ob-gyn forms. So part of the effort here (a minor part) is to remove these from the iSanté interface. There are challenges to implementing this successfully:

1. The clinical view of available/desired lab tests does not perfectly match the lab view of tests that can be performed. The clinical view for ordering is simple and general, while the lab view for testing is complex and detailed, based upon the sample type provided and the lab bench at which the test is performed. The iSanté side of the order interface needs to be as simple as possible to satisfy OpenELIS, but no simpler. There is an implied one to many mapping of clinician order items to OpenElis tests that will need to be generated at some point prior to reporting results back to iSanté.
2. Replacing an existing form in iSanté requires approval from clinicians, from CONASIS, and potentially from other groups in Haiti.
3. The dynamic nature of testing means that this interface and form will not be static over time. The extent to which it changes is a function of the tests themselves and the flexibility of the lab workflow to absorb changes.

The link below is the current proposal for the paper version of the lab order form, provided by Dr. Balan at the end of November 2012.

[Balan's draft lab order form](https://docs.google.com/file/d/0B_nkvGpYalKAWU9fY0ZKZzdyNGc/edit?usp=sharing)

As part of the completion of this UI task, we will need to assure that this is the CONASIS approved form. In discussions with Mary Nagle and Dimitri Pierre-Lys on Feb 12, 2013, they stated that not all tests on Dr. Balan’s form are in the OpenElis test catalog. Further, Mary feels that the OE interface must be changed so that type of test is chosen when entering results instead of when initially entering or processing orders.

The external requirements document for the order form/user interface is here:

[User Requirements For iSanté Lab Orders](https://docs.google.com/document/d/1oNGF8pFvbS2rmkUqbJkF5pX7E7gLXqoyAFcOtoi0Zqs/edit?usp=sharing)

## Transmit Order to OpenELIS

This posts an order to OpenELIS in the format specified here: HL7 v2.5.1. It should receive a HL7 response message. The order would come from the iSanté labs table. The minimal information sent would include:

1. Lab order number generated by iSante (external to OpenElis)
2. Patient information including (note: these are taken from the current patient search)
   1. mothersFirstName
   2. GUID
   3. DOB
   4. STNumber (PCNumber, OBNumber; maybe identifierType, identifierNumber pairs?)
   5. nationalId
   6. gender
   7. lastName
   8. firstName
3. Order time, the timestamp of when the order was made, not when it was sent to OpenElis
4. Panels and tests requested (each of these would be either a unique key to a row from the test catalog or a non-unique key that could be resolved when the order is reviewed on the OE side)
5. The url for receiving the lab orders is http://<IP>/haitiOpenElis/OrderRequest

## User Interface/Pending Orders iSante (optional)

This is a user interface that would show pending orders for a specific patient similar to the way that results are displayed currently. It could perhaps be a toggle within the existing results display, or pending orders could be interspersed with results, depending on clinical preference. This may not be necessary, so it is considered optional.

## Test catalog synchronization

Test catalog synchronization is complicated. There seem to be a number of options for sourcing the tests:

1 The iSanté labLookup table is synchronized with the latest version of the OpenELIS test catalog whenever iSanté is about to build and issue a new release. This is almost automated now, but requires some manual intervention. So it would be possible to implement orders in iSanté using labLookup with only OpenELIS tests displayed. This is easy because all iSanté tests have a 2-digit ID and OpenELIS tests have a 4-digit ID. So far synchronization has meant iSanté picking up the latest version of the OpenELIS test catalog whenever it is about to issue a new release.

2 A utility could be built that would read the OpenELIS catalog at a site and load it’s contents into the iSanté labLookup table. This could be done manually when a new release of OpenELIS is installed; or scheduled to run monthly, weekly, or daily. The manual intervention required in 1) would need to be eliminated.

3 A service could provide a dynamic view into the OpenELIS test catalog.

4 A service could provide for dynamic viewing and updating a master test catalog.

1) and 2) require some effort on the iSanté side. 3) and 4) would not.

# OpenELIS Functions

## User Interface/Order Entry-Receiving-processing

The existing interface is mostly ok as regards tests. It needs to be changed to put the patient search/register fields at the top and the test selection below. The register patient transaction will need to be added (see *consume registration from OpenELIS* above). It may require some changes in the workflow as well. The order receiving and processing will required functionality to create new tables based on specific business rules.

## User Interface/Order

The existing interface is mostly ok as regards tests. It needs to be changed to put the patient search/register fields at the top and the test selection below. The register patient transaction will need to be added (see *consume registration from OpenELIS* above).

## Test catalog synchronization

Most of the work in 3) and 4) above (iSanté--*test catalog synchronization*) would need to be done in OpenELIS. Paul previously circulated a related proposal, which is here:

https://docs.google.com/open?id=1d10NZnv9RSjDAOIQ3x9bjts9\_VMT0DAeEiV0B7O9QDEDuElslZjWkMRAt3KF

## Test Names

The following is a list of the test names to be supported along with how many differing sample types they are associated with. (select name, count(\*) as sample\_types from clinlims.test where is\_active = 'Y' group by name order by count(\*) desc, name;)

"ASO";3

"Bacteries";3

"Chlorures";3

"Colloidal Gold / Shangai Kehua VIH";3

"Couleur";3

"Creatinine";3

"CRP";3

"Determine VIH";3

"Helicobacter Pilori";3

"Hépatite B Ag";3

"Hépatite C IgM";3

"HTLV I et II";3

"Malaria Test Rapide";3

"SGOT/AST";3

"SGPT/ALT";3

"Syphilis Bioline";3

"Syphilis RPR";3

"Syphilis Test Rapide";3

"Syphilis TPHA";3

"VIH Elisa";3

"VIH test rapide";3

"Aspect";2

"B-HCG";2

"C3 du Complement";2

"C4 du complement";2

"Cellules Epitheliales";2

"Coloration de Gram";2

"CRP Quantitatif";2

"Dengue NS1 Ag";2

"Filaments Myceliens";2

"FSH";2

"Globules Blancs";2

"Globules Rouges";2

"Glycemie";2

"Herpes Simplex";2

"Levures Bourgeonantes";2

"Levures Simples";2

"LH";2

"pH";2

"Proteines";2

"PSA";2

"Recherche de BARR par Fluorochrome Specimen 1";2

"Recherche de BARR par Fluorochrome Specimen 2";2

"Recherche de BARR par Fluorochrome Specimen 3";2

"Recherche de BARR par Ziehl Neelsen Specimen 1";2

"Recherche de BARR par Ziehl Neelsen Specimen 2";2

"Recherche de BARR par Ziehl Neelsen Specimen 3";2

"Test de comptabilite";2

"Acide ascorbique";1

"Acide urique";1

"Albumine";1

"Amylase";1

"Anti-Thrombine III (Activite)";1

"Anti-Thrombine III (Dosage)";1

"Azote de l'Uree";1

"Azote Urée";1

"Basophiles";1

"BE";1

"Bicarbonates";1

"Bilirubine";1

"Bilirubine directe";1

"Bilirubine indirecte";1

"Bilirubine totale";1

"Bleu de Methylene";1

"Calcium";1

"Calcium (Ca++)";1

"Camp-test";1

"Catalase";1

"CCMH";1

"CD4 Compte Absolu";1

"CD4 Compte en %";1

"cellules epitheliales";1

"Cetones";1

"Chlamydia Ab";1

"Chlamydia Ag";1

"Chlore";1

"Chlorure";1

"Cholera Test rapide";1

"Cholesterol Total";1

"Cholestérol total";1

"Clostridium Difficile Toxin A & B";1

"CMV Ig A";1

"CMV Ig G";1

"Coagulase libre";1

"Coloration à l'acridine orange";1

"Coloration à l'auramine";1

"Coloration de Kinyoun";1

"Coloration de Ziehl-Neelsen";1

"Compte de spermes";1

"Compte des Globules Blancs";1

"Compte des Globules Rouges";1

"Coombs Test Direct";1

"Coombs Test Indirect";1

"Coproculture";1

"CPK";1

"creatinine";1

"Créatinine";1

"Cristaux";1

"Cryptococcus Antigene dipstick";1

"Culture Bacterienne";1

"Culture de M. tuberculosis";1

"Cylindres";1

"Dengue";1

"Dengue Ig A";1

"Dengue Ig G";1

"Densite";1

"DNAse";1

"Electrophorese de l'hemoglobine";1

"Eosinophiles";1

"Examen Microscopique apres concentration";1

"Examen Microscopique direct";1

"Facteur IX";1

"Facteur Rhumatoide";1

"Facteur VIII";1

"Fer Serique";1

"filaments myceliens";1

"Formes anormales";1

"Formes normales";1

"Frottis Uretral/Gram";1

"Frottis Vaginal/Gram";1

"Fructose";1

"Glucose";1

"glycemie";1

"Glycémie";1

"Glycemie Postprandiale";1

"Glycémie provoquée";1

"Glycémie provoquée 1/2 hre";1

"Glycémie provoquée 1hre";1

"Glycémie provoquée 2hres";1

"Glycémie provoquée 3hres";1

"Glycémie provoquée 4hres";1

"Glycemie Provoquee Fasting";1

"Groupe Sanguin - ABO";1

"Groupe Sanguin - Rhesus";1

"HCO3";1

"HDL";1

"HDL-cholestérol";1

"Hematies";1

"Hematocrite";1

"Hemoculture";1

"Hemoglobine";1

"Hémoglobine glycolisee";1

"Heparinemie";1

"Hydrolyse de l'esculine";1

"INR";1

"KOH";1

"LCR GRAM";1

"LCR ZIELH NIELSEN";1

"LDH";1

"LDL";1

"LDL-cholesterol (calculée)";1

"LE Cell";1

"Leucocytes";1

"Levures";1

"Lipase";1

"Lipide";1

"Liquefaction";1

"Lithium";1

"Lymphocytes";1

"magnésium";1

"Malaria";1

"MBG";1

"Mixtes";1

"Mobilité";1

"Mono Test";1

"Monocytes";1

"Motilite 1 heure";1

"Motilite 3 heures";1

"Motilite STAT";1

"Neutrophiles";1

"Nitrites";1

"O2 Saturation";1

"Oestrogene";1

"ONPG";1

"Oxydase";1

"PaCO2";1

"PaO2";1

"Ph";1

"Phosphatase Alcaline";1

"phosphore";1

"Plaquettes";1

"Potassium";1

"PPD Qualitaitif";1

"PPD Quantitatif";1

"Progesterone";1

"Prolactine";1

"Protéines totales";1

"Réaction de Voges-Proskauer";1

"Recheche de microfilaire";1

"Recherche de cryptosporidium et Oocyste";1

"Sang";1

"Sang Occulte";1

"SGOT (AST)";1

"SGOT/ AST";1

"SGPT (ALT)";1

"SGPT/ ALT";1

"Sickling Test";1

"Sodium";1

"spores";1

"T3";1

"T4";1

"Taux reticulocytes - Auto";1

"Taux reticulocytes - Manual";1

"TCMH";1

"Techniques d'agglutination";1

"Temps de cephaline Activé(TCA)";1

"Temps de Coagulation";1

"Temps de Coagulation en tube";1

"Temps de Prothrombine";1

"Temps de saignement";1

"Test à la porphyrine";1

"Test à la potasse";1

"Test de Grossesse";1

"Test de Rivalta";1

"Test de Widal Ag H";1

"Test de Widal Ag O";1

"TOXOPLASMOSE GONDII Ig M Ac";1

"TOXOPLASMOSE GONDII IgG Ac";1

"trichomonas";1

"Trichomonas hominis";1

"Trichomonas vaginalis";1

"Triglyceride";1

"Triglycéride";1

"Triponine I";1

"TSH";1

"Typhoide Widal Ag H";1

"Typhoide Widal Ag O";1

"Uree";1

"Urée-tryptophane";1

"Urée (calculée)";1

"Urobilinogene";1

"VGM";1

"Vitesse de Sedimentation";1

"VLDL";1

"VLDL – cholesterol (calculée)";1

"Volume";1

"α1 globuline";1

"α2 globuline";1

"β globuline";1

"ϒ globuline";1

# Mothballed **iSanté Functions**

## Consume Registration from OpenELIS

This service receives a patient record from OpenELIS, checks that the patient is not already registered in iSanté, and does a new patient registration, using the GUID provided in the transaction. It returns success if the registration succeeds and the patient’s GUID if the patient already exists. Since the patient search service has already determined a mapping between patient records in iSanté and patient records in OpenELIS, it is assumed that this record will use the same mapping. At least a review of the existing mapping should be undertaken. If necessary, an expanded mapping should be determined and corresponding modifications to the patient search service should be made.

## Consume Order from OpenELIS

This service receives an order from OpenELIS and inserts the order’s tests into the iSanté lab table. In that way it resembles results consumption without the results themselves. The function is necessary in the case where the order is entered into OpenELIS before it is entered into iSanté. This would most likely happen only if the site was not doing point of care entry and if a patient was also registered at the lab instead of from iSanté.

**Mothballed OpenELIS Functions**

## Transmit Registration to iSanté

If a patient shows up at the lab before being registered in iSanté, this transaction would send a patient record to iSanté with a OpenELIS-generated GUID, and iSanté would add that patient (see *consume registration from OpenELIS* above). If the patient was previously registered, the transaction would return the patient’s previous GUID.

## Patient Deduplication

If a patient that is already registered in iSanté is also registered locally in OpenELIS, or if the same patient is registered more than once in OpenELIS then this functionality would decide which patient record would be the *chosen* one, and all information (orders/results) would be removed from the *not-chosen* patients and added to the *chosen* patient.

## Order Reflection from OpenELIS to iSanté

Similar to the existing send results transaction, this would send a new order to iSanté if the order originates in OpenELIS. In addition, it would send any changes made by the OpenELIS user to orders originating in iSanté back to iSanté. So, for instance, if the clinician requested a tb smear, but sent a rapid test sample, OpenELIS would modify the order to reflect a rapid test [probably not a good example, but you get the idea?].

## User Interface/Pending Orders

At both the individual patient level and/or at the test group/overall level, this would show pending orders, or perhaps the stage of test processing, if that has any meaning or value within the laboratory. This is probably optional.

Shouldn't this be mothballed or are you proposing to actually do some kind of dynamic test catalog?