HL7 Generator Tool Overview (CSV File Input)

Version 20220225

| Version number	Changes made
20200921	Added capability to customize the file name (Step 5 to Step 5A and 5B)
	Updated notes around replacement value handling
20201016	Updated instructions to explain how testing lab / reporting facility information is used.
	Updated instructions to clarify which element in the csv file is used as the look up in the Local Code column on the DropDownValues tab
	Updated instructions to indicate how to deal with assigning authority
20201125	Added note about use of only the first row per specimen for comments
	Added Mapping table for content in the COVID-19 LIVD file to specific csv file columns
20210105	Added instructions what to do, when you need help
20211026	Added instructions for using the flat file generator tool for different programs (e.g., PHLIP)
20220225	Added instructions to explain how to generate individual messages rather than batch.
	Added the evaluation for "CLIP" in Testing_Lab_ID in addition to "CLIA".

How to Enable Macros

Starting in April 2022 - Office Version 2203, macros in files obtained from the internet will be disabled by default.

Enable the macro by right clicking the file, open Properties, see Security, select Unblock checkbox, and select OK button. For more information, please see Microsoft additional information page below.

https://docs.microsoft.com/en-us/DeployOffice/security/internet-macros-blocked#mark-of-the-web-motw-and-trusted-documents
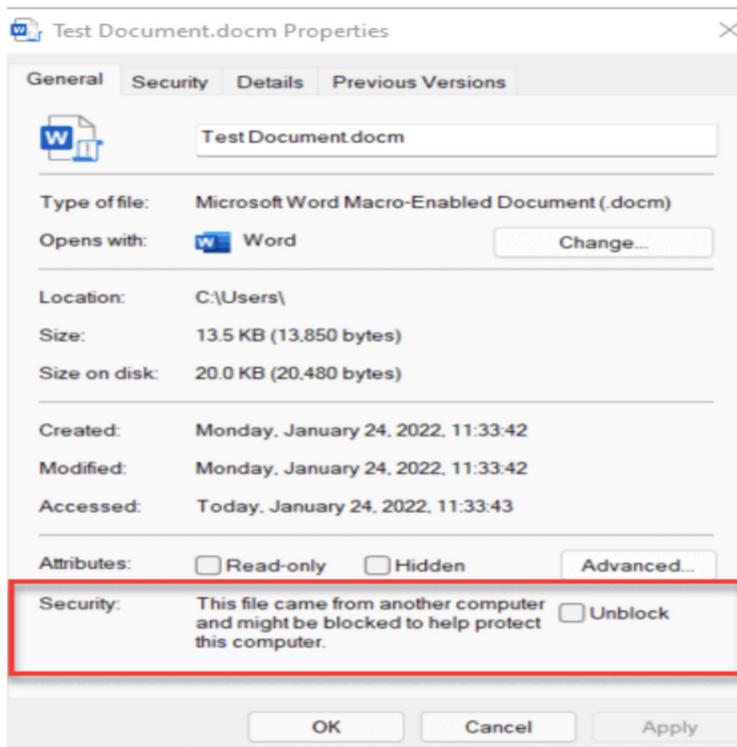
This tool is built into Microsoft Excel and has various tabs, some of which are for data input and some of which are for configuration data.

Note: When you have to update to a new version of the tool it is recommended to copy over the entire tabs EXCEPT for the Admin tab - copy only your settings (values in Column B) over to it.

Description of Tabs in the HL7 Generator Tool

Instructions Tab: Contains overall instructions and buttons to execute the generation

Gap_Analysis_7-8 Tab: Contains the overall data guidance/constraints provided by CDC and HHS on 7/8/2020

Flatfile_Result_Use Tab: Data entry tab which allows the user to manually enter data into the required fields to generate an HL7 v.2.5.1 compliant message. This provides the file layout and column headers that the imported file must contain – the tab itself is not used when using csv file input option. Column header order is not important when creating the csv input file; the column header names are not case sensitive.

In order to help with population of some of the content use the following table to extract related information for the specific test you are performing using the COVID-19 LIVD file accessible here: https://www.cdc.gov/csels/dls/sars-cov-2-livd-codes.html

Column Header in Flatfile HL7 Generator	LIVD Column Name	LIVD Column ID	Comment
Ordered_test_code	LOINC Order Code	H	This is the preferred value to use in the Ordered_test_code column in the csv file and also populate column C in the DropDownValues tab, so that the lookup can properly work to include the version number
Ordered_test_description	LOINC Order Code Long Name	I	
Ordered_test_code_system	Not explicitly in the LIVD file, but can be assumed by the column header name - should be set to "LN"		

Column Header in Flatfile HL7 Generator	LIVD Column Name	LIVD Column ID	Comment
Specimen_type_code	Vendor Specimen Description the first element in the () - a numeric value in most cases.	D	This is the preferred value to use in the Specimen_type_code column in the csv file and also populate column C in the DropDownValues tab, so that the lookup can properly work to include the version number
Specimen_type_description	Vendor Specimen Description the second element in the () - text	D	
Specimen_type_code_system	Vendor Specimen Description the third element in the () - "SCT" in most cases	D	
Test_kit_EUA_ID	Testkit Name ID, when Testkit Name ID Type = "EUA"	M and N	Use the content of this column and append _<Testkit Name ID Type>, so in this case _EUA
Test_kit_model_ID	Testkit Name ID, when Testkit Name ID Type = "DIT"	M and N	Use the content of this column and append _<Testkit Name ID Type>, so in this case _DIT
Test_kit_model_name	Testkit Name ID, when Testkit Name ID Type = "MNT" or "MNM"	M and N	Use the content of this column and append _<Testkit Name ID Type>, so in this case _MNT
Instrument_model_ID	Equipment UID, when Equipment UID Type = "DII"	O and P	Use the content of this column and append _<Testkit Name ID Type>, so in this case _DII
Instrument_model_name	Equipment UID, when Equipment UID Type = "MNI"	O and P	Use the content of this column and append _<Testkit Name ID Type>, so in this case _MNI

Column Header in Flatfile HL7 Generator	LIVD Column Name	LIVD Column ID	Comment
Test_performed_code	LOINC Code	F	This is the preferred value to use in the Test_performed_code column in the csv file and also populate column C in the DropDownValues tab, so that the lookup can properly work to include the version number
Test_performed_description	LOINC Long Name	G	
Test_performed_code_system	Not explicitly in the LIVD file, but can be assumed by the column header name - should be set to "LN"		
Test_result_coded	Vendor Result Description the first element in the () - a numeric value in most cases.	E	This is the preferred value to use in the Test_result_coded column in the csv file and also populate column C in the DropDownValues tab, so that the lookup can properly work to include the version number
Test_result_description	Vendor Result Description the second element in the () - text	E	
Test_result_code_system	Vendor Result Description the third element in the () - "SCT" in most cases	E	

Configuration Tab: Contains two parts that determine data mapping for each message generated by the tool.

1. Static values to be included in specific data fields for all messages generated
    a. If Column E – "Corresponding input column name (to replace if empty)" is populated, the tool will only populate this entry if the corresponding input column is empty. (e.g., for reporting_facility_id – if the csv file has values, the tool will use those, if those cells are blank, the tool will use the value from the configuration tab in cell B11. This means:

If you are reporting only for one facility you can use the configuration tab values and don't need to populate the cells in the csv file, but if you are reporting for many different testing sites, you should only use the csv cell values and leave the configuration cells blank, so that you get an error, when csv file data is missing).

2. References that map valid values from the dropDownValues tab to the HL7 replacement value for each column configured. The dropdowns are manually configured to the data input fields on the Flatfile_Result_Use tab using data validation.

dropDownValues Tab: Defines specific value sets that are valid for certain HL7 elements and fields. Referenced by Configuration Tab and Flatfile_Result_Use Tab and allows for mapping local codes used in the csv file coded columns (e.g., test_performed_code) that is being imported to the standard codes to be included in the HL7 messages. If the lookup of the local value fails, it will then check to see if the input is in column D (Standard code). If it matches the value in Column D, it will map the replacement value to the HL7 message for that field, if it does not match, the file will error.

Admin Tab: Defines overall flat file configuration (input/output directories for processing, flatfile naming parameters, reporting profile) as well as validations and lookups to be used for various fields

For a video of this section see (The video uses the previous version of the tool, so if some screens look different don't despair – the screenshots in this document show the updated views): https://youtu.be/3SdD0D4vPwQ

Summary of Steps to Generate HL7 Output Files from CSV Input File

Setting up the tool

Step 1: Set up folder structures for files

Step 2: Open the HL7 Generator Tool

Step 3: In *Admin tab*, specify file directory paths

Step 4: In *Admin* tab, specify 'Test' or 'Prod'

Step 5A: For Centralized ELR partners using the AIMS Routing Service: In *Admin* tab, select "InterPartner" in Cell B13; specify the *InterPartner "From"* value in Cell B16, which will be the ID assigned to your organization by the AIMS team; specify 'AIMSPlatform' as the *InterPartner "To"* value in Cell B17; specify 'CentralizedELR' as the *InterPartner use case* value in B25; and select 'CentralizedELR' as the *Reporting Profile* value in B26.

Step 5B: For PHLIP partners using the AIMS Routing Service: In *Admin* tab, select ""InterPartner" in Cell B13; specify the *InterPartner "From"* value in Cell B16, which will be the ID assigned to your organization by the AIMS team; specify 'CDC' as the *InterPartner "To"* value in Cell B17; specify 'PHLIP_251' as the *InterPartner use case* value in B25; and select 'PHLIP' as the *Reporting Profile* value in B26.

Step 5C: For direct connections with jurisdictions: In *Admin* tab, select the desired file naming schema in Cell B13 and enter the specific requirements for the jurisdiction you are working with in Cell B14.

Step 6: In *Admin* tab, specify the .csv file name in Cell B20 for the tool to look for in the "Input" file directory path

Step 7: In *Admin* tab, specify the delimiter character in Cell B19 to note multiple values (repeats) in a single segment.

Step 8: In *Admin* tab, when Batch messages are selected to "TRUE" or "FALSE" to generate Individual messages or Batch message.

Step 9: Take test file (named to input filename specified in Step 6) and put in "Input" file directory

Step 10:   In *Instructions* tab*,* click "Process CSV and Generate HL7" button to generate test output

Step 11: In *Configuration* tab, populate static meta-data values.

Step 12: In *dropDownValues* tab, map local lab values to standard values for use in HL7; this includes demographic data, test related data and assigning authority identification

Step 13: In *Configuration* tab, ensure that all standard HL7 values from *dropDownValues* tab are represented in the bottom half of the tab

For videos of the above steps see here (The video uses the previous version of the tool, so if some screens look different don't despair – the screenshots in this document show the updated views):

https://youtu.be/5ZEK1JXRN5c

https://youtu.be/6_6v4cCv7y0

Creating the CSV file

Step 14: In *Gap Analysis* tab*,* view minimum required fields and indicate fields that your lab supports; if your lab is missing required fields, those will either need to be added or default values will need to be defined.

Step 15: Create CSV file for input

Step 16: Validate the csv file using the flat file validator tool: https://validator.aimsplatform.org/ (select the Flatfile Validator),

Step 17: Take CSV file (named to input filename specified in Step 6) and put in "Input" file directory

Step 18: In *Instructions* tab*,* click "Process CSV and Generate HL7" button to generate output

Step 19: Automation of the csv file conversion process

For a video of the above steps see here (The video uses the previous version of the tool, so if some screens look different don't despair – the screenshots in this document show the updated views): https://youtu.be/Ryp2z1MZlKg

Instructions when you need help

If you encounter issues, send an email to informatics.support@aphl.org

In the subject line include the name of your jurisdiction (if you are a PHA) or organization and "HL7 Generator Help". Describe your problem in detail and be sure to also attach your version of the HL7 generator file – as well as the csv file you are working with – make sure you are only sending TEST DATA (no PHI).

Detailed Steps to Generate HL7 Output Files from CSV Input File

Setting up the tool

Step 1: Create a folder structure (suggested on Desktop of your Computer) with four folders: Input, Output, Processed, Error. Write down the full paths of each of the folders.
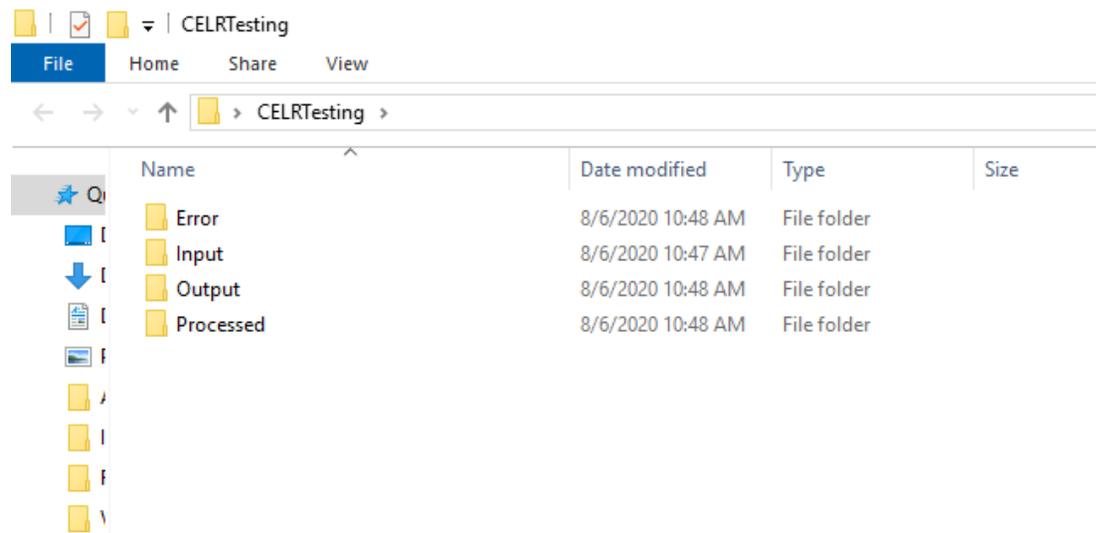
Step 2: Open the HL7 Generator tool Excel file (*NatELRFlatFile_GapAnalysis_HL7Generator.xlsm*). Enable all content and macros. Click on "Save As" and add your own unique filename to save your specific configurations separate from the base tool file (i.e., *NatELRFlatFile_GapAnalysis_HL7Generator_Testing.xlsm*).

Step 3. Go to the *Admin* tab of the tool. Note that Config items highlighted in yellow on the *Admin* tab are the fields that need to be configured. Enter the full directory paths for the Input, Output, Processed and Error Directories from Step 1.

Please note that the tool can process files automatically that are placed in a network drive. Please contact informatics.support@aphl.org to discuss configuration and other necessary considerations for optimal processing performance.

	A	B	C	FlatFile_C
1	Config Item	Value	Description	FlatFile_C
2	Input Directory	C:\runMacro\test1\input		Abnormal_flag
3	Output Directory	C:\runMacro\test1\output		Comments
4	Processed Directory	C:\runMacro\test1\processed		Date_result_re
				Disease_symp
5	Error Directory	C:\runMacro\test1\error		
6	FlatFile_order_use column to count rows	BB		Employed_in_I
7	FlatFile_Result_Use final column	DP		Employed_in_I
8				First_test
9	Timer on	FALSE		flatfile_version
10	Number of Errors before exit	0		Hospitalized
11	Include Batch header and footer	TRUE		ICU
12				Illness_onset_
13	File Naming option	InterPartner		Instrument_in
14	Manual file Name	ELR~		Instrument_m
15	Current Usage (and MSH-11 mapping)	Prod		Instrument_m
16	InterPartner "From" value	eTrueNorth		Link_test_to_p
17	InterPartner "To" value	AIMSPlatform		Link_test_to_p
18	Test result exclude from normal processing	Test_kit_EUA_ID,Test_kit_model_ID,Test_kit_model_name,Test_result_code_system,Test_r	Order_result_s	
19	Multiple value separator	;		Order_test_da
20	Input file name	csvTextOutput.csv		Ordered_test_
21	Debug mode	FALSE		Ordered_test_
22	Time zone	ET		Ordered_test_
23	Column to count input CSV rows	Patient_ID		Ordering_facili
24	Default hour for timestamp when time not provi	08		Ordering_facili
25	InterPartner use case	CentralizedELR		Ordering_facili
26	Reporting Profile	CentralizedELR		Ordering_facili
27				Ordering_facili
28				Ordering_facili

Step 4: On the *Admin* tab, select the appropriate value (Test or Prod) from the drop down for the field *Current Usage (and MSH-11 mapping).*

Step 5A: Setting up for Use of InterPartner file naming convention for CentralizedELR partners: On the *Admin* tab, in Cell B13 select InterPartner.

On the *Admin* tab, in Cell B16 *InterPartner "From" value*, input the appropriate value for your organization (example below shows "eTrueNorth"), which will be the ID assigned to your organization by the AIMS team; in Cell B17 specify 'AIMSPlatform' as the *InterPartner "To" value*; in Cell B25 specify 'CentralizedELR' as the *InterPartner use case* value; and in Cell B26 select 'CentralizedELR' as the *Reporting Profile* value. For more information about setting up the InterPartner filename follow instructions in *"AIMS - CentralizedELR InterPartner Messaging Guide".* This step is important when using AIMS routing services.

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B26 | CentralizedELR

	A	B	C	FlatFile_C
1	**Config Item**	**Value**	**Description**	**FlatFile_C**
2	Input Directory	C:\runMacro\test1\input		Abnormal_flag
3	Output Directory	C:\runMacro\test1\output		Comments
4	Processed Directory	C:\runMacro\test1\processed		Date_result_re
				Disease_symp
5	Error Directory	C:\runMacro\test1\error		
6	FlatFile_order_use column to count rows	BB		Employed_in_
7	FlatFile_Result_Use final column	DP		Employed_in_
8				First_test
9	Timer on	FALSE		flatfile_version
10	Number of Errors before exit	0		Hospitalized
11	Include Batch header and footer	TRUE		ICU
12				Illness_onset_
13	File Naming option	InterPartner		Instrument_in
14	Manual file Name	ELR~		Instrument_m
15	Current Usage (and MSH-11 mapping)	Prod		Instrument_m
16	InterPartner "From" value	eTrueNorth		Link_test_to_p
17	InterPartner "To" value	AIMSPlatform		Link_test_to_p
18	Test result exclude from normal processing	Test_kit_EUA_ID,Test_kit_model_ID,Test_kit_model_name,Test_result_code_system,Test_	Order_result_
19	Multiple value separator	;		Order_test_da
20	Input file name	csvTextOutput.csv		Ordered_test_
21	Debug mode	FALSE		Ordered_test_
22	Time zone	ET		Ordered_test_
23	Column to count input CSV rows	Patient_ID		Ordering_facili
24	Default hour for timestamp when time not provi	08		Ordering_facili
25	InterPartner use case	CentralizedELR		Ordering_facili
26	Reporting Profile	CentralizedELR		Ordering_facili
27		CentralizedELR		Ordering_facili
28		PHLIP		Ordering_facili

Step 5B: Setting up for Use of InterPartner file naming convention for PHLIP partners: On the *Admin* tab, in Cell B13 select InterPartner.

On the *Admin* tab, in Cell B16 *InterPartner "From" value*, input the appropriate value for your organization (example below shows "USAFSAM EpiLab"), which will be the ID assigned to your organization by the AIMS team; in Cell B17 specify 'CDC' as the *InterPartner "To" value*; in Cell B25 specify 'PHLIP_251' as the *InterPartner use case* value; and in Cell B26 select 'PHLIP' as the *Reporting Profile* value. For more information about setting up the InterPartner filename follow instructions in *"AIMS - CentralizedELR InterPartner Messaging Guide".* This step is important when using AIMS routing services.

Config Item	Value	Description	FlatFile_C
Input Directory	C:\runMacro\test1\input		Abnormal_flag
Output Directory	C:\runMacro\test1\output		Comments
Processed Directory	C:\runMacro\test1\processed		Date_result_re
Error Directory	C:\runMacro\test1\error		Disease_symp
FlatFile_order_use column to count rows	BB		Employed_in_
FlatFile_Result_Use final column	DP		Employed_in_
			First_test
Timer on	FALSE		flatfile_version
Number of Errors before exit	0		Hospitalized
Include Batch header and footer	TRUE		ICU
			Illness_onset_
File Naming option	InterPartner		Instrument_in
Manual file Name	ELR~		Instrument_m
Current Usage (and MSH-11 mapping)	Prod		Instrument_m
InterPartner "From" value	USAFSAM EpiLab		Link_test_to_p
InterPartner "To" value	CDC		Link_test_to_p
Test result exclude from normal processing	Test_kit_EUA_ID,Test_kit_model_ID,Test_kit_model_name,Test_result_code_system,Test_r		Order_result_
Multiple value separator	;		Order_test_da
Input file name	csvTextOutput.csv		Ordered_test_
Debug mode	FALSE		Ordered_test_
Time zone	ET		Ordered_test_
Column to count input CSV rows	Patient_ID		Ordering_facil
Default hour for timestamp when time not provi	08		Ordering_facil
InterPartner use case	PHLIP_251		Ordering_facil
Reporting Profile	PHLIP		Ordering_facil
			Ordering_facil
	PHLIP		Ordering_facil

Cell reference: B26 — PHLIP

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Step 5C: Setting up for Use of other file naming conventions: *When working directly with a jurisdiction they may have other requirements for file naming conventions, which can be configured using cell B14 in the Admin tab.*

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B29

	A	B	C	
1	**Config Item**	**Value**	**Description**	**FlatFile_C**
2	Input Directory	C:\runMacro\test1\input		Abnormal_flag
3	Output Directory	C:\runMacro\test1\output		Comments
4	Processed Directory	C:\runMacro\test1\processed		Date_result_ra
5	Error Directory	C:\runMacro\test1\error		Disease_symp
6	FlatFile_order_use column to count rows	BB		Employed_in_
7	FlatFile_Result_Use final column	DP		Employed_in_
8				First_test
9	Timer on	FALSE		flatfile_versior
10	Number of Errors before exit		0	Hospitalized
11	Include Batch header and footer	TRUE		ICU
12				Illness_onset_
13	File Naming option	ManualAndTimeStamp		Instrument_in
14	Manual file Name	ELR~		Instrument_m
15	Current Usage (and MSH-11 mapping)	Prod		Instrument_m
16	InterPartner "From" value	eTrueNorth		Link_test_to_p
17	InterPartner "To" value	AIMSPlatform		Link_test_to_p
18	Test result exclude from normal processing	Test_kit_EUA_ID,Test_kit_model_ID,Test_kit_model_name,Test_result_code_system,Test_	Order_result_
19	Multiple value separator	;		Order_test_da
20	Input file name	csvTextOutput.csv		Ordered_test_
21	Debug mode	FALSE		Ordered_test_
22	Time zone	ET		Ordered_test_
23	Column to count input CSV rows	Patient_ID		Ordering_facili
24	Default hour for timestamp when time not provi	08		Ordering_facili
25	InterPartner use case	CentralizedELR		Ordering_facili
26	Reporting Profile	CentralizedELR		Ordering_facili
27				Ordering_facili
28				Ordering_facili

Cell B13 in the *Admin* tab allows selection of one of 4 basic file naming schemes:

- Manual – where the filename is defined in the *Admin* tab in cell B14
- Manual with timestamp – uses the value from cell B14 in *Admin* tab and appends with the file creation date and time
- Manual with the name of the input file – uses the value from cell B14 in *Admin* tab and appends with the file name defined in cell B20

- Manual with the name of the input file and timestamp– uses the value from cell B14 in *Admin* tab and appends with the file name defined in cell B20 and the file creation date and time

On the *Admin* tab, note that Columns D-K contains the logic by which the different data fields are read, transformed, and output to the flat file. Please do not change these columns or the tool macros may break.

On the Admin tab, the fields "Timer on", "Number of Errors before exit" and "Debug mode" should be used by developers or those trained with the macro to perform integration testing. This is documented in "Developer Instructions". By default, "Timer on" and "Debug Mode" should be set to "FALSE" and "Number of Errors before exit" should be set to 0.

If you notice any issues, please contact AIMS Technical Assistance at informatics.support@aphl.org.

Step 6: In *Admin* tab, specify the .csv file name for the tool to look for in the "Input" file directory path. Note that the input CSV file that you use MUST be named this or the tool will not process it. Note that Config items highlighted in orange on the *Admin* tab are the fields that need to be configured.

Step 7: In *Admin* tab, specify the delimiter character to note multiple values (repeats) in a single field. Note that the default character used is a semicolon (;). Use this delimiter to list multiple values in the Disease_symptoms column. In the output, each value will be mapped to a separate OBX segment.

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B13   fx   InterPartner

	A	B	C	FlatFile_C
1	**Config Item**	**Value**	**Description**	**FlatFile_C**
2	Input Directory	C:\runMacro\test1\input		Abnormal_flag
3	Output Directory	C:\runMacro\test1\output		Comments
4	Processed Directory	C:\runMacro\test1\processed		Date_result_re
				Disease_symp
5	Error Directory	C:\runMacro\test1\error		
6	FlatFile_order_use column to count rows	BB		Employed_in_
7	FlatFile_Result_Use final column	DP		Employed_in_
8				First_test
9	Timer on	FALSE		flatfile_versior
10	Number of Errors before exit	0		Hospitalized
11	Include Batch header and footer	TRUE		ICU
12				Illness_onset_
13	File Naming option	InterPartner		Instrument_in
14	Manual file Name	ELR~		Instrument_m
15	Current Usage (and MSH-11 mapping)	Prod		Instrument_m
16	InterPartner "From" value	eTrueNorth		Link_test_to_
17	InterPartner "To" value	AIMSPlatform		Link_test_to_
18	Test result exclude from normal processing	Test_kit_EUA_ID,Test_kit_model_ID,Test_kit_model_name,Test_result_code_system,Test_		Order_result_
19	Multiple value separator	;		Order_test_da
20	Input file name	csvTextOutput.csv		Ordered_test_
21	Debug mode	FALSE		Ordered_test_
22	Time zone	ET		Ordered_test_
23	Column to count input CSV rows	Patient_ID		Ordering_facil
24	Default hour for timestamp when time not provi	08		Ordering_facil
25	InterPartner use case	CentralizedELR		Ordering_facil
26	Reporting Profile	CentralizedELR		Ordering_facil
27				Ordering_facil
28				Ordering_facil

Step 8: In *Admin* tab, when "Batch messages" is set to "TRUE" on column B27, a batched message will be the output. When "Batch messages" is set to "FALSE" on column B27, an individual message for each sample in the csv file will be the output.

Step 9: Take the CSV file you intend to use (or a test validation CSV file provided by AIMS) and place it in the "Input" file directory that you specified in Step 3.   Rename the file to the input CSV filename you specified in the *Admin* tab in Step 6 (make sure the filename matches exactly or the tool will not process it)
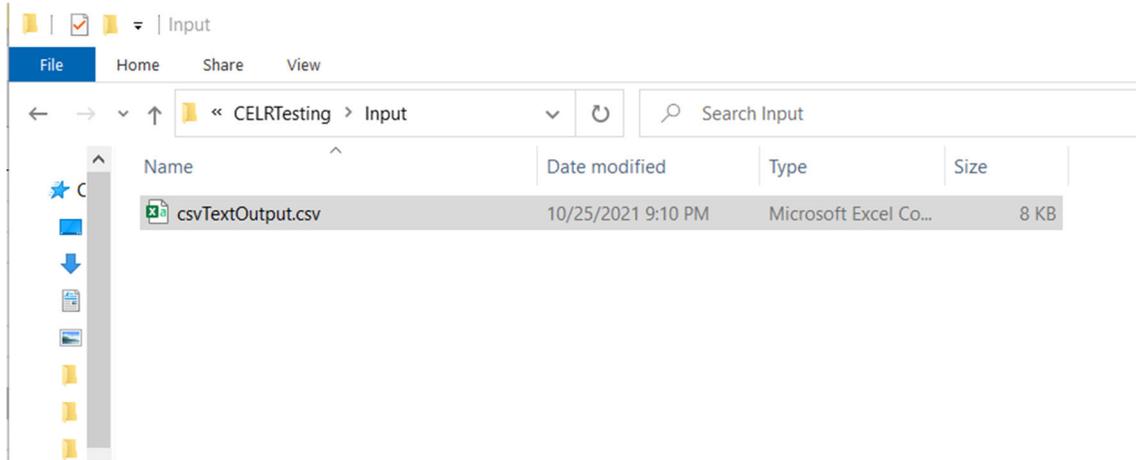
Step 10: Under the *Instructions* tab, click the "Process CSV and generate HL7" button to generate a test output. If a runtime error pops up, go through Steps 1 to 8 (especially Step 3 and Step 6) to ensure that all setup steps are correct. If no runtime error is generated or no message appears, the tool should take you to the *Admin* tab to the Input File Name field. Go to the Output directory set up in Step 3 to find an output file generated from the input CSV. The output is generated as an HL7 batch file. If there are errors in processing, such as missing required fields, improper data, wrong format, or lookup failure, it will not output an HL7 file and output the error file in the "Error" directory.
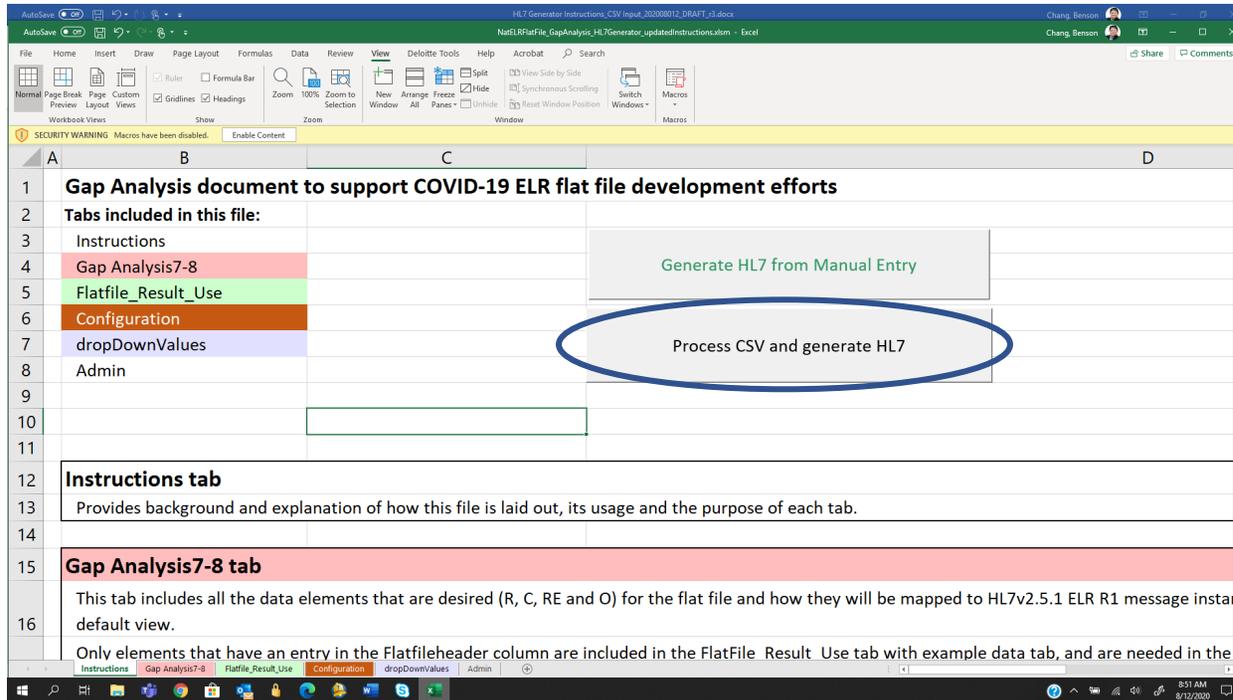
Output folder showing generated file:
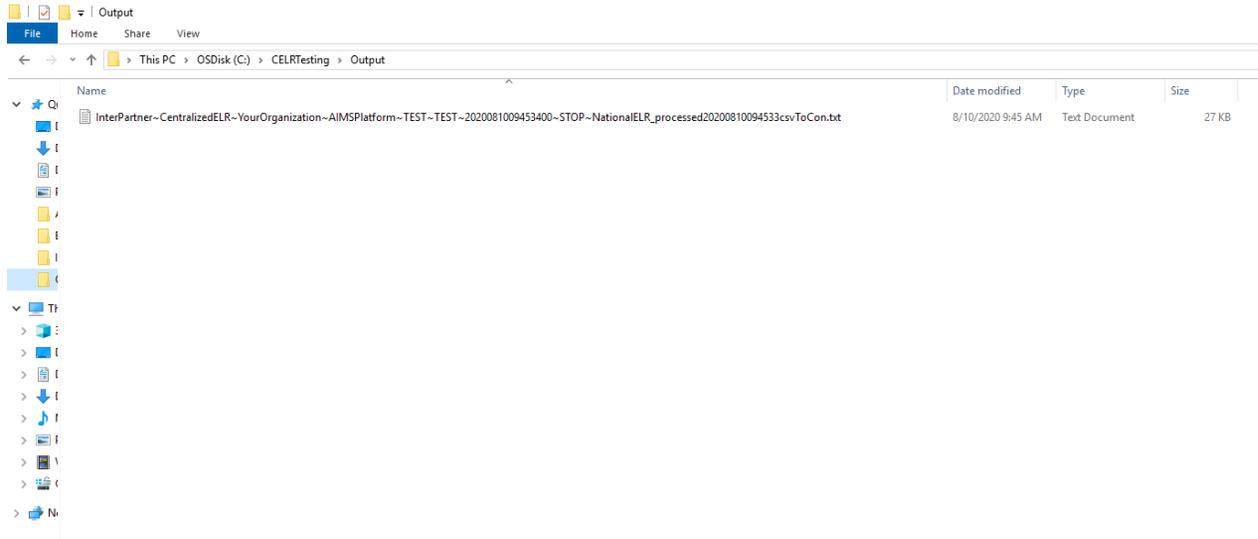
Step 11: Go to the *Configuration* tab. The top part of the tab specifies static values that will be sent with every HL7 message generated (i.e., your lab name, address, and CLIA number) and which fields they are mapped to in the HL7 message. If a field is left empty on the "Flatfile_Result_Use" tab, the field will be automatically populated with the appropriate value from the "Configuration" tab if column E "Corresponding input column name (to replace if empty)" is configured. Populate all fields in Column B, *Answer (local value)* that are highlighted in yellow. The tool will reference these values to populate the appropriate field when generating the HL7 message. You will need to create 1 tool file for each submitting laboratory if you are a data aggregator. Be sure to get the right values for MSH-5 (Cells B32 and B33) and MSH-6 (Cells B34 and B35) from the jurisdiction you are working with – if you are using the AIMS routing service make sure these fields are left blank. For PHLIP partners, populate the LIMS Namespace ID and OID (Cells B36 and B37). Either a CLIA or CLIP number can be populated in OBX-23.10. Based on the value in OBX-23.10, the "CLIP" or "CLIA" assigning authority value in "Testing Lab Assigning authority-CLIP" (cell B38) or "Testing Lab Assigning authority-CLIA" (cell B39) will be populated in OBX-23.6.

	A	B	C	D	E	F	G
1	Static Values	Do not move these columns. The macro code references specific cells.					
2	Data on this tab is assumed to be the same for each site, where testing is performed, so could be pre-populated for manual user entry or populated automatically if entry is blank						
3	Question	Answer (local value)	More information about the question	Mapping to HL7	Corresponding input column name (to replace if empty)	Additional mapping instructions	Related mapping value
4	Testing Laboratory Street	202 South Monroe		OBX-24.1	Testing_lab_street		
5	Testing Laboratory Street 2	Bldg 12		OBX-24.2	Testing_lab_street2		
6	Testing Laboratory City	Little Rock		OBX-24.3	Testing_lab_city		
7	Testing Laboratory State	AR		OBX-24.4	Testing_lab_state		
8	Testing Laboratory County	27029		OBX-24.9	Testing_lab_county		
9	Testing Laboratory Zip	72205		OBX-24.5	Testing_lab_zip_code		
10	Name of the reporting facility	eTrueNorth	For this project this can be left blank - if populated, it MUST NOT exceed 20 characters	MSH-4.1	Reporting_facility_name	MSH 4.3	CLIA
11	Identifier of the reporting facility	45D2134744	This MUST be a CLIA number	MSH-4.2	Reporting_facility_ID		
12	Name of the reporting system	UAMC		MSH-3.1	Report_facil_data_source_app	MSH-3.3	OID
13	OID for the reporting system (if known)	2.16.840.1.113883.3.13.2.2.1		MSH-3.2			
14	Testing Lab ID assigner	EHR	This is no longer used. the testing lab assigner name is copied from the Testing_lab_name column which is required				
15	Testing Lab ID assigner OID	2.16.840.1.113883.3.2226	This is no longer used. The testing lab assigner Id is copied from the Testing_lab_ID column which is required				
16	Name of the testing laboratory	UAMC-Sample		OBX-23.1	Testing_lab_name		
17	CLIA or CLIP number of the testing laboratory	04D1044169		OBX-23.10	Testing_lab_ID		
18	Name of the organization that assigns the Patient Identifier		Patient_ID_assigner -assigned from input column Patient_ID_assigner	PID-3.4.1-1			
19	OID of organization that assigns the Patient Identifier		Patient ID assigning OID-assigned from dropdown	PID-3.4.2-1			
20	Name of the organization that assigns the Patient Identifier		Patient_ID_assigner 2 -assigned from input column Patient_ID_2_assigner	PID-3.4.1-1			
21	OID of organization that assigns the second Patient Identifier		Patient ID assigning OID-assigned from dropdown	PID-3.4.2-1			
22	Test instrument or kit		If more than one test is performed, copy this row as often as needed	OBX-17.1		populate if OBX-17.1 empty	
23	Test instrument or kit		If more than one test is performed, copy this row as often as needed	OBX-17.1		populate if OBX-17.1 empty	
24	Test instrument or kit			OBX-17.1		populate if OBX-17.1 empty	
25	Default Specimen_type_description	Specimen of unknown material	If Specimen_type_description is not populated, enter this value	SPM-4.2	Specimen_type_description		
26	Default specimen type code	119324002	Default value if not populated	SPM-4.1	Specimen_type_code		
27	Software vendor	software vendor		SFT-1			
28	Software version or release number	v12		SFT-2			
29	Software Name	software name	Cannot exceed 20 characters	SFT-3			
30	Binary ID	Binary ID unknown		SFT-4			
31	Install date	20181008	Date in HL7 format 'YYYYMMDD'	SFT-6			
32	Receiving Application Name	AR.NBS		MSH-5.1			
33	Receiving Application OID	2.16.840.1.114222.4.3.3.2.5.3		MSH-5.2			
34	Receiving Facility Name	AR DOH	This field can be left blank, if using the AIMS routing service	MSH-6.1			Based on the name, look up the OID for use in MSH-6.2 and also
35	Name of the health department receiving the data	2.16.840.1.114222.4.1.141		MSH-6.2			
36	PHLIP LIMS namespace id	STARLIMS					
37	PHLIP LIMS OID	2.16.840.1.113883.3.2226					
38	Testing Lab Assigning authority-CLIP	DOD.CLMS&2.16.840.1.113883.3.8	This is to map to OBX 23.6 based on the value in OBX 23.10 for CLIP	OBX-23.6			
39	Testing Lab Assigning authority-CLIA	CLIA&2.16.840.1.113883.4.7&ISO	This is to map to OBX 23.6 based on the value in OBX 23.10 for CLIA	OBX-23.6			
40							

The bottom part of the *Configuration* tab refers to cells on the *dropDownValues* tab and indicates which range of dropdown values are mapped to particular HL7 fields. See next step for more details on the *dropDownValues* tab.
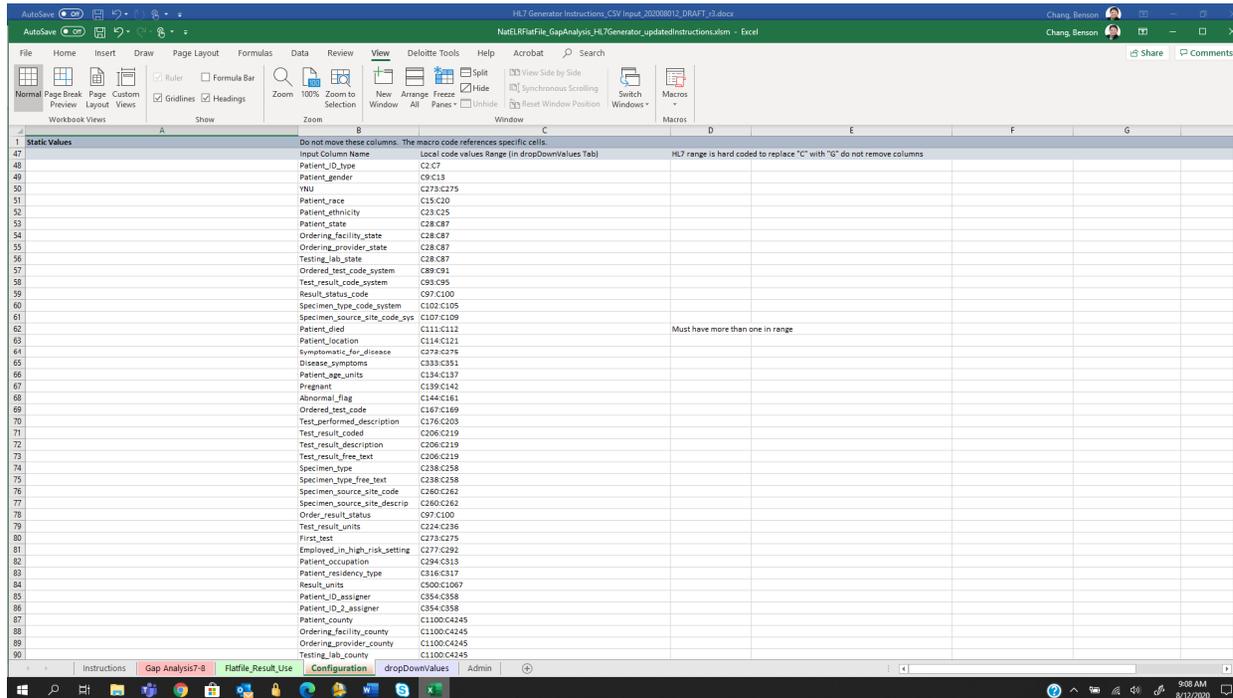
Step 12: The *dropDownValues* tab maps input values from your lab for certain fields that may be plain text or locally coded to standard values to be included in the HL7 output. Note that any input values in the Column C of the *dropDownValues* tab will be replaced with corresponding values in Column G of the same row.

- On the *dropDownValues* tab, enter any transformation values for particular data fields as new rows at the bottom of the tab, if additional values are needed, else update to your local values in column C.
- Ensure that Column A, *HL7 element / Field Name* matches the name of the data column in Row 1 of the *Flatfile_Result_Use* tab.
- Also ensure that each row in Column C, *Local Code* represents all the local values that could be received from your system.
    - Notes:
        - For all coded entries the following hierarchy applies:

- If the input value for the code (i.e. Ordered_test_code or Test_performed_code, or Test_result_coded or Specimen_type_code or Specimen_source_site_code) matches a value in the Local Code (Column C) or the Standard Code(Column D) then the entire replacement value will be used and entries in the respective *_code_system fields will be ignored; if the input value does not match the values from the respective fields in the input file will be used.
- If you need to map different local codes to the same standard codes (for example Detected and D both need to be mapped to detected, then you need to create a second version of the standard code entry in column D, or the tool will not process properly (the tool uses the replacement value from Column G, so that will not affect the HL7 file output values.
  - For identification of assigning authorities (so that identifiers across organizations will be unique):
    - Ensure you have local values that will be in the csv file represented in column C for these elements:
      - Patient_ID_assigner
      - If used: Submitter_sample_ID_assigner
    - Seek help in creating the replacement value in column G as an OID will be required as well as the suffix of '&ISO'
  - Transformation for county values starts on row 1218 (scroll way down!) – because many counties have the same name in different states, it is recommended that you include the state in the same field (we may update the tool in the future to use a combined search, but for now) to get the right county mapped.
- Column G *Replacement Value* is the standard value that will populate and replace your local code in the output file. Verify that that this replacement value is correct. In most instances you will want to use the standard code found in Column D. For example, in the screen below, a Local Code value of "Medical Record Number" in cell C2 (yellow) will be replaced with the value of "MR" as specified in cell G2, which is the standard code populated in cell D2 (orange).

HL7 element / Field name	Local Description	Local Code	Standard Code	Standard Code Description	Standard Code System	Replacement Value	Comment
Patient_ID_Type		Medical Record Number	MR	Medical Record Number		MR	
Patient_ID_Type		Specimen Identifier	SID	Specimen Identifier		SID	
Patient_ID_Type		Patient Internal ID	PI	Patient Internal ID		PI	
Patient_ID_Type		Social Security Number	SS	Social Security Number		SS	
Patient_ID_Type		Patient External ID	PT	Patient External ID		PT	
Patient_ID_Type		Public Health Case ID	PHC	Public Health Case ID		PHC	
Patient_gender		Male	M	M		M	
Patient_gender		Female	F	F		F	
Patient_gender		Other	O	O		O	
Patient_gender		Unknown	U	U		U	
Patient_gender		Ambiguous	A	A		A	
Patient_race		American Indian or Alaska Native	1002-5	American Indian or Alaska Nat	HL70005	1002-5^American Indian or Alaska Native^HL70005	
Patient_race		Asian	2028-9	Asian	HL70005	2028-9^Asian^HL70005	
Patient_race		Black or African American	2054-5	Black or African American	HL70005	2054-5^Black or African American^HL70005	
Patient_race		Native Hawaiian or Other Pacific Isla	2076-8	Native Hawaiian or Other Paci	HL70005	2076-8^Native Hawaiian or Other Pacific Islander^HL7	
Patient_race		White	2106-3	White	HL70005	2106-3^White^HL70005	
Patient_race		Other Race	2131-1	Other Race	HL70005	2131-1^Other Race^HL70005	
Patient_race		Asked but no answer / unknown	ASKU	Asked but unknown	NULLFL	ASKU^Asked but unknown^NULLFL	
Patient_ethnicity		Hispanic or Latino	H	Hispanic or Latino	HL70189	H^Hispanic or Latino^HL70189	
Patient_ethnicity		Not-Hispanic or latino	N	Not-Hispanic or latino	HL70189	N^Not-Hispanic or latino^HL70189	
Patient_ethnicity		Unknown	U	Unknown	HL70189	U^Unknown^HL70189	
Patient_ethnicity		Asked but no answer / unknown	ASKU	Asked but unknown	NULLFL	ASKU^Asked but unknown^NULLFL	

Step 13: Once you are done entering transformation values in the *dropDownValues* tab, go back to the *Configuration* tab and ensure that all values from the *dropDownValues* tab match those listed in the bottom half of the tab. For example, it specifies that rows C15 through C20 will be input values for the field Patient_Race.

Step 14: Go to the *Gap Analysis7-8* tab. Filter on Column L, *MUST SUPPORT in flatfile* = Y. This displays the minimum data fields that must be populated in the input and output file.

Review each data element and mark in Column M, *Supported by Lab* whether your lab can support the particular required data field (Y/N). Enter any notes, database field names, other documentation that may help with understanding what you are using to populate the field or anything needed for follow up in Column N, *Gap Analysis Notes,* as necessary. Once you have validated that your lab can provide data for each of the minimum required fields, proceed to Step 12.

Make sure ALL comments are entered in the FIRST ROW for each specimen – the tool currently ONLY uses the data from that first row!

Step 15: Generate a CSV that includes all of the column headers listed in the *Gap Analysis7-8* tab. Ensure that the minimum required data fields determined in Step 10 are populated using the specified CSV file format. The Gap Analysis7-8 tab provides all the details about each of the data elements, expected values etc. Or you can copy the headers from the FlatFile_Result_Use tab and use that as the starting point for your csv file definition. Note that each row represents one test result. If there are more than one test result for a specimen, you will need to copy all the other information into the next row and then add the second test result. The tool will create a separate HL7 message for each accession (Testing_lab_accession_number); all HL7 messages will be batched into a single output file.

Note that every column header listed on the *Gap Analysis7-8* tab MUST be included in the CSV file, even if your lab does not send all of the data. Column headers are not case sensitive and can be sent in any order.

Step 16: Validate the csv file using the flat file validator tool: https://validator.aimsplatform.org/ to ensure it has all column headers, data in all required elements and that the entries are formatted correctly; if you are using standard codes the tool will also validate those values (they are under warnings). See the document *Flatfile Validator Use Instructions* for more details.

Step 17: Take the CSV file and place it in the "Input" file directory that you specified in Step 3. Rename the file to the input CSV filename you specified in the *Admin* tab in Step 6 (make sure the filename matches exactly or the tool will not process it)
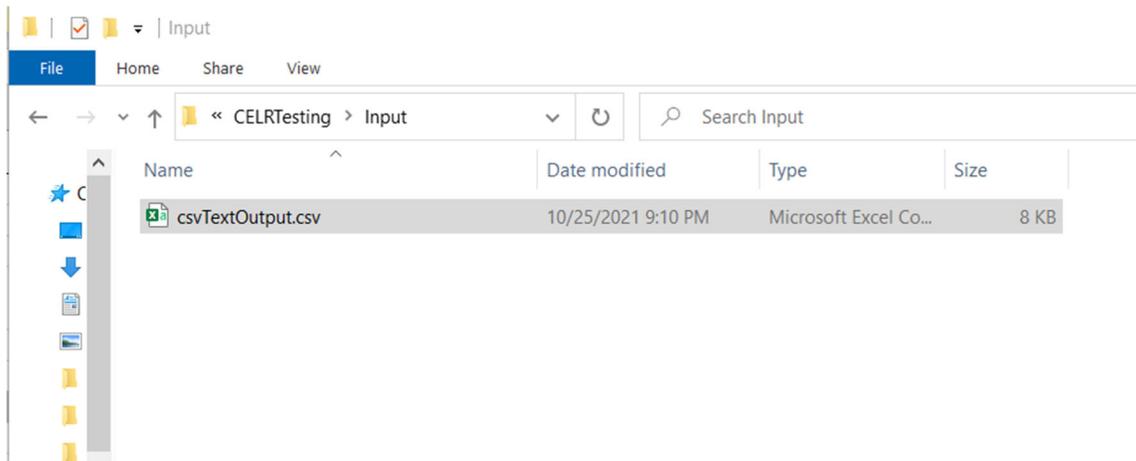
Step 18: Under the *Instructions* tab, click the "Process CSV and generate HL7" button to generate an output file. If a runtime error pops up, go through Steps 1 to 8 (especially Step 3 and Step 6) to ensure that all setup steps are correct. If no runtime error is generated or no message appears, the tool should take you to the *Admin* tab to the Input File Name field. Go to the Output directory set up in Step 3, and you will find the output file generated from the input CSV.
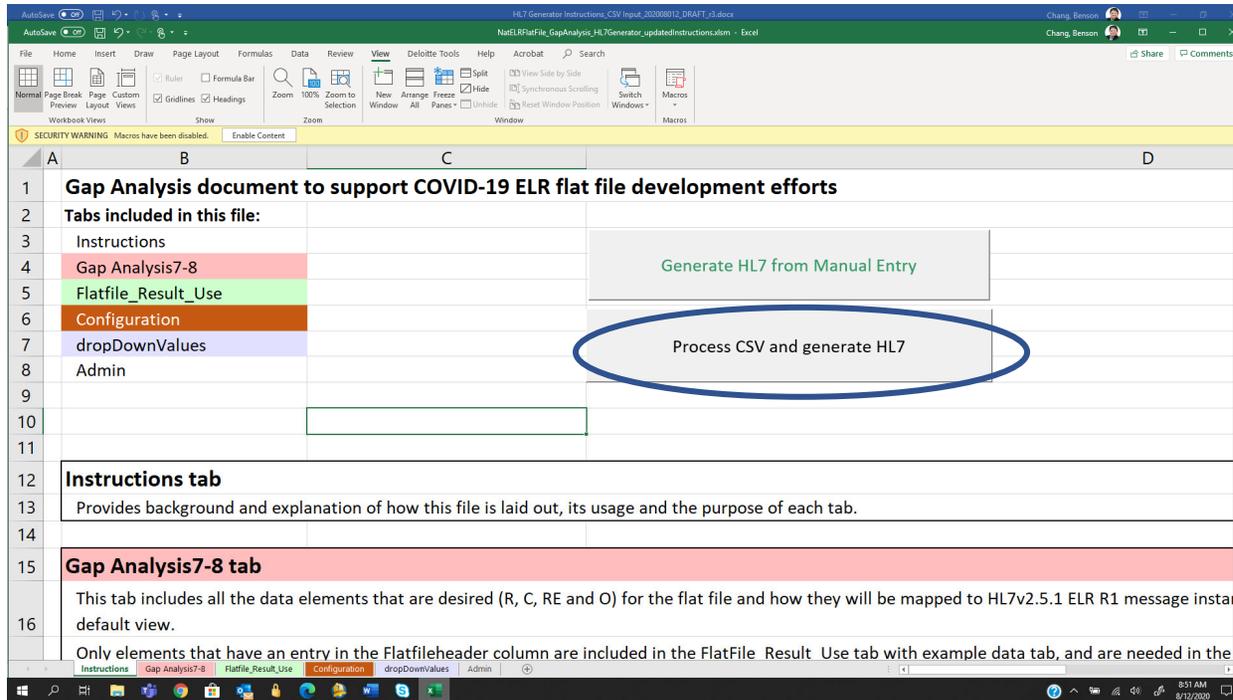
Output folder showing generated file:
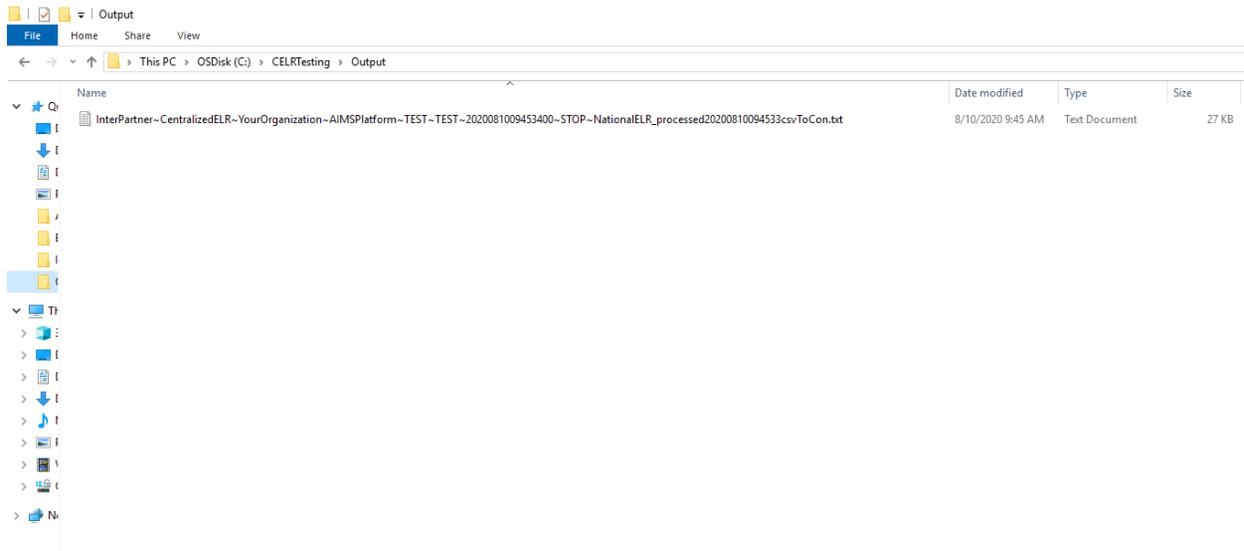
If the output file is not present, check the Error directory for the "NationalELRLog<*timestamp*>.txt" or "CSVLoadErrorLog<timestamp>.txt" for errors.

Step 19: Automation of the csv file conversion process
To automate the csv file conversion process:

1. Create a text file and change the extension of the file to ".bat"
2. The text of the batch file should be: "C:\Windows\System32\cscript.exe C:\runMacro\MacroLauncher.vbs //nologo". The path of MacroLauncher.vbs is configurable.
3. Create a text file and change the extension to ".vbs". The name of the vb script should be "MacroLauncher.vbs" with the following text:

'Input Excel File's Full Path

ExcelFilePath = "C:\runMacro\NatELRFlatFile_GapAnalysis_HL7Generator.xlsm"

'Input Module/Macro name within the Excel File

```
MacroPath = "Module1.LoadCSV"

'Create an instance of Excel

 Set ExcelApp = CreateObject("Excel.Application")

'Do you want this Excel instance to be visible?

ExcelApp.Visible = False  'or "False"

'Prevent any App Launch Alerts (ie Update External Links)

ExcelApp.DisplayAlerts = False

'Open Excel File

Set wb = ExcelApp.Workbooks.Open(ExcelFilePath)

'Execute Macro Code

ExcelApp.Run MacroPath

'Save Excel File (if applicable)

wb.Save

'Reset Display Alerts Before Closing

 ExcelApp.DisplayAlerts = False

'Close Excel File

 wb.Close

'End instance of Excel

 ExcelApp.Quit

'Leaves an onscreen message!
```

'MsgBox "Your Automated Task successfully ran at " & TimeValue(Now), vbInformation

'Note: change the Excel file path to the path of the excel macro enabled file on your local system

4. Open the Windows task scheduler as administrator and create a new scheduled task called HL7Generator and configure the following:
    a. Under General click "Run whether use is logged on or not"
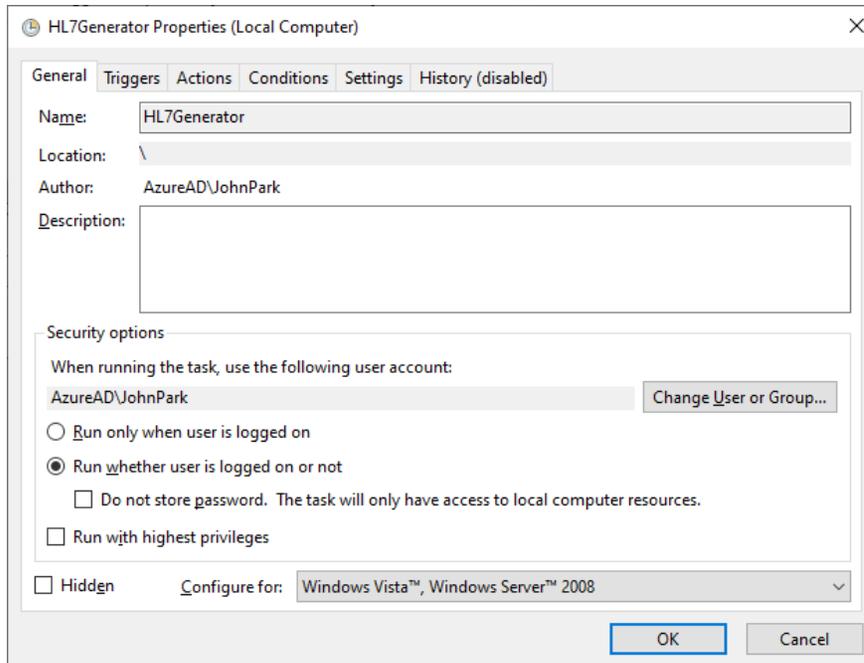
b. Under Triggers, select the schedule desired
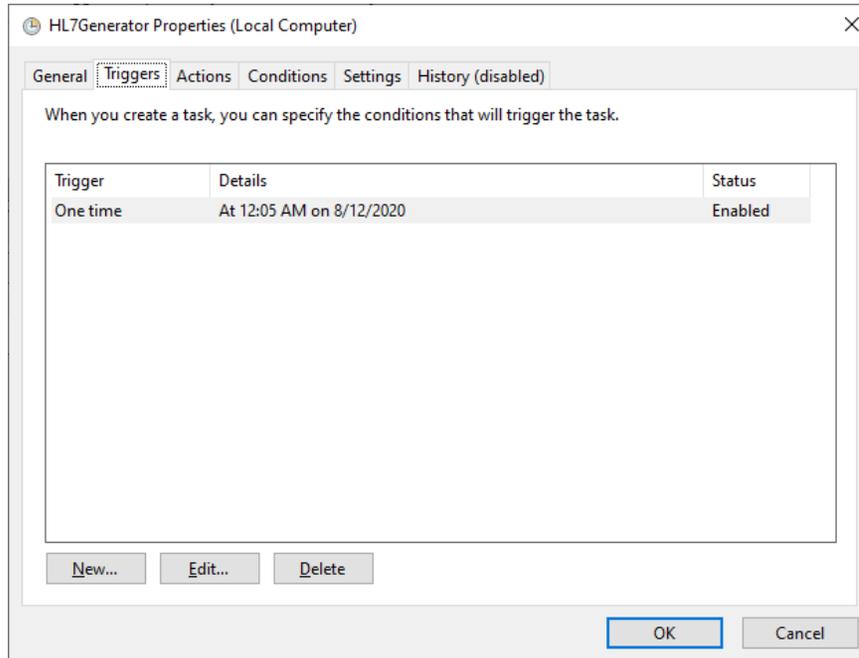
c. Under Actions, select runMacro.bat
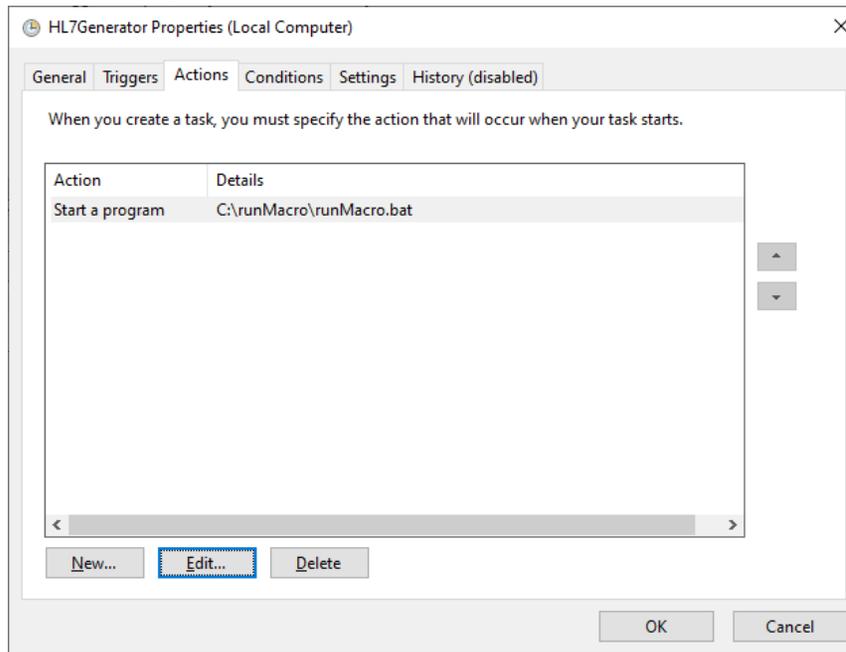
The scheduled task can be tested by right clicking on "HL7Generator" and clicking "Run"

Trouble shooting other tool outputs etc.

When the scheduled task runs the following happens:

1. The macro reads the CSV and loads all the information
2. If the load is successful, it removes it from the "Input" directory and places it in the "Processed" directory renamed with "prc" and the timestamp pre-pended to the name.
3. It processes the CSV and outputs the HL7 batch to the output directory only if there are no errors (although there could be warnings in the NationalELRLog file). The HL7 file will generate if there are warnings.
4. If there are errors, it will output the error file (and warnings if any) to the error directory describing what happened. Possible outputs are:

a. A file named "NationalELRLog<*timestamp*>.txt with: "Not generating HL7 because of the following errors:" (with a list of the errors that prevented processing)
    i. Use the error entries to fix the data being input into CSV file
b. A file named "CSVLoadErrorLog<timestamp>.txt" with: "File not processed because it could not be found."
5. If there are no errors, it will output a file named "NationalELRLog<*timestamp*>.txt with: "HL7 batched produced with no errors" and may have warnings in the file.

Note: the CSV to HL7 conversion was benchmarked to process 2000 records in about 2 minutes. Performance will vary based on data entry and number of rows per distinct HL7 record. Macros have a limitation where it cannot fully utilize the resources of multi core processor computers. If more than 2000 rows at a time need to be processed, please refer to the Developer's guide to implement parallel processing with the CSV file. Parallel processing separates the file into smaller files and processes them in parallel with multiple instances of the vb script that invokes the macro enabled excel document.