MS Template Creator

Developer Documentation

Version 0.0.7

2018

# Version Control Table

|  |  |
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| **Created By** | Jeremy John Selva |
| **Date Created** | 27 March 2018 |
| **Maintained By** | Jeremy John Selva |

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# Introduction

## Purpose

This document highlights the Excel VBA code structure for MS Template Creator.

The excel macro is created to provide users a more friendly interface to take in raw data exported directly from the mass spectrometry machines and create several annotation templates suited for automated data processing and statistical analysis.

## Scope

This guide will assist developers to understand the organisation of the code structure. We are still working on making the codes more modular so that changes in the feature of the MS Template Creator will require minimal efforts

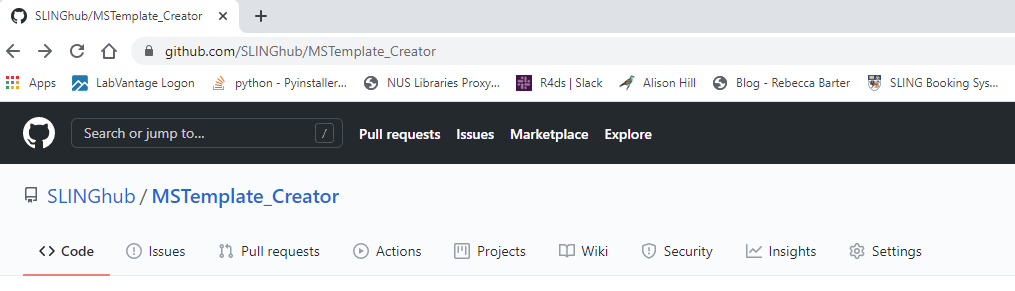
## Displaying the developer tab on the toolbar

As the excel sheet contains macros, to modify the codes, the developer tab must be present in the toolbar.

Refer to <https://www.excel-easy.com/examples/developer-tab.html> to display the developer tab

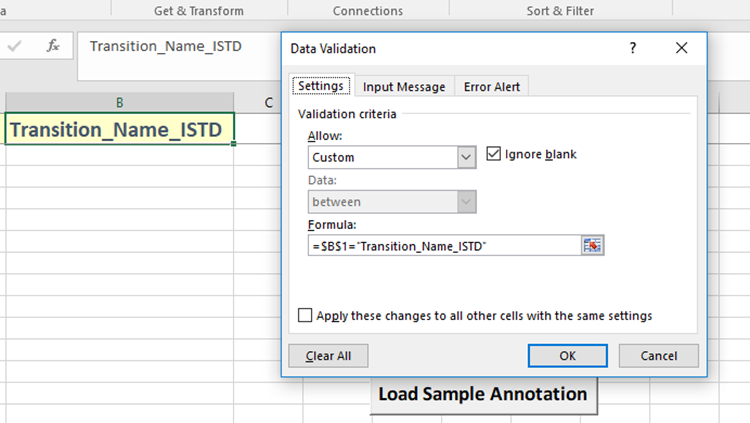
# Code Repository

The codes can be found in <https://github.com/SLINGhub/MSTemplate_Creator>



# Excel Column Settings

All headers in the excel column are fixed using Data validation



To change the column names in the excel sheet, you must disable the validation criteria first.

Please note that by changing the column names, the code in the macro file will be needed to be updating in order to be in working condition.

The updating steps can be found on Section “Code Updating Guidelines”

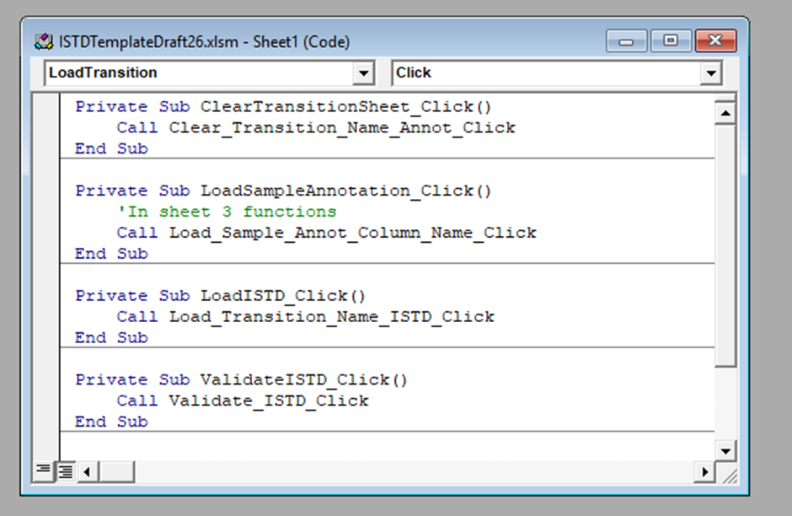
# Excel Buttons and Textboxes Settings

## Buttons Settings

### Code in the Buttons

Buttons in excel are Active X control to ensure that they can be moved around freely. However, their codes will be sheet specific

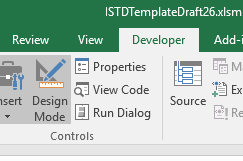
Deleting the sheet will cause these sheets’ specific function to be deleted. Remember to back up the code before deleting the script



All functions in the sheet leads to the Button Module.

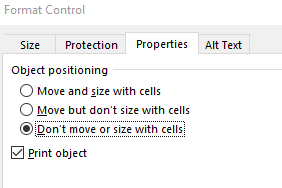
### Moving Buttons

To move the button, go to the Developer tab and click on “Design Mode”



### Buttons format

All buttons are set to this format property

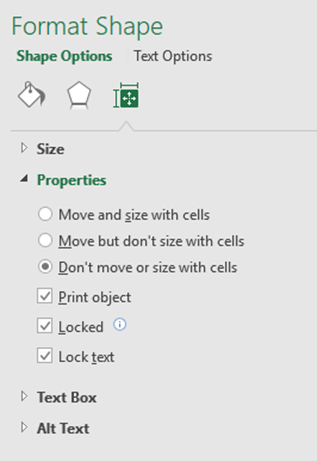


We take into consideration that users will change the number of rows more often than to change the number of columns.

If the number of columns need to be changed of resized, the buttons will not move with the columns. To move the button manually, refer to Section “Moving Buttons”.

## Textboxes Settings

All textboxes are set to this format shape property



We take into consideration that users will change the number of rows more often than to change the number of columns.

If the number of columns need to be changed of resized, the textboxes will not move with the columns. There will be a need to move the textbox manually.

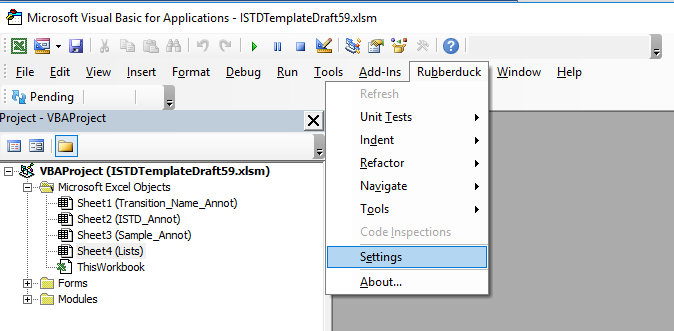
# Excel Add-Ins

## Rubberduck

The RubberDuck is used to create a fully integrated test environment for the VBA codes in MS Template Creator.

It can be installed in <http://rubberduckvba.com/>

A successful installation will give an additional “Rubberduck” tab in Microsoft Visual Basic for Applications

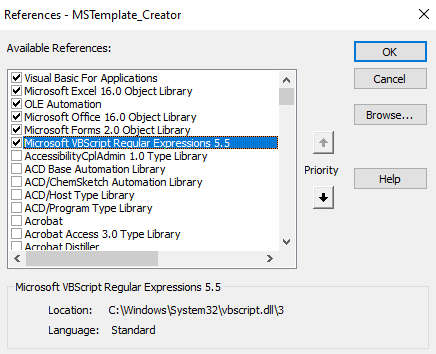


# Code Structure Overview



# Code Structure Details

## Vba Dependencies



## Annotation Creating Modules

### “Button” module

The Button module serves as an interface/wrapper between the Active X buttons in the excel sheets to the modules are user forms in e\Excel VBA.

Please ensure that new Active X buttons are directed to this module first before linking it to other modules.

A total of four button modules are created for each excel sheet.

* Transition\_Name\_Annot\_Buttons
* ISTD\_Annot\_Buttons
* Sample\_Annot\_Buttons
* Dilution\_Annot\_Buttons

### Utilities module

The Utilities module are a collection of functions that is mostly used throughout the excel macro file. All forms and modules depend on this Utilities module. Please change this file with caution.

### Transition\_Name\_Annot module

Functions that are applied only the sheet “Transition\_Name\_Annot” should be written in this module.

### ISTD\_Annot module

Functions that are applied only the sheet “ISTD\_Annot” should be written in this module.

### Sample\_Annot module

Functions that are applied only the sheet “Sample\_Annot” and to create arrays directly from Sample Annotation files should be written in this module.

### Load\_Raw\_Data module

Functions that are designed to create arrays directly from Mass spec raw data files are to be written there.

### Load\_Tidy\_Data module

Functions that are designed to create arrays from csv files that in a in table form.

### Sample\_Type\_Identifier module

Functions to help identify the Sample Type from the Sample Name using regular expression are to be written there.

### Concentration\_Unit module

Functions to help identify the correct final concentration unit given the Sample Amount Unit from the Sample\_Annot sheet and the ISTD Concentration Custom Unit used from the ISTD\_Annot sheet.

## Sheet Tracking Modules

### ColourTracker

Functions to add colours to cell when it has been modified unnecessarily. It only runs on Sheet 1 (Transition\_Name\_Annot) and Sheet 2 (ISTD\_Annot)

## Unit Test Modules

### Utilities Test module

Functions to test the Utilities module for logical errors.

### Transition\_Annot\_Test module

Functions to test the Transition\_Name\_Annot module for logical errors.

### ISTD\_Annot\_Test modules

Functions to test the ISTD\_Annot module for logical errors.

### Sample\_Annot\_Test modules

Functions to test the Sample\_Annot module for logical errors.

### Load\_Raw\_Data\_Test module

Functions to test the Load\_Raw\_Data module for logical errors.

### Load\_Tidy\_Data\_Test module

Functions to test the Load\_Tidy\_Data module for logical errors.

### Sample\_Type\_Identifier\_Test module

Functions to test the Sample\_Type\_Identifier module for logical errors

### Concentration\_Unit \_Test module

Functions to test the Concentration\_Unit module for logical errors

## Integration Test Modules

### Integration\_Test module

Functions to run an integration test for MS Template Creator.

## Export VBA Code module

### Export\_VBA module

Functions to export the VBA source codes to a folder.

## Forms

### Autofill\_By\_Sample\_Type

UserForm and Functions to autofill the Sample\_Amount, Sample\_Amount\_Unit and the ISTD\_Mixture\_Volume\_[uL] column by a fixed value based on a given Sample\_Type.

### Clear\_Dilution\_Annot

UserForm and Functions to clear columns in sheet “Dilution\_Annot”

### Clear\_ISTD\_Table

UserForm and Functions to clear columns in sheet “ISTD\_Annot”

### Clear\_Sample\_Annot

UserForm and Functions to clear columns in sheet “Sample\_Annot”

### Clear\_Transition\_Name\_Annot

UserForm and Functions to clear columns in sheet “Transition\_Name\_Annot”

### Concentration\_Unit\_MsgBox

UserForm and Funtions to indicate what concentration units are generated automatically in sheet “Sample\_Annot”

### Invalid\_ISTD \_MsgBox

UserForm and Functions to highlight to users of potential invalid ISTD

### Load\_Sample\_Annot\_Raw

UserForm and Functions to help users load Sample Annotation from raw data file

### Load\_Sample\_Annot\_Tidy

UserForm and Functions to help users load Sample Annotation from csv files in table form.

### Load\_Transition\_Name\_Tidy

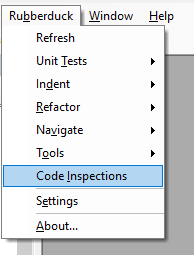
UserForm and Functions to help users load Transition Annotation from csv files in table form.

### Overwrite

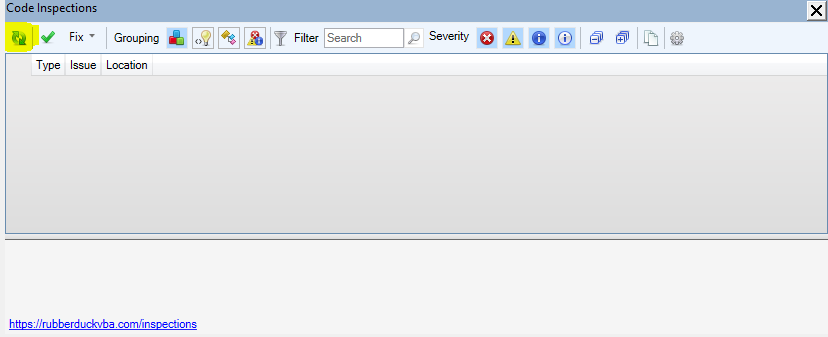
UserForm and Functions to ask users if a particular column should be overwritten or not.

# Code Inspection

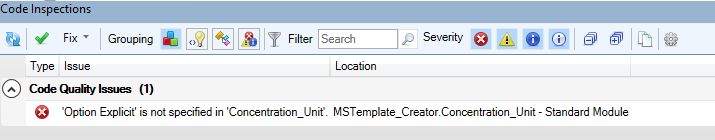
Click on Rubberduck and then Code Inspection.

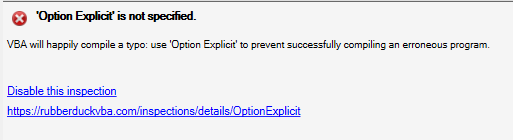


You will see the following. Click on the refresh button highlighted.



Issues will be displayed.





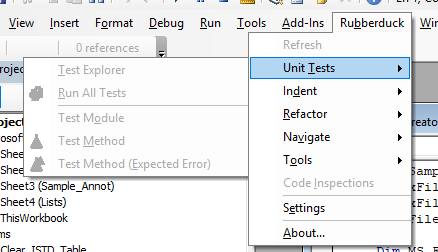
Use the links to help clean your code. References in <https://rubberduckvba.com/inspections>

# Unit and IntegrationTest

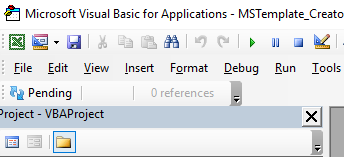
## Rubberduck for unit testing

### Initialising the Rubberduck

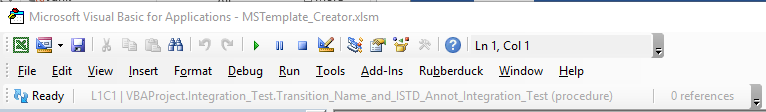
When you open the Visual Basic from the Developer Tab, Rubberduck is not activated yet.



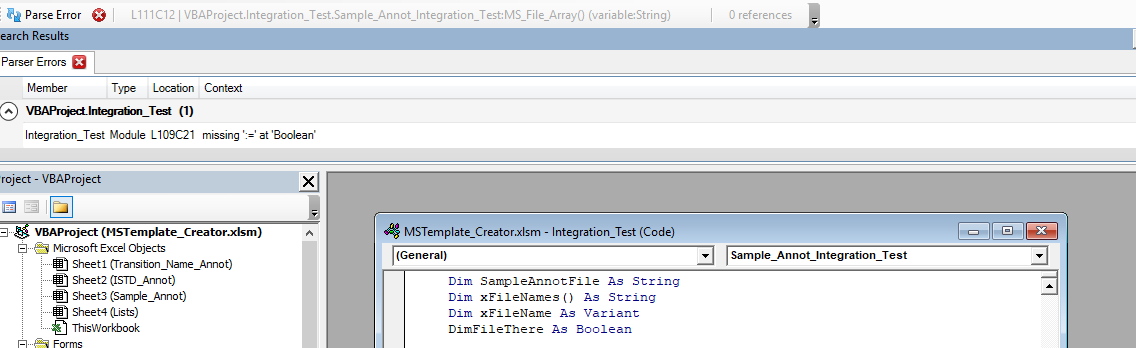
To start the Rubberduck, click on “Pending”



When it appears as “Ready”, you can start the unit testing



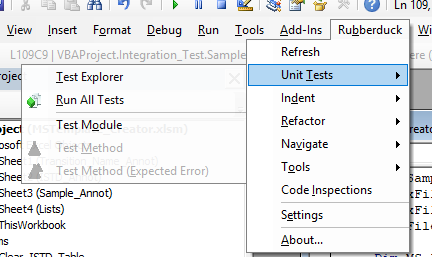
If it appears like this



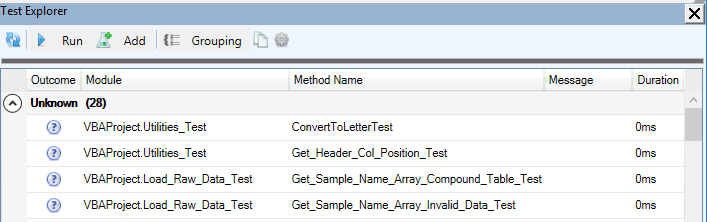
It means you have a syntax error (Should be “Dim FileThere” instead of “DimFileThere”) and Rubberduck clearly cannot proceed with unit testing on codes with bugs.

### Opening the Unit Test

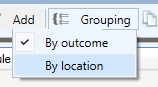
To start the unit testing, go to Rubberduck, Unit tests, Test Explorer



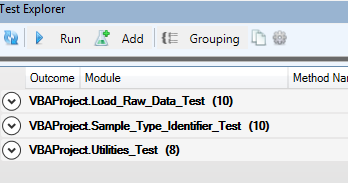
You will see this



You will need to Group the unit test according to their respective modules. Click on Grouping and then “By Location”

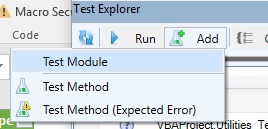


You will see the unit test are grouped based on the unit test modules

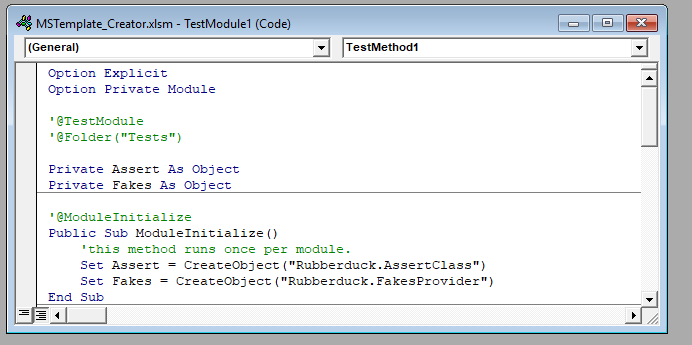


### Adding a new unit test module

Go to Add, Click on Test Module



A new test module will be automatically created



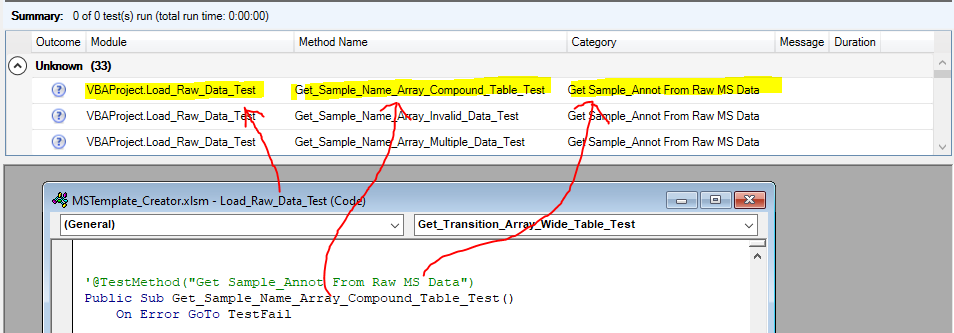
Refer to the documentation to see how to write a unit test properly

<https://github.com/rubberduck-vba/Rubberduck/wiki/Unit-Testing>

### Categorising Unit Test

To group unit test into the same category, put the group name beside

‘@TestMethod({Your group name})

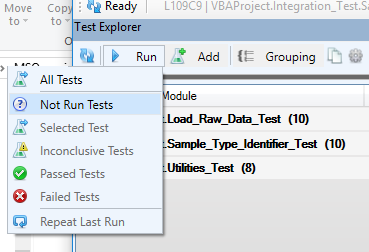


### Running the Unit Test

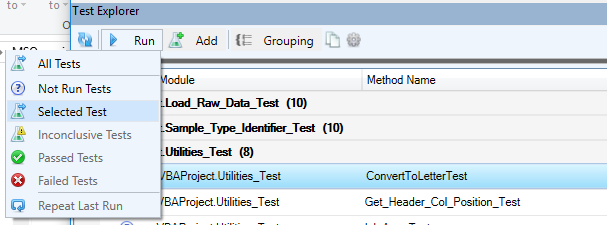
Click on the refresh button to update the Test Explorer to find any newly created unit test



To run all the unit test, Click on Run, then all test



To run a specific test, highlight a specific test, click on run and then “Selected test”



A passed test will look like this



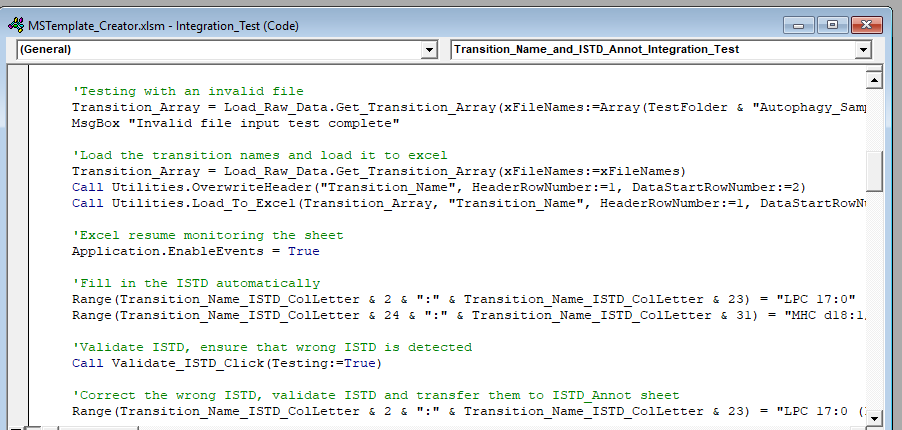
A failed test will look like this



## Integration Test

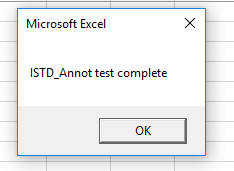
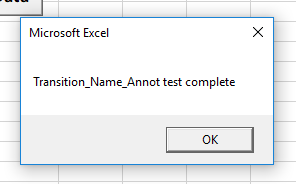
Open the Intergration\_Test module and run all the functions in this module.

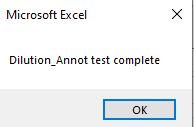
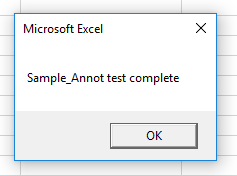
What each test is doing can be found in the comments of the code



Click Ok for every message box that appears.

Make sure all sheets are tested successfully





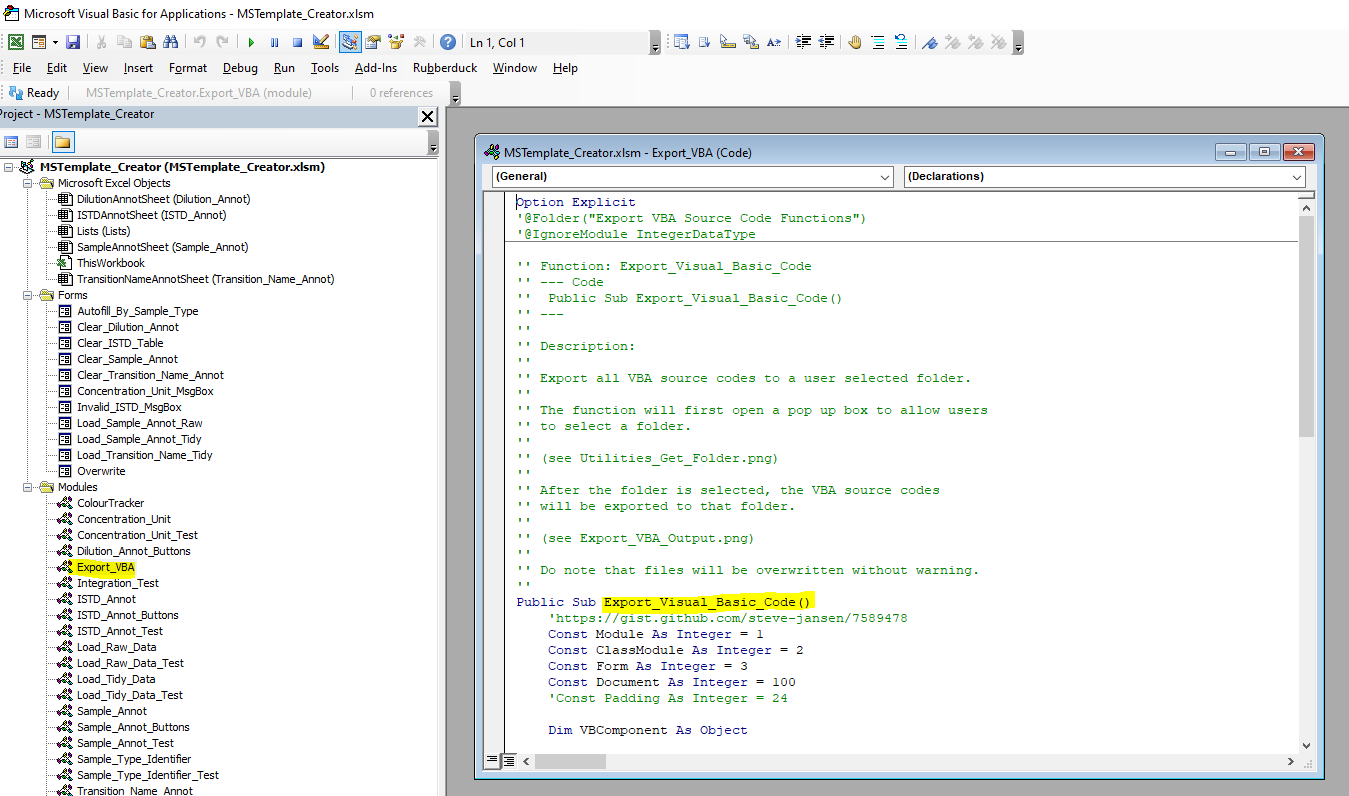
# Version Control

## Exporting VBA source code using Export\_VBA

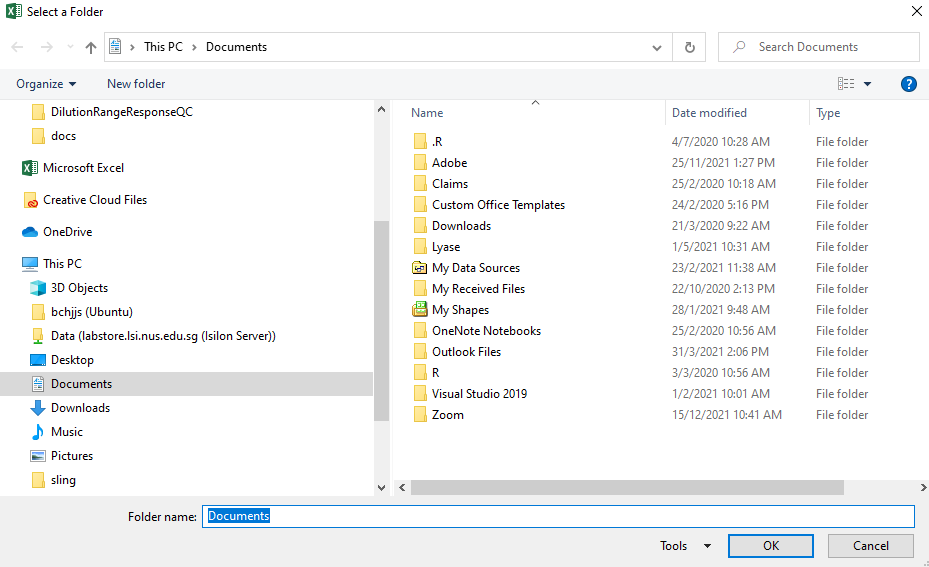
Credits is given to <https://gist.github.com/steve-jansen/7589478> for making this possible

When you open the Visual Basic from the Developer Tab, click on Export\_VBA module and run this function.

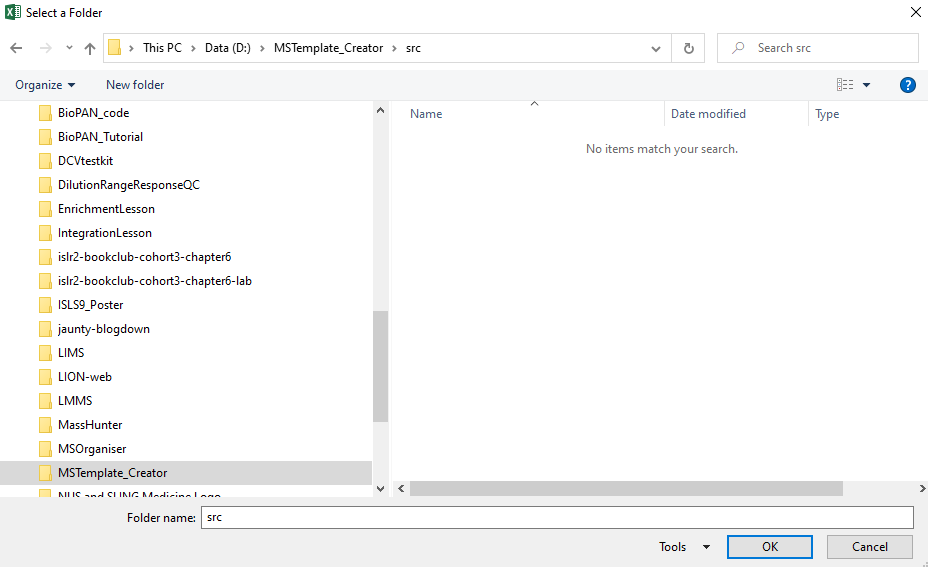




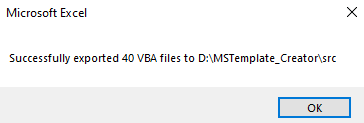
The following box will pop up asking the user to select a folder to output the vba code

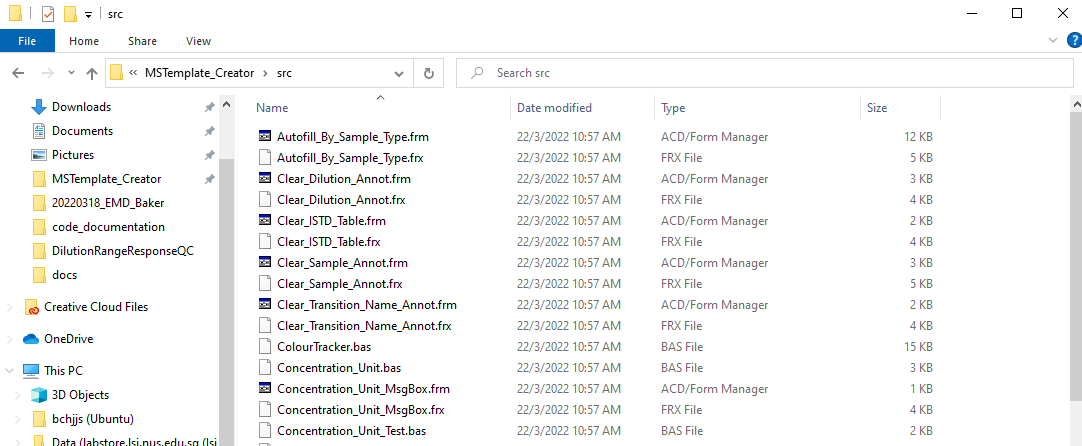


Once a folder is selected, click Ok.



If successful, this export message can be seen





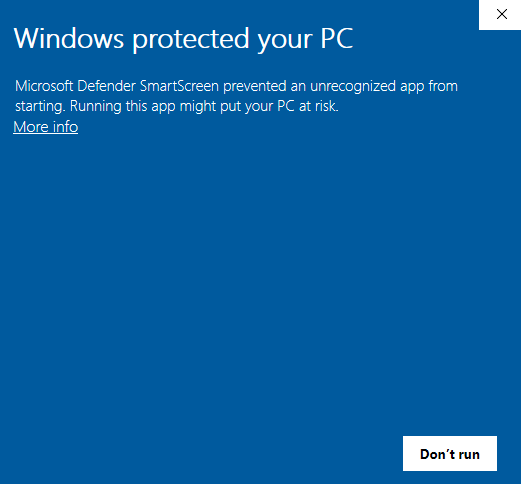
# Code Documentation

## Installing Natural Docs

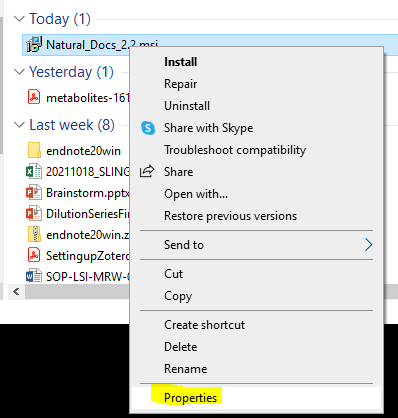
Natural Docs <https://www.naturaldocs.org/> is used to document the excel VBA codes.

Refer to <https://www.naturaldocs.org/getting_started/> to set up.

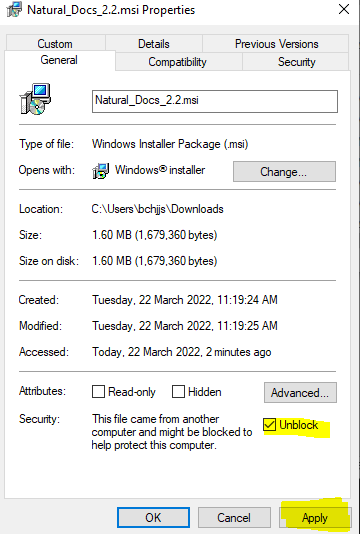
If you encounter this,



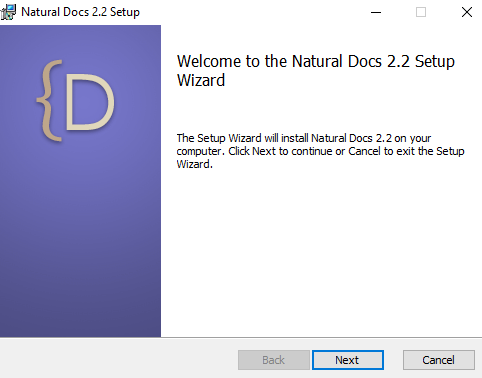
Refer to <https://www.thewindowsclub.com/microsoft-defender-smartscreen-prevented-an-unrecognized-app-from-starting> , by right clicking on the installation file and go to properties.



Check the box Unblock and click Apply, then Ok.

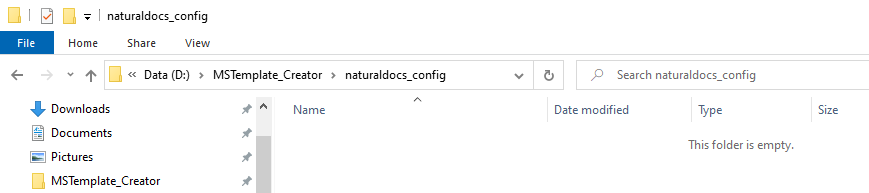


The setup wizard should appear when the installer file is double clicked.

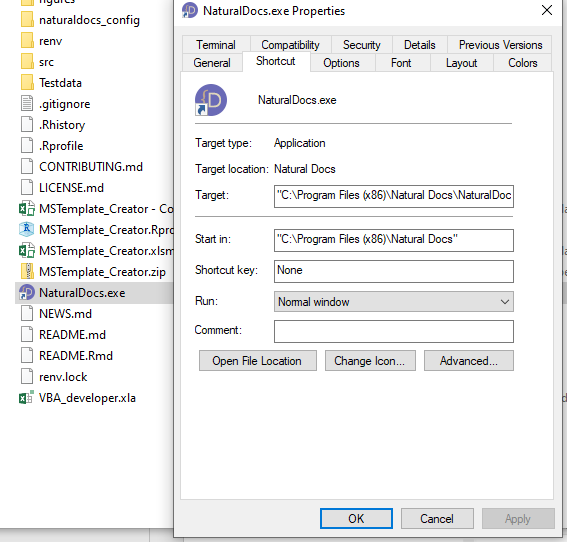


## Setting Up Summary

Create a folder that will contain configuration files for Natural Docs



Create a shortcut to the Natural Docs software



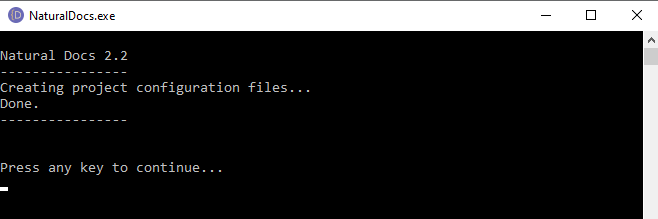
In the Target section, fill in the command lines.

"C:\Program Files (x86)\Natural Docs\NaturalDocs.exe" D:\MSTemplate\_Creator\naturaldocs\_config --pause-before-exit

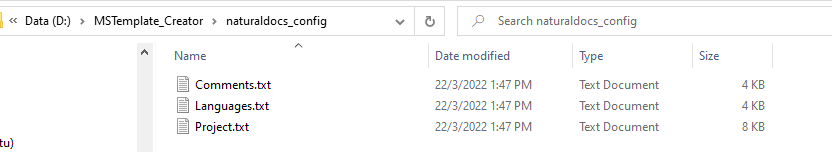
Or

{Pathway to NaturalDocs exe file} {Pathway to Configuration folder} -- pause-before-exit

Double clicking on the shortcut will give the following.



You will see three configuration files being created.

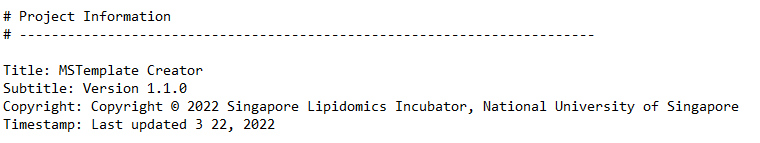


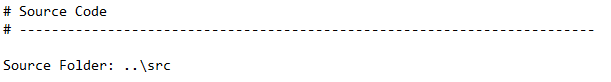
## Project.txt

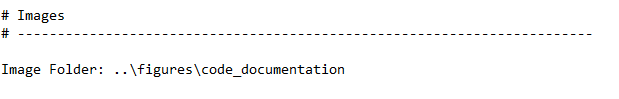
As mentioned in <https://www.naturaldocs.org/getting_started/getting_set_up/> , all configuration files contain explanation of certain parameters.

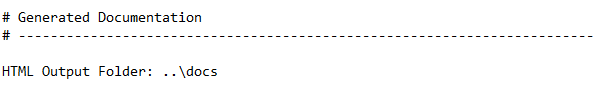
The reference can be found in <https://www.naturaldocs.org/reference/project.txt/>

We will mention the important changes without explanation.





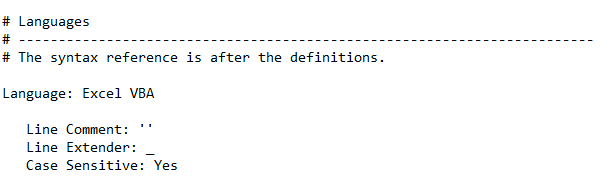




## Language.txt

The reference can be found in <https://www.naturaldocs.org/reference/languages.txt/>

We will mention the important changes without explanation.



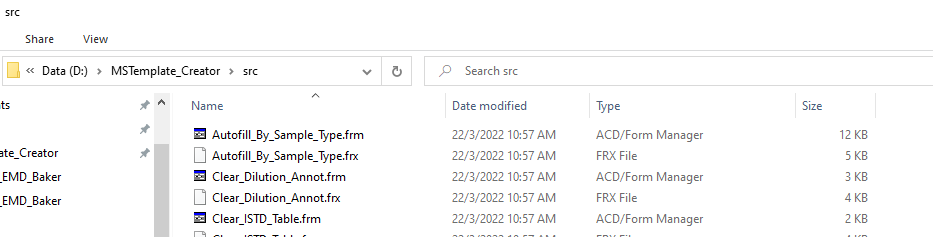
## Comments.txt

The reference can be found in <https://www.naturaldocs.org/reference/comments.txt/>

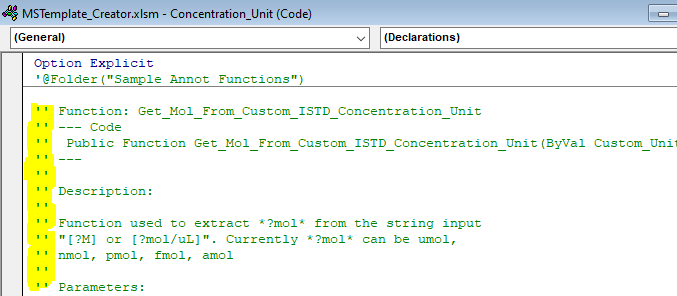
To date, no changes have been made on this file.

## Developing the code documentation

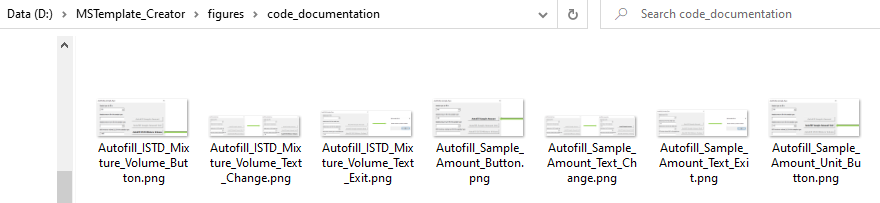
From our configuration, we are telling Natural Docs to read the files in



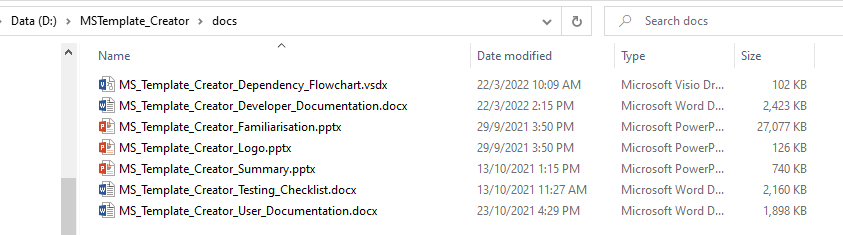
Look for those lines that starts with ‘’



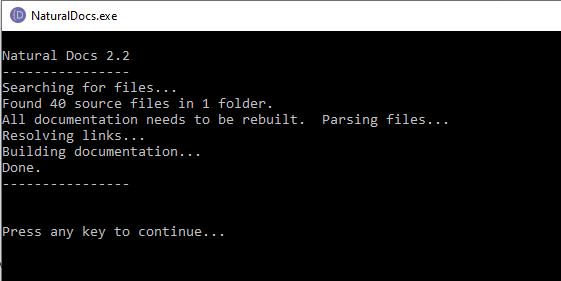
Read Images in



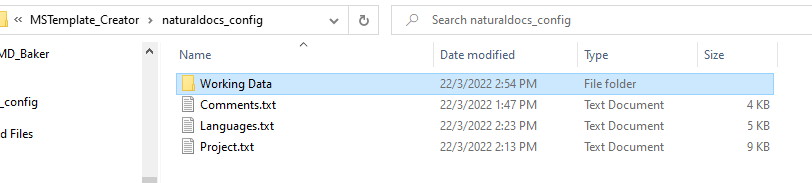
And build the documentation in

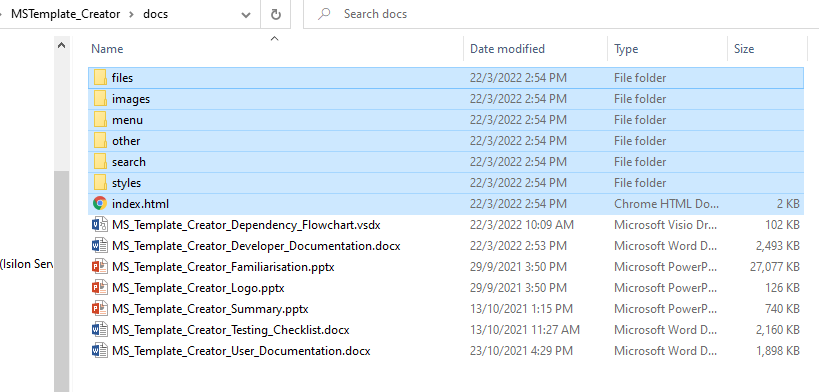


With the parameters set, double clicking on the shortcut will give the following.

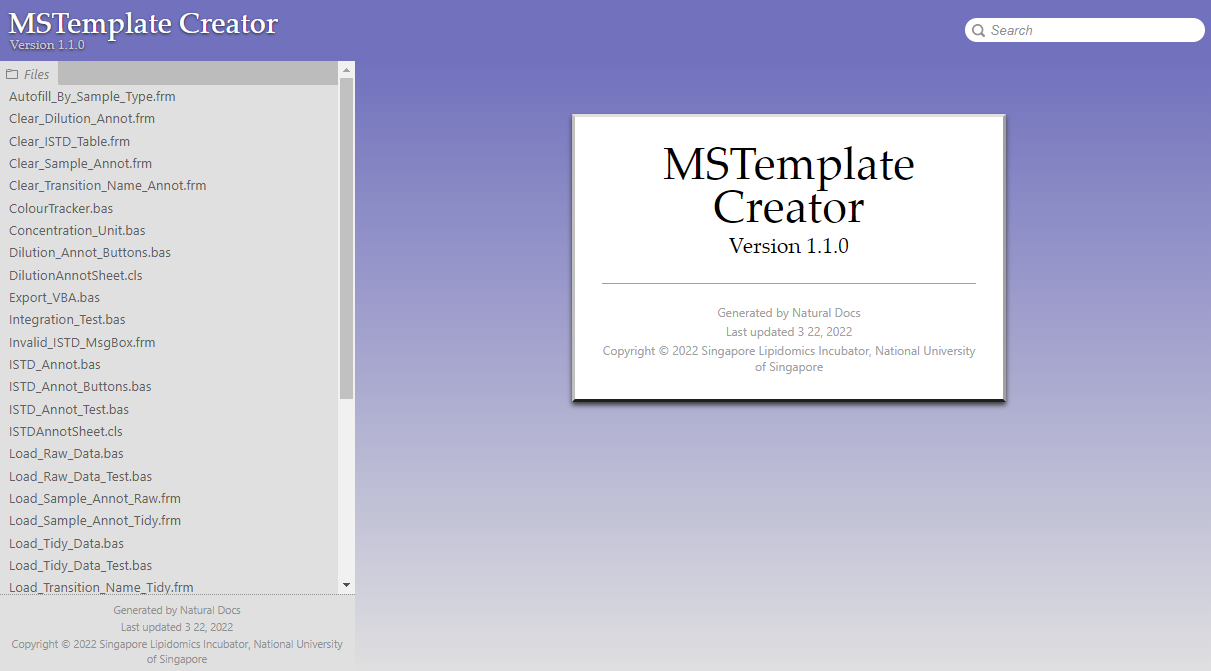


This will create the following





Clicking on index.html will give the following



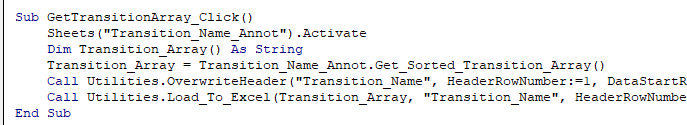
# Code Update guidelines

Below are some guiding steps to change in the code should there be any small minor changes needed.

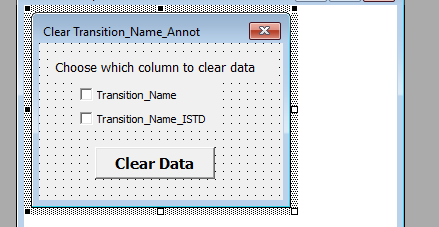
## Transition\_Name\_Annot changes

### Changes in the name of the column where the transition name is placed

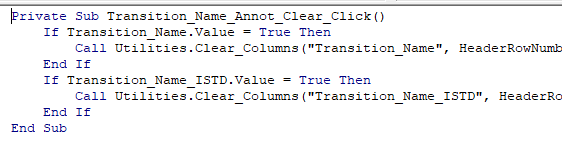
In the Transition\_Name\_Annot\_Buttons Modules, go to GetTranstionArray\_Click function and update the function Utilities.OverwriteHeader and Utilities.Load\_To\_Excel



In the Userform Clear\_Transition\_Name\_Annot, change the column name in



Change the relevant code for the userform



In the Colour Tracker module, , go to ChangeToBlankWhenChanged function and update the function Utilities.Get\_Header\_Col\_Position and Utilities.ConvertToLetter

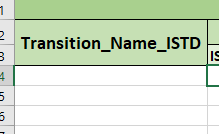
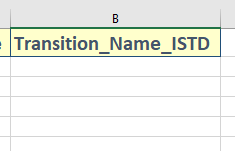


In the Integration\_Test module, go to Transition\_Name\_and\_ISTD\_Annot\_Integration\_Test and update the functions such as Utilities.Get\_Header\_Col\_Position, Utilities.ConvertToLetter, etc

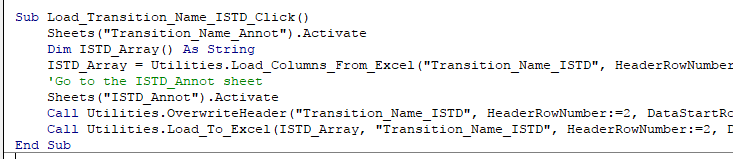


### Changes in the name of the column where the transition name ISTD is placed

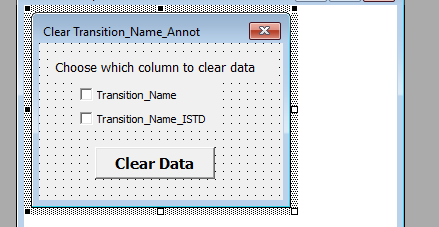
Firstly, you must change the column in both the sheet Transition\_Name\_Annot and ISTD\_Annot to the one you have changed



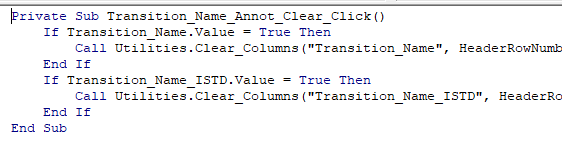
In the Transition\_Name\_Annot\_Button Modules, go to Load\_Transition\_Name\_ISTD\_Click function and change the function, Utilities.Load\_Columns\_From\_Excel, Utilities.OverwriteHeader and Utilities.Load\_To\_Excel



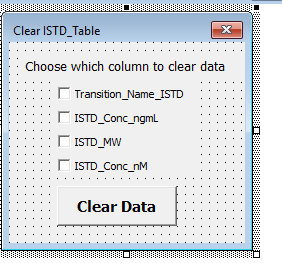
In the Userform Clear\_Transition\_Name\_Annot, change the column name in



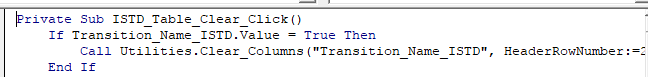
Change the relevant code for the userform



In the userform Clear ISTD\_Table, change the column name in



Change the relevant code for the userform



In the Colour Tracker module, , go to ChangeToBlankWhenChanged function and update the function Utilities.Get\_Header\_Col\_Position and Utilities.ConvertToLetter



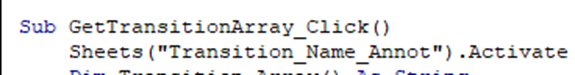
In the Integration\_Test module, go to Transition\_Name\_and\_ISTD\_Annot\_Integration\_Test and update the functions such as Utilities.Get\_Header\_Col\_Position, Utilities.ConvertToLetter, etc



### Changes in the sheet name

In the Button Modules, go to Load\_Transition\_Name\_ISTD\_Click function and GetTranstionArray\_Click function change the sheet name in the command





In the Colour Tracker module, go to ChangeToBlankWhenChanged function and update the sheet name to activate



In the Integration\_Test module, go to Transition\_Name\_and\_ISTD\_Annot\_Integration\_Test and update the sheet name.



## ISTD\_Annot changes

### Changes in the name of the column where the transition name ISTD is placed

Following the steps in 10a) part ii

In the Colour Tracker module , go to ISTDCalculationChecker function and update the function Utilities.Get\_Header\_Col\_Position and Utilities.ConvertToLetter

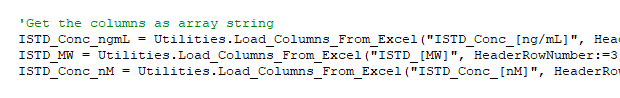


In the Integration\_Test module, go to Transition\_Name\_and\_ISTD\_Annot\_Integration\_Test and update the functions such as Utilities.Get\_Header\_Col\_Position, Utilities.ConvertToLetter, etc



### Changes in the column name used in the calculation of ISTD concentration from ng/ML to nM

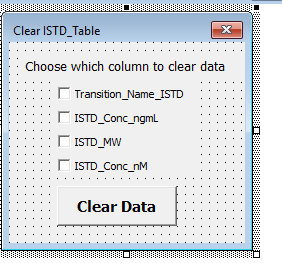
In the ISTD\_Annot module, go to Get\_ISTD\_Conc\_nM\_Array. Update the function Utilities.Load\_Columns\_From\_Excel



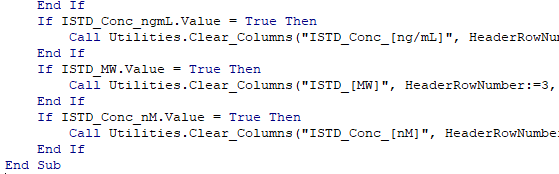
In the ISTD\_Annot\_Buttons module, go to nM\_Calculation\_Click. Update Utilities.Load\_To\_Excel “”ISTD\_Conc\_[nM]” if this column name is changed



In the userform Clear ISTD\_Table, change the column name in



Change the relevant code for the userform



In the Colour Tracker module , go to ISTDCalculationChecker function and update the function Utilities.Get\_Header\_Col\_Position and Utilities.ConvertToLetter

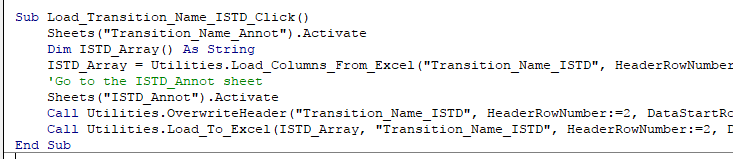


In the Integration\_Test module, go to Transition\_Name\_and\_ISTD\_Annot\_Integration\_Test and update the functions such as Utilities.Get\_Header\_Col\_Position, Utilities.ConvertToLetter, etc



### Changes in the sheet name

In the Button Modules, go to Load\_Transition\_Name\_ISTD\_Click function function change the sheet name in the command



In the Colour Tracker module , go to ISTDCalculationChecker function and update the sheet name to activate.



In the Integration\_Test module, go to Transition\_Name\_and\_ISTD\_Annot\_Integration\_Test and update the sheet name



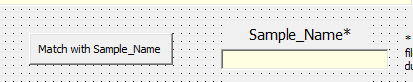
## Sample\_Annot changes

### Changes in the column names for MRM transition name data input

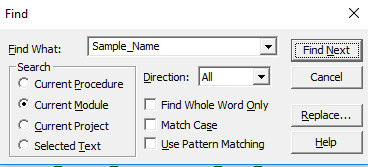
The column names affected are



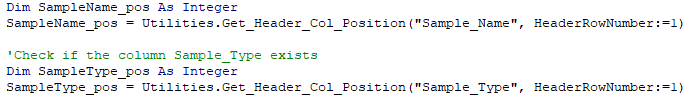
If Sample\_Name has been change, update the userfrom Load\_Sample\_Annot



And the corresponding codes with Sample\_Name involved if necessary. You may wish to use



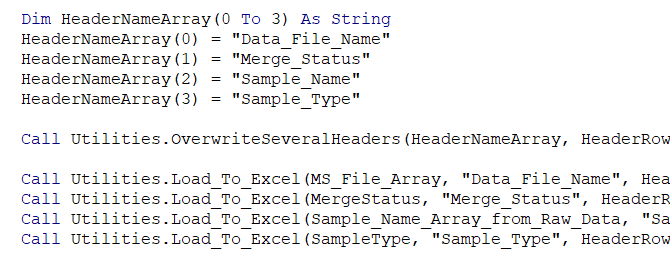
If Sample\_Name and Sample\_Type column has been changed, go to the Buttons module and update the function Autofill\_Sample\_Type\_Click()



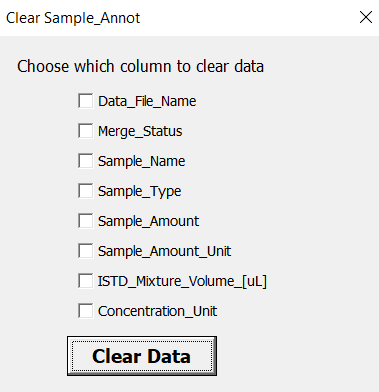


In the Sample\_Annot module, update the function

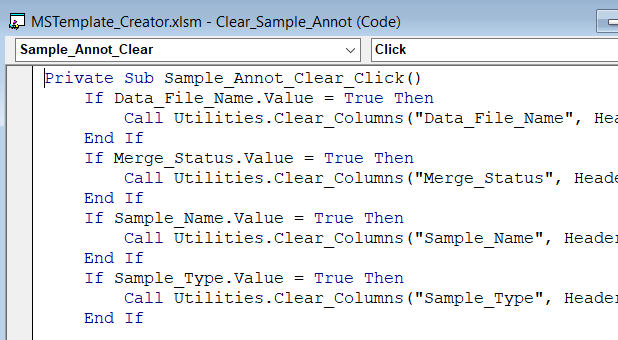
Create\_New\_Sample\_Annot\_Raw, Create\_New\_Sample\_Annot\_Tidy and Merge\_With\_Sample\_Annot



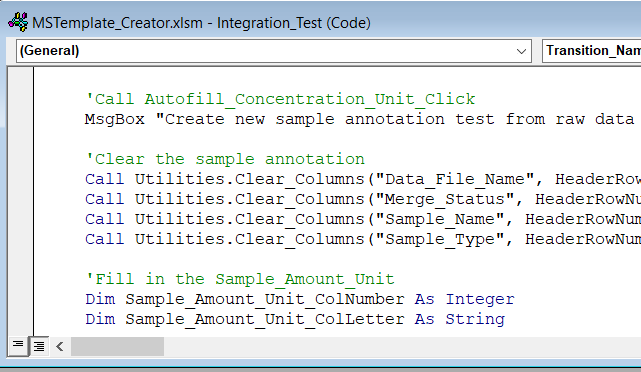
In the userform Clear\_Sample\_Annot, change the column name in



Change the relevant code for the userform

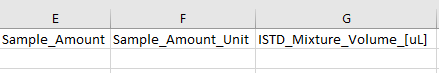


In the Integration\_Test module, go to Sample\_Annot\_Integration\_Test and Sample\_Annot\_and\_Dilution\_Annot\_Integration\_Test to update functions such as Utilities.Clear\_Columns

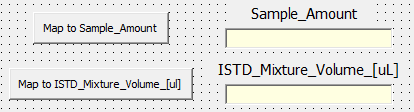


### Changes in the column names for sample annotation input

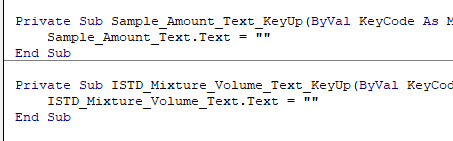
The column names affected are



If Sample\_Name has been change, update the userfrom Load\_Sample\_Annot

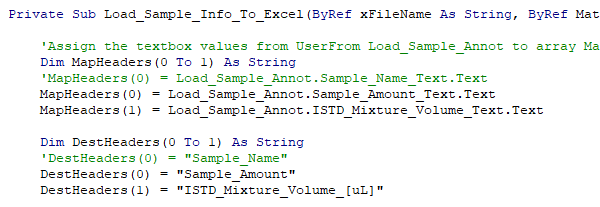


And the corresponding codes with Sample\_Amount and ISTD\_Mixture\_Volume\_[uL] involved if necessary.

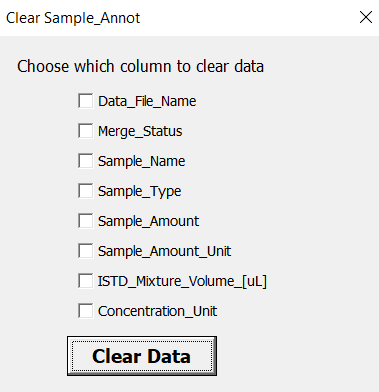


There will be a lot of changes. Use Ctrl-F to help you.

In the Sample\_Annot module, update the function Load\_Sample\_Info\_To\_Excel



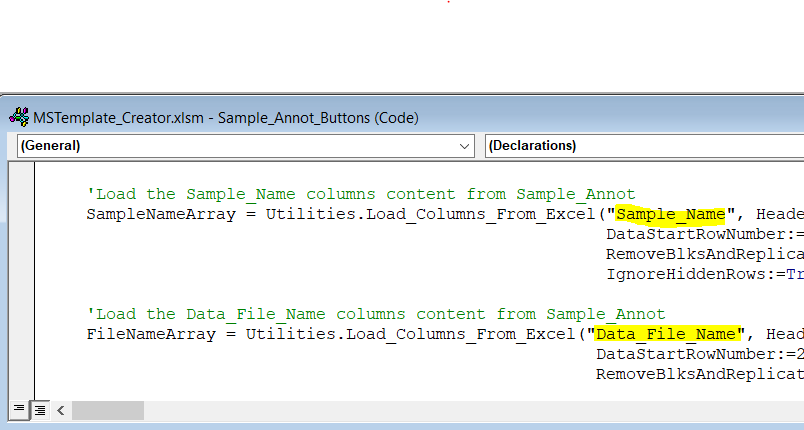
In the userform Clear\_Sample\_Annot, change the column name in



Change the relevant code for the userform

In the Sample\_Annot\_Buttons module, update the function Load\_Sample\_Name\_To\_Dilution\_Annot\_Click and make the changes where Utilities.Get\_Header\_Col\_Position and Utilities.Load\_Columns\_From\_Excel is called





### Changes in the sheet name

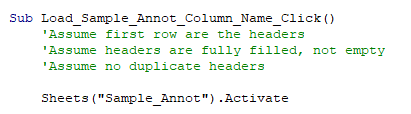
In the Sample\_Annot Modules, go to Create\_new\_Sample\_Annot and Merge\_With\_Sample\_Annot functions to change the sheet name





In the Button Modules, go to Autofill\_Sample\_Type\_Click, Load\_Sample\_Annot\_Column\_Name\_Click and Load\_Sample\_Name\_To\_Dilution\_Annot\_Click to change the sheet name

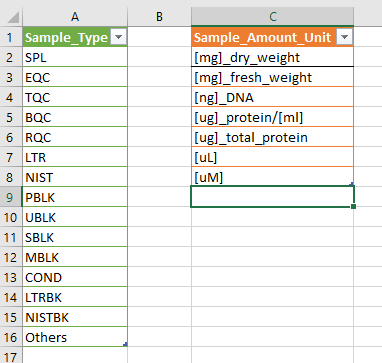




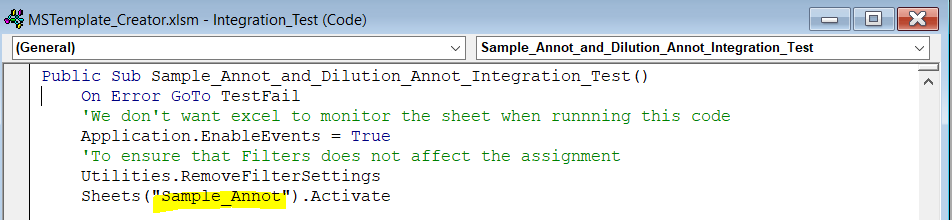


### Changes in the listbox in Sample\_Type and Sample\_Amount\_Unit

Go to the sheet “Lists” and update the table accordingly



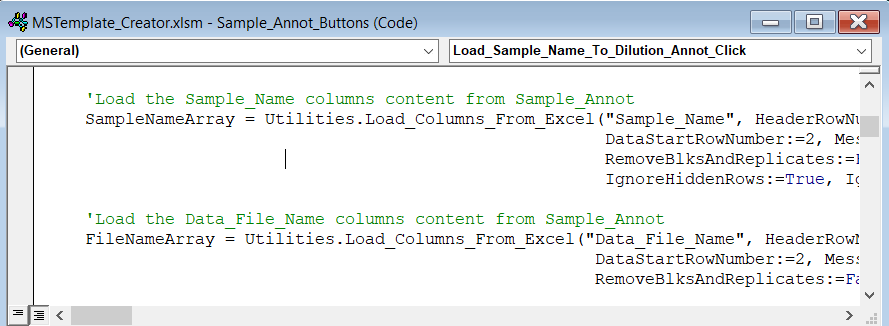
In the Integration\_Test module, go to Sample\_Annot\_Integration\_Test and Sample\_Annot\_and\_Dilution\_Annot\_Integration\_Test to update the sheet name



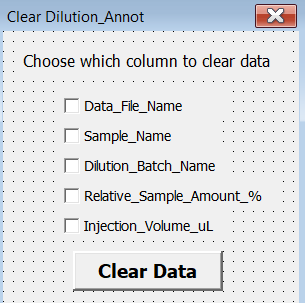
## Dilution\_Annot changes

### Changes in the name of the column where raw data file name and sample name is placed.

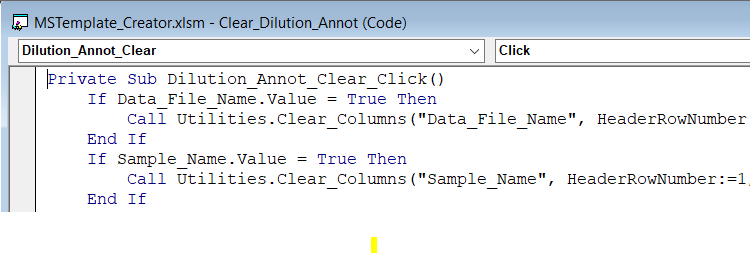
In the Sample\_Annot\_Buttons Modules, go to Load\_Sample\_Name\_To\_Dilution\_Annot\_Click function and update the function Utilities.OverwriteHeader and Utilities.Load\_To\_Excel



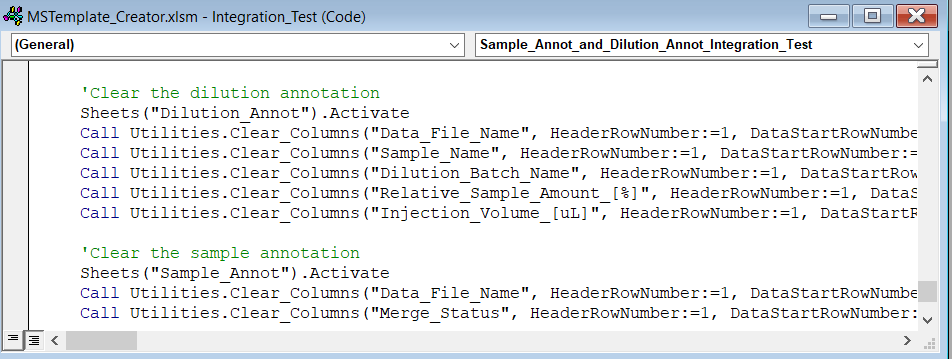
In the Userform Clear\_Dilution\_Annot, change the column name in



Change the relevant code for the userform

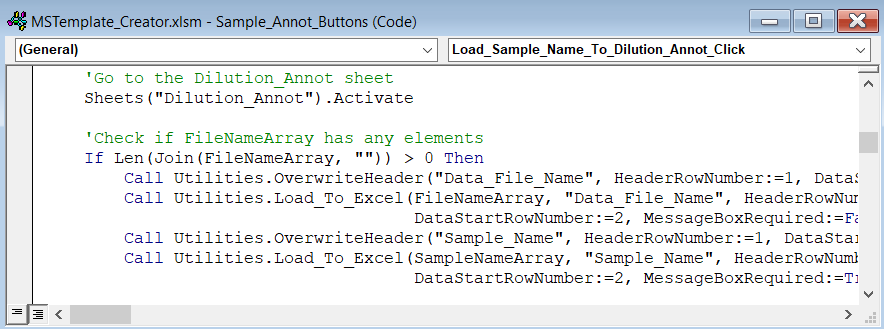


In the Integration\_Test module, go to Sample\_Annot\_and\_Dilution\_Annot\_Integration\_Test to update functions such as Utilities.Clear\_Columns

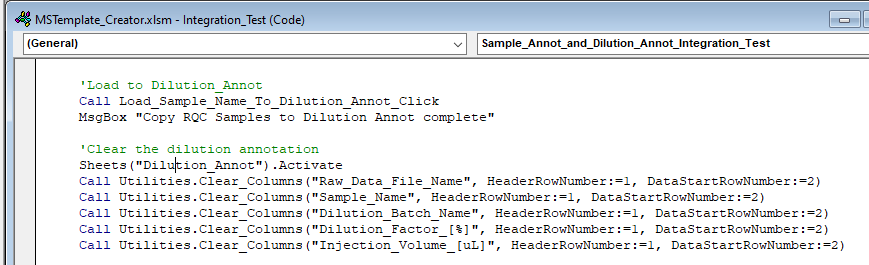


### Changes in the sheet name

In the Sample\_Annot\_Buttons Modules, go to Load\_Sample\_Name\_To\_Dilution\_Annot\_Click function and change the sheet name in the command



In the Integration\_Test module, go to Sample\_Annot\_and\_Dilution\_Annot\_Integration\_Test to update the sheet name to activate.



## Additional help

If you have troubles looking for a particular phrase, you may use the find button on Visual Basic or the Code Explorer in Rubberduck.

