Creating Hyperlinks in SDTM Specifications

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ABSTRACT

SDTM Specification documents (usually Excel files) can be difficult to navigate due to the large number of worksheets within the Excel file. In this paper, I show two methods for creating hyperlinks that all the user to more easily navigate the Excel file. One method involves using PROC FORMAT and the other method involves using a COMPUTE BLOCK in PROC REPORT. I have only shown two types of hyperlinks, but you can probably think of other hyperlinks that would be useful in navigating SDTM Specification documents. I given you to tools to add your own hyperlinks.

INTRODUCTION

SDTM specification documents are used to specify all of the necessary information to program the various SDTM datasets needed for a particular study. Typically, the SDTM specification document contains specification for each dataset to be created and other information such as methods (algorithms) for creating certain variables. Usually, SDTM specification document are done in Excel and may have many worksheets. Thus, hyperlinking various items in the Excel file would help the programmer to more easily move around the Excel file.

BUSINESS NEED

The business need for this project was two-fold:

- To hyperlink datasets listed in the Datasets worksheet to the individual dataset specs as shown in Figure 1.

Figure 1 – Datasets worksheet in SDTM Specification Document

As you can see, CO in cell A2 is colored blue indicating that there is a hyperlink. When you click in this cell, it will take you to the CO worksheet. You can see the CO worksheet at the bottom of Figure 1. The actual worksheet is not shown, but it contains the metadata for creating the CO dataset. The metadata contains items like variable name, variable label, length, format, codelists, roles and core values.

- To hyperlink variables that have methods associated with creating the variable. Figures 2 and 3 show the links that are created.

Figure 2 – Methods worksheet in SDTM Specification Document

Figure 2 shows the method (algorithm) to create DTC variables.

| Variable Name	Variable Label	Type	Length	CT or Formats	Role	Core	Mapping Notes
AESTDTC	Start Date/Time of Adverse Event	Char	19	ISO 8601	Timing	Exp	(DTC)
AEENDTC	End Date/Time of Adverse Event	Char	19	ISO 8601	Timing	Exp	(DTC)

Figure 3 – AE Worksheet in SDTM Specification Document

In Figure 3, you can see that AESTDTC and AEENDTC have (DTC) in the Mapping Notes column that are colored blue. This means that they are hyperlinked to the Methods worksheet. If you click anywhere in the Mapping Notes column that has (DTC) colored in blue, it will take you to the DTC in the Methods worksheet. Thus, the programmer can easily check the algorithm for creating the DTC variablest.

CREATING THE HYPERLINKS

To figure out how to create the hyperlinks, I first created the hyperlinks manually in Excel to see what I needed to do in a SAS program.

The first step was to go to CO (cell A2) in the Datasets worksheet and right click in the cell and choose the Link option. On the left side of the dialog box, you will notice that the default is 'Existing File or Web Page.' Click 'Place in this Document' and you will see the options in Figure 4.
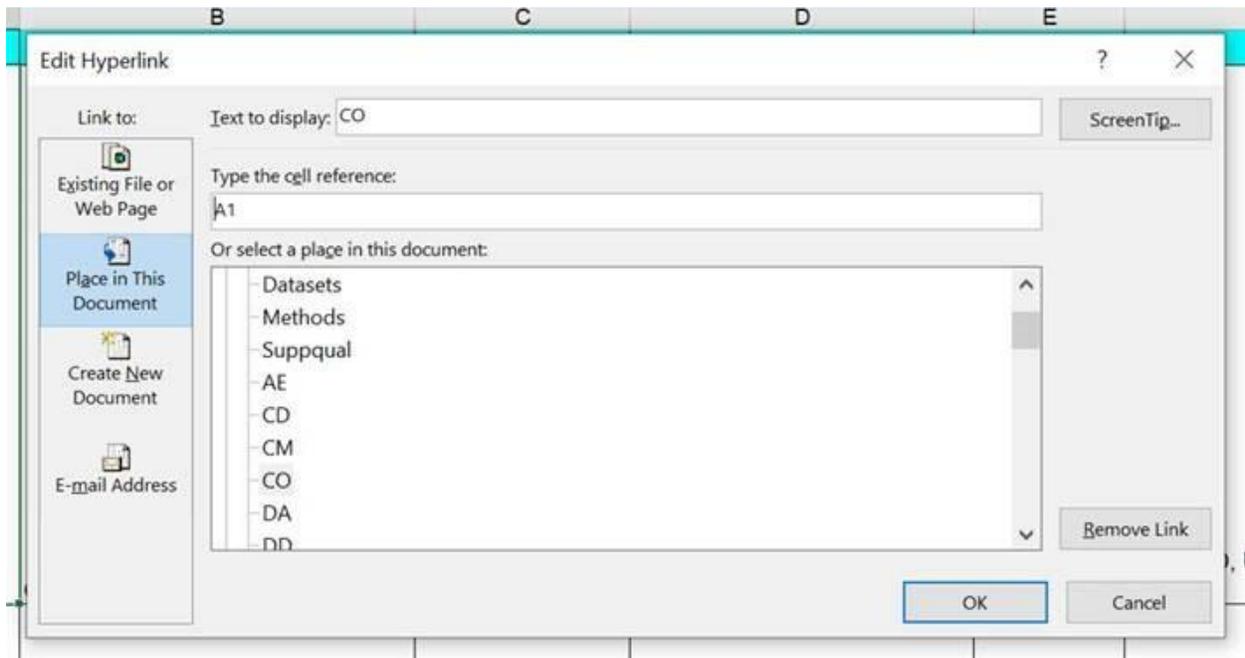
Figure 4 – Link Option – Place in This Document

Now click on CO in the middle of the dialog box and click Ok. The hyperlink is now created. Now go back to the Datasets worksheet and hover the mouse over CO. You will see a path like, file:///\\server\project\study\docs\SDTM_Specification.xlsx\-CO!A1. The task now to program this path in a SAS program to create the hyperlink.

SAS CODE TO CREATE HYPERLINKS

SAS Code to Generate Hyperlinks in Figure 1

The first step is to create this link in a PROC FORMAT:

```
proc format;
  value $nfmt
'CO'="file:///\\server\project\study\docs\SDTM_Specification.xlsx#CO!A1";
run;
```

The difference between what you see in Excel when the hyperlink is manually created is that the string ends with '\CO!a1'. To get this to work in SAS, this string needs to be changed to '#CO!A1'. You simply substitute the '\' with a '#'. Now lets look at how to use this format to get the desired result (Figure 1).

I chose ODS Excel for this task because it creates .xlsx files. The above format is simply referenced in the DEFINE statement in the PROC REPORT as shown below (see bolded text: url=$nfmt.):

```
ods excel options(sheet_name='Datasets' sheet_interval='TABLE'
        gridlines='ON' flow='DATA');

   proc report data=dsn_1 nowd
        style(report)=[bordercolor=black]
        style(lines)=header{background=white asis=on font_size=10pt
              font_face="Arial" font_weight=bold color=#000000
              just=left bordercolor=black}
        style(header)=header{background=cyan font_size=10pt
```

```
        font_face="Arial" font_weight=bold color=#000000
        frame=box bordercolor=black}
style(column)=header{background=white font_size=10pt
        font_face="Arial" font_weight=medium color=#000000
        bordercolor=black};
columns Domain Label Class Structure Purpose Key_Variables
        CDISC_Source Source_Data Sort_Order Mapping_Notes;
define Domain / "Domain" flow
        style(column)={cellwidth=0.6 in url=$nfmt.}
        style(header)={cellwidth=0.6 in};
```

SAS Code to Generate Hyperlinks in Figures 2 and 3

To generate the hyperlinks shown in Figures 2 and 3, the method described above (using PROC FORMAT) will not work. Rather, the hyperlinking is done in a COMPUTE BLOCK in PROC REPOR.

```
define Mapping_Notes / "Mapping Notes" flow
        style(column)={cellwidth=2 in}
        style(header)={cellwidth=2 in};

compute Mapping_Notes;
        if index(Mapping_Notes,'(DTC') > 0 then do;
          call
          define(_COL_,'URL',"file:///\\server\SAS\stat\project\stu
          dy\dev\docs\SDTM_Specification.xlsx#Methods!B2");
          call define(_COL_,"style","STYLE={color=#0000FF}");
        end;
endcomp;
```

You will notice that the path is similar to the PROC FORMAT shown above, but now the URL (see bolded text above) is created in a CALL DEFINE statement in the PROC REPORT.

Tip for Creating the Excel File

I have not shown the whole code because it is very long. In doing this method, I use ODS EXCEL since it is capable of creating a .xlsx file. You will notice in the section for the SAS code for Figure 1, that the 'file=' is not associated with the ODS Excel statement. That is because the first worksheet that I create is called "ReadMe". In the ODS Excel statement that creates the 'ReadMe' worksheet, I do specify the 'file=' option. If you do not close the ODS Excel statement, you can keep creating worksheets to the same file by not specifying the "file=' option (as shown in the SAS code for Figure 1). Once you have created the last worksheet in the Excel file, then you need to close the ODS Excel destination.

CONCLUSION

Adding hyperlinks to SDTM specification documents can help a statistical programmer in more easily moving about the Excel file. I have not shown all of the hyperlinking that can be done. You can probably think of other hyperlinks that would be nice to have. But I have shown you two methods for creating hyperlinks – one using PROC FORMAT and one using a COMPUTE BLOCK. These methods should be useful in creating other hyperlinks that you may think of on your own.

RECOMMENDED READING

Boniface, Christopher J. ODS TAGSETS.EXCELXP and ODS EXCEL SHOWDOWN. SAS Global Forum, Orlando, FL, April 2-5, 2017. https://support.sas.com/resources/papers/proceedings17/0973-2017.pdf

Parker, Chevell. A Ringside Seat: The ODS Excel Destination versus the ODS ExcelXP Tagset. SAS Global Forum, Las Vegas, NV, April 18-21, 2016.
https://support.sas.com/resources/papers/proceedings16/SAS5642-2016.pdf

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