

PHUSE EU CONNECT 2023

# No Adobe Pro, No Worries

(CT08)

Author: Catriona O'Hare

---

Statistical Programming Team Leader

([catriona.ohare@exploristics.com](mailto:catriona.ohare@exploristics.com))



unlocking the value in data

# No Adobe Pro, No Worries

TASKS	PROBLEM	SOLUTION
<p>1) Combined PDF of all RTF Files of Table, Listings, and Figures with Table of Contents\Bookmarks.</p> <p>2) Patient Profiles in PDF with Bookmarks.</p>	<p>Adobe Pro can be a high cost to a company.</p> <p>Sometimes it can't be installed on the server where SAS is used.</p>	<p>1) Present how to combine all RTF files of TFLs into a PDF using SAS,VBS, and GHOSTSCRIPT.</p> <p>2) Present how to create Patient Profiles straight into PDF with Bookmarks using ODS DOCUMENT and ODS PDF in SAS.</p>

# Combined TFLs in PDF with TOC

---

Macro COMBINE\_RTF to combine all RTFs together into one RTF with TOC.

```
*call combine rtf macro**;  
%combine_rtf(indir=&pgmpath./Part1_2,  /**location of RTF TFLs files*/  
            indata=keep,                /** work dataset with TFL file name, title for TOC and order */  
            outdir=&pgmpath./Part1_2, /**location of Combined RTF file**/  
            outfile=_CombinedOutputs,/**name of the Combined RTF File**/  
            tocyn=y);                  /**if want TOC or not**/
```



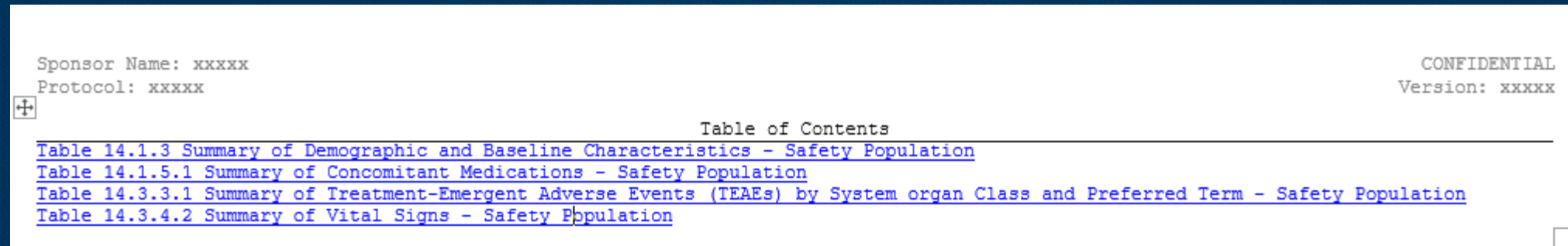
# Combined TFLs in PDF with TOC

- KEEP dataset must contain variables TFL, TITLE and ORDER.
  - TFL: Filename of the TFL
  - TITLE: Title for the TOC
  - ORDER: Order of TFL wanted

	TFL	TITLE	ORDER
1	Table_14.1.3(tdemo)	Table 14.1.3 Summary of Demographic and Baseline Characteristics - Safety Population	1
2	Table_14.1.5.1(tcm)	Table 14.1.5.1 Summary of Concomitant Medications - Safety Population	2
3	Table_14.3.3.1(tae)	Table 14.3.3.1 Summary of Treatment-Emergent Adverse Events (TEAEs) by System organ Class and Preferred Term - Safety Population	3
4	Table_14.3.4.2(tvs)	Table 14.3.4.2 Summary of Vital Signs - Safety Population	4

# Combined TFLs in PDF with TOC

- Macro Creates Combined RTF with TOC.



The screenshot shows a document header with the following text: "Sponsor Name: xxxxx", "Protocol: xxxxx", and "CONFIDENTIAL Version: xxxxx". Below the header is a "Table of Contents" section with four hyperlinks: "Table 14.1.3 Summary of Demographic and Baseline Characteristics - Safety Population", "Table 14.1.5.1 Summary of Concomitant Medications - Safety Population", "Table 14.3.3.1 Summary of Treatment-Emergent Adverse Events (TEAEs) by System organ Class and Preferred Term - Safety Population", and "Table 14.3.4.2 Summary of Vital Signs - Safety Population".

Sponsor Name: xxxxx  
Protocol: xxxxx

CONFIDENTIAL  
Version: xxxxx

Table of Contents

- [Table 14.1.3 Summary of Demographic and Baseline Characteristics - Safety Population](#)
- [Table 14.1.5.1 Summary of Concomitant Medications - Safety Population](#)
- [Table 14.3.3.1 Summary of Treatment-Emergent Adverse Events \(TEAEs\) by System organ Class and Preferred Term - Safety Population](#)
- [Table 14.3.4.2 Summary of Vital Signs - Safety Population](#)

- Save the Combined RTF as a PDF
  - It is more user-friendly and reduces the size of the file by a great deal.
  - TOC hyperlinks still works in PDF.



# Combined TFLs in PDF with TOC

---

## Notes:

- PAGE X of Y at the bottom is updated to reflect the whole Combine RTF file and not individual TFL. Therefore, would keep PAGE X of Y as a footnote under the output.

Data: xxxxxxxx.sas7bdat  
Page 1 of 2

Page 2 of 9

- If there are lots of outputs, the COMBINE\_RTf macro can take a long time to run, and a long time to save as a PDF.

# Combined TFLs in PDF with TOC & Bookmarks

- Use GHOSTSCRIPT to add bookmarks to the Combined PDF file.  
Download GHOSTSCRIPT free.
- Use SAS to find the Page number for each bookmark by pulling in the individual RTF TFLs and using the dataset to create BOOKMARKS.TXT.

VIEWTABLE: Work.Rtftoc

	BOOKMARK	PAGE
1	Table of Contents	1
2	Table 14.1.3 Summary of Demographic and Baseline Characteristics - Safety Population	2
3	Table 14.1.5.1 Summary of Concomitant Medications - Safety Population	4
4	Table 14.3.3.1 Summary of Treatment-Emergent Adverse Events (TEAEs) by System organ Class and Preferred Term - Safety Population	6
5	Table 14.3.4.2 Summary of Vital Signs - Safety Population	7



# Combined TFLs in PDF with TOC & Bookmarks

```
data _null_;
  set keep;
  call symputx('max',_n_);
  call symputx('filename' || compress(put(_n_,best.)),tfl);
  call symputx('ttl' || compress(put(_n_,best.)),title);
run;

%let npage=0;

%macro bookmark;
  %do i=1 %to &max.;
    **pull in each output in order**;
    filename rtf "&pgmpath.\Part1_2\&&filename&i...rtf";

    data rtf_&i. ;
      infile rtf missover length = 1 end = lastobs lrecl = 2000;
      input text $varying2000. 1;

      **find where new page occurs in each output**;
      if index(text,'sas7bdata\line Page') or index(text,'Page\~') then pg+1;
      **add max page of previous output*;
      page=pg+&npage;

      **filename and bookmark**;
      length tfl bookmark $200.;
      tfl="&&filename&i.";
      bookmark="&&ttl&i.";
      order=&i;
  %end;
%mend bookmark;

%bookmark;
```

```
    **No of pages for each output**;
    call symputx('npage',page);
    page=page+1;

    keep order page bookmark;
run;

    **find first page of each output**;
    proc sort data=rtf_&i nodupkey;
      by order ;
    run;
%end;
%mend bookmark;

%bookmark;

**Table of Contents**;
data toc;
  length bookmark $2000.;
  page=0;
  bookmark='Table of Contents';
run;

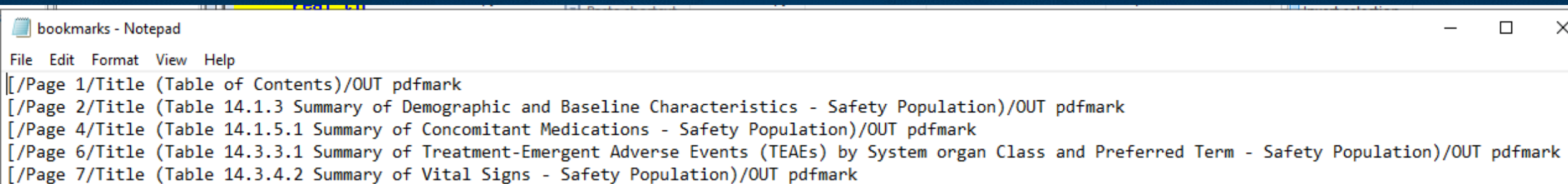
**TOC with rest of Outputs**;
data rtftoc;
  set toc rtf_;;
  page+1; **add extra page of TOC**;
run;
```



# Combined TFLs in PDF with TOC & Bookmarks

- BOOKMARK.TXT

```
* Generate txt file containing bookmarks for TOC filee**;  
filename pdfmk "&pgmpath.\Part1_2\bookmarks.txt" lrecl=2000;  
data _null_;  
    set rtftoc ;  
    length line $2000;  
    file pdfmk ;  
    line = "[/Page " || strip(put(page, 8.)) || "/Title" || ' (' || strip(bookmark) || ')/OUT pdfmark';  
    put line;  
run;
```



bookmarks - Notepad

File Edit Format View Help

[/Page 1/Title (Table of Contents)/OUT pdfmark  
[/Page 2/Title (Table 14.1.3 Summary of Demographic and Baseline Characteristics - Safety Population)/OUT pdfmark  
[/Page 4/Title (Table 14.1.5.1 Summary of Concomitant Medications - Safety Population)/OUT pdfmark  
[/Page 6/Title (Table 14.3.3.1 Summary of Treatment-Emergent Adverse Events (TEAEs) by System organ Class and Preferred Term - Safety Population)/OUT pdfmark  
[/Page 7/Title (Table 14.3.4.2 Summary of Vital Signs - Safety Population)/OUT pdfmark

# Combined TFLs in PDF with TOC & Bookmarks

- Create a BAT file to combine the bookmarks.txt with the Combined PDF file using GHOSTSCRIPT.

```
* Generate bat file to run for creating combined pdf with bookmarks*;
%let locbat=%sysfunc(tranwrd(&pgmpath.\Part1_2,\,/));

data _null_;
  file "&pgmpath.\Part1_2\Combine.bat";
  put "gswin64c.exe ^";
  put "-o &locbat./_CombinedOutputs_TOC_Bookmarks.pdf ^";
  put "-sDEVICE=pdfwrite ^";
  put "-dPDFSettings=/Screen ^";
  put "&locbat/bookmarks.txt ^";
  put "&locbat/_CombinedOutputs.pdf ";
run;
```

- Double-click on the BAT file and create the Combined PDF with TOC and Bookmarks.

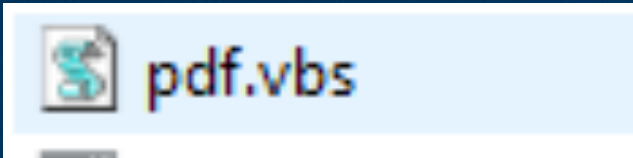


# Combined TFLs in PDF with TOC & Bookmarks

<ul style="list-style-type: none"><li>Table of Contents</li><li>Table 14.1.3 Summary of Demographic and Baseline Characteristics - Safety Population</li><li>Table 14.1.5.1 Summary of Concomitant Medications - Safety Population</li><li>Table 14.3.3.1 Summary of Treatment-Emergent Adverse Events (TEAEs) by System organ Class and Preferred Term - Safety</li><li>Table 14.3.4.2 Summary of Vital Signs - Safety Population</li></ul>		<p>Sponsor Name: xxxxxx Protocol: xxxxxx</p> <hr/> <p style="text-align: right;">Table of Contents</p> <p><a href="#">Table 14.1.3 Summary of Demographic and Baseline Characteristics - Safety Popu</a></p> <p><a href="#">Table 14.1.5.1 Summary of Concomitant Medications - Safety Population</a></p> <p><a href="#">Table 14.3.3.1 Summary of Treatment-Emergent Adverse Events (TEAEs) by System</a></p> <p><a href="#">Table 14.3.4.2 Summary of Vital Signs - Safety Population</a></p>
--	--	---

# Combined TFLs in PDF with Bookmarks without Macro

- Save all TFLs to PDF by using VBScript.
- Double click on pdf.vbs and it will save all the RTF in the same folder as PDF.



```
bRecursive = False
Set oFSO = CreateObject("Scripting.FileSystemObject")
Set oWord = CreateObject("Word.Application")
oWord.Visible = True

docInputFile = oFSO.GetAbsolutePathName(docInputFile)
Set oFolder = oFSO.GetFolder(docInputFile)
ConvertFolder(oFolder)
oWord.Quit

Sub ConvertFolder(oFldr)
    For Each oFile In oFldr.Files
        If LCase(oFSO.GetExtensionName(oFile.Name)) = "rtf" Then
            Set oDoc = oWord.Documents.Open(oFile.path)
            Str = left(oFile,instr(1,oFile,".rtf")-1)
            oWord.ActiveDocument.SaveAs Str & ".pdf", 17
            oDoc.Close
        End If
    Next

    If bRecursive Then
        For Each oSubfolder In oFldr.Subfolders
            ConvertFolder oSubfolder
        Next
    End If
End Sub
```



# Combined TFLs in PDF with Bookmarks without Macro

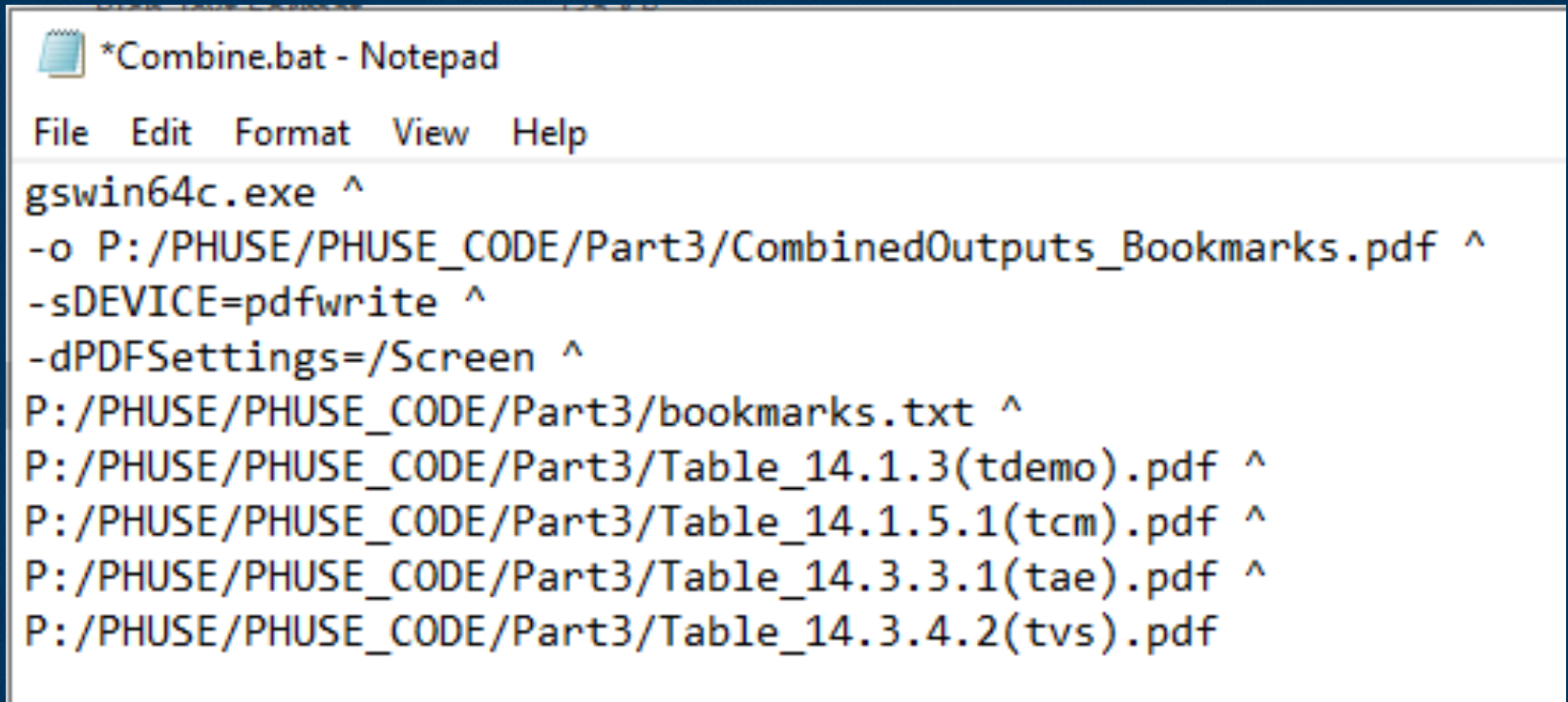
- Create bookmarks.txt again but without TOC.
- Create a BAT file again but use the KEEP dataset to put all the TFLs in.

```
* Generate bat file to run for creating combined pdf with bookmarks*;
%let locbat=%sysfunc(tranwrd(&pgmpath.\Part3,\,/));

data _null_;
  file "&pgmpath.\Part3\Combine.bat";
  set keep end=last;
  length line $2000;
  if _N_=1 then do;
    put "gswin64c.exe ^";
    put "-o &locbat./CombinedOutputs_Bookmarks.pdf ^";
    put "-sDEVICE=pdfwrite ^";
    put "-dPDFSettings=/Screen ^";
    put "&locbat/bookmarks.txt ^";
  end;
  if not last then line = "&locbat./"||compress(tfl)||".pdf ^";
  | else          line = "&locbat./"||compress(tfl)||".pdf ";
  put line;
run;
```

# Combined TFLs in PDF with Bookmarks without Macro

- Text in the BAT File.



```
*Combine.bat - Notepad
File Edit Format View Help
gswin64c.exe ^
-o P:/PHUSE/PHUSE_CODE/Part3/CombinedOutputs_Bookmarks.pdf ^
-sDEVICE=pdfwrite ^
-dPDFSettings=/Screen ^
P:/PHUSE/PHUSE_CODE/Part3/bookmarks.txt ^
P:/PHUSE/PHUSE_CODE/Part3/Table_14.1.3(tdemo).pdf ^
P:/PHUSE/PHUSE_CODE/Part3/Table_14.1.5.1(tcm).pdf ^
P:/PHUSE/PHUSE_CODE/Part3/Table_14.3.3.1(tae).pdf ^
P:/PHUSE/PHUSE_CODE/Part3/Table_14.3.4.2(tvs).pdf
```

- Double-click on the BAT file and create the Combined PDF with Bookmarks.



# Combined TFLs in PDF with Bookmarks without Macro

Bookmarks

Table 14.1.3 Summary of Demographic and Baseline Characteristics - Safety Population

Table 14.1.5.1 Summary of Concomitant Medications - Safety Population

Table 14.3.3.1 Summary of Treatment-Emergent Adverse Events (TEAEs) by System organ Class and Preferred Term - Safety

Table 14.3.4.2 Summary of Vital Signs - Safety Population

Sponsor Name: xxxxxxxxxxxx  
Protocol: XXXXXXXXXXXX

Table 14.1.3  
Summary of Demographic and Baseline Characteristics - Safety Population

	TRT1 (N=X)
Age (yrs)	xx (x)
n (missing)	xx.x (x.xx)
Mean (SD)	xx.x
Median	xx ; xx
Min ; Max	
Age Range, n (%)	
17 to 30	xx (xx.x)
31 to 60	xx (xx.x)
61 to 70	xx (xx.x)
Missing	xx (xx.x)

# Combined TFLs in PDF with Bookmarks without Macro

---

- Notes:
  - No TOC but can save time by not combining all into one RTF first.
  - Can deliver the individual PDF outputs instead of the RTF.
  - The PAGE X of Y does not change from the TFL output.
  - Don't have any Word files opened when using VBScript as can stop it from working.



# Patient Profiles in PDF

- Listings of all subject's data by site and subject.
- Using ODS DOCUMENT, PROC DOCUMENT and ODS PDF.

Patient\_Profile.pdf 1 / 32 150%

Site 001

Subject 001001

Listing 1 Concomitant Medications

Listing 2 Adverse Events

Listing 3 Treatment

Subject 001002

Site 002

Site 003

Sponsor: xxxxx.

Site 001, Subject 001001

Listing 1 Concomitant Medications

Medication or Therapy	Dose	Units	Frequency	Route	Indication
No Data					

# Patient Profiles in PDF

```
**CREATE ODS DOCUMENT**;  
ods document name=pp(write);
```

Call ODS DOCUMENT

```
%macro pp;
```

```
%do i=1 %to &maxsub.;**1 to max number of subject**;
```

Do for each subject in order

```
** site and subject headers**;
```

```
title2 j=c "Site &&site&i., Subject &&subject&i.";
```

```
ods proclabel "Site &&site&i." ;
```

1st Bookmark (Site)

```
*****;
```

```
**Listing 1 Report**;
```

```
*****;
```

```
title4 j=c "Listing 1 Concomitant Medications";
```

```
proc report data=pp.conmed(where=(subject= "&&subject&i.")) split='-' style(header)={just=1 asis=on} contents="Subject &&subject&i.";
```

2nd Bookmark (Subject)

```
column v: ;
```

```
define v1 / display order=data style(column)=[cellwidth=4.7 cm just=1] contents="Listing 1 Concomitant Medications" page;
```

```
define v2-v4 / display style(column)=[cellwidth=2.2 cm ];
```

```
define v5 / display style(column)=[cellwidth=2.5 cm ];
```

```
define v6 / display style(column)=[cellwidth=3.5 cm ];
```

```
define v7 / display style(column)=[cellwidth=2.2 cm ];
```

```
define v8-v9 / display style(column)=[cellwidth=2.5 cm ];
```

```
define v10 / display style(column)=[cellwidth=1.7 cm ];
```

```
run;
```

3rd Bookmark (Listing Title)

Proc Report for each output after each other.  
Then close all.

```
%end;  
%mend pp;  
%pp;  
ods document close;**CLOSE ODS DOCUMENT**;
```

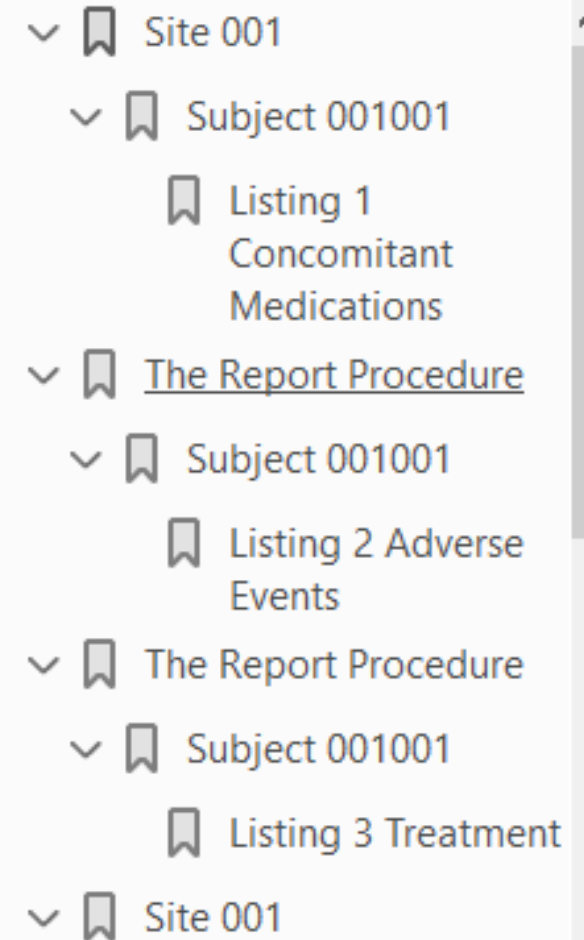


# Patient Profiles in PDF

- Use ODS PDF to create the PDF of all the listings by site and subject. Use PROC DOCUMENT calling PP.

```
*****;  
* PRINT : PDF output *;  
*****;  
ods pdf file="%pgmpath.\Part4\Patient_Profile.pdf" ;  
  
proc document name=pp ;  
    replay ;  
quit;  
  
ods pdf close;  
  
*****;
```

- But when opened in PDF the bookmarks are not what is needed.



# Patient Profiles in PDF

First, create a dataset Book with no of subjects per site and the number of outputs per site plus previous sites.

Create macro variable OUTPUTS for the number of outputs per subject.

VIEWTABLE: Work.Book

	SUBJECT	SITE	SUBSITE	OUTPUTS	OUT	ITEM
1	001002	001	2	3	6	1
2	002005	002	3	3	9	7
3	003008	003	3	3	9	16
4	004010	004	2	3	6	25

```
%let outputs=3;**number of outputs for each subject**;  
  
**variables needed for updating bookmarks**;  
data book;  
  set pp.demog;  
  by site subject;  
    **number of subjects in each site**;  
    if first.site then subsite=1;  
    else subsite+1;  
    **outputs per subject**;  
    outputs=&outputs;  
    **no of outputs times the no of subjects**;  
    if last.site then out=outputs*subsite;  
    *find number of outputs per sites plus previous sites**;  
    retain item;  
    item+lag(out);  
    if _n_=1 then item=1;  
    **keep only last subject per site**;  
    if last.site;  
run;
```



# Patient Profiles in PDF

Move Bookmarks  
using PROC  
DOCUMENT.

Using ITEM, SUBSITE  
from dataset BOOK.

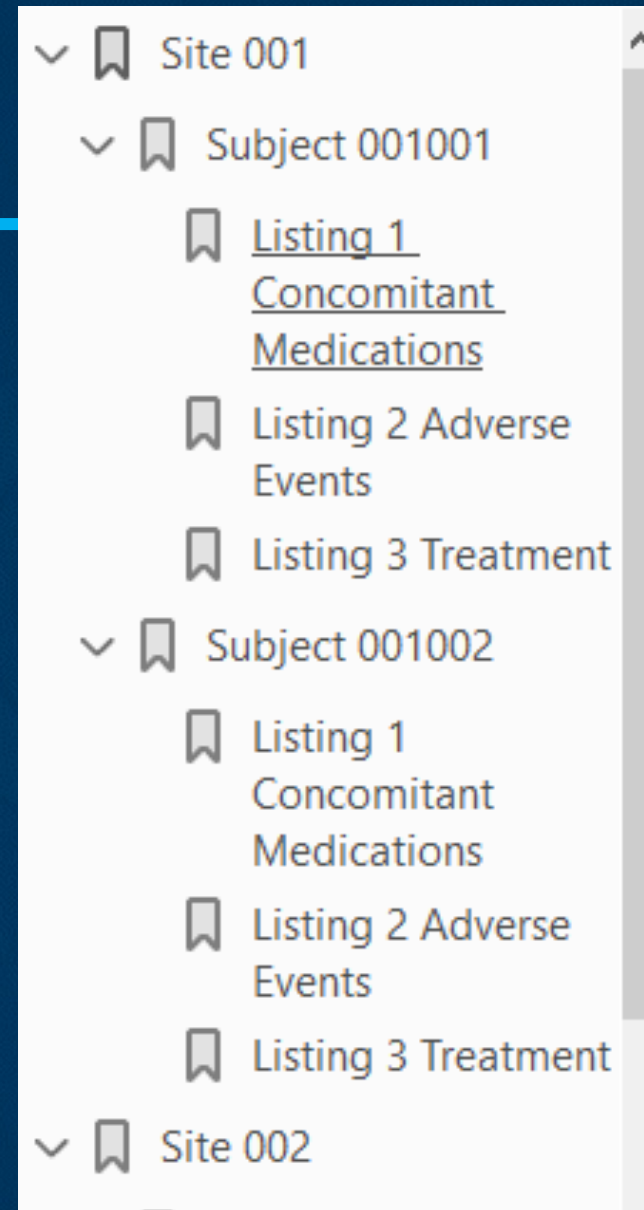
And OUTPUTS  
macro variable.

```
%macro bookmarks(i,out);|
  proc document name=pp;
    *move the 1st subject of each site to correct place*;
    %do l=1 %to %eval(&outputs.-1);
      move \Report#%eval(&i.+ &l.)\Report#1\Report#1 to \Report#&i.\Report#1;
    %end;
    *move the 2nd + subject of each site to correct place*;
    %do j=2 %to &out.;
      %let k=%eval(&outputs.*&j.-&outputs.);
      move \Report#%eval(&i.+&k.)\Report#1 to \Report#&i.;
      %do l=1 %to %eval(&outputs.-1);
        move \Report#%eval(&i.+&k.+ &l.)\Report#1\Report#1 to \Report#&i.\Report#&j.;
      %end;
    %end;
  run;
quit;
%mend bookmarks;

data _null_;
  set book;
  **call bookmarks macro**;
  call execute('%bookmarks('||compress(put(item,best.))||','||compress(put(subsite,best.))||')');
run;
```

## Patient Profiles in PDF

- Then create PDF again using ODS PDF.
- Set up to work for any number of outputs per subject by updating the macro variable **OUTPUTS**.





## Source Info

---

[SAS/combine.sas at master · LwanI2/SAS · GitHub](#)