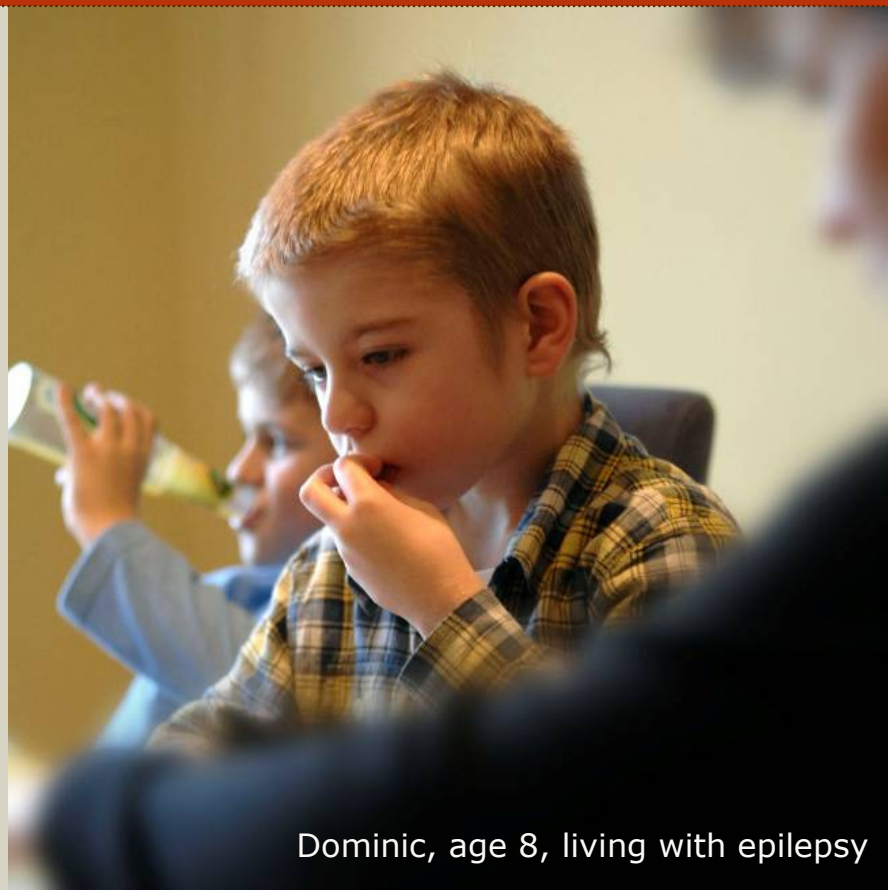
%check_projects

An overview of datasets, variables, and values across multiple studies



Dominic, age 8, living with epilepsy

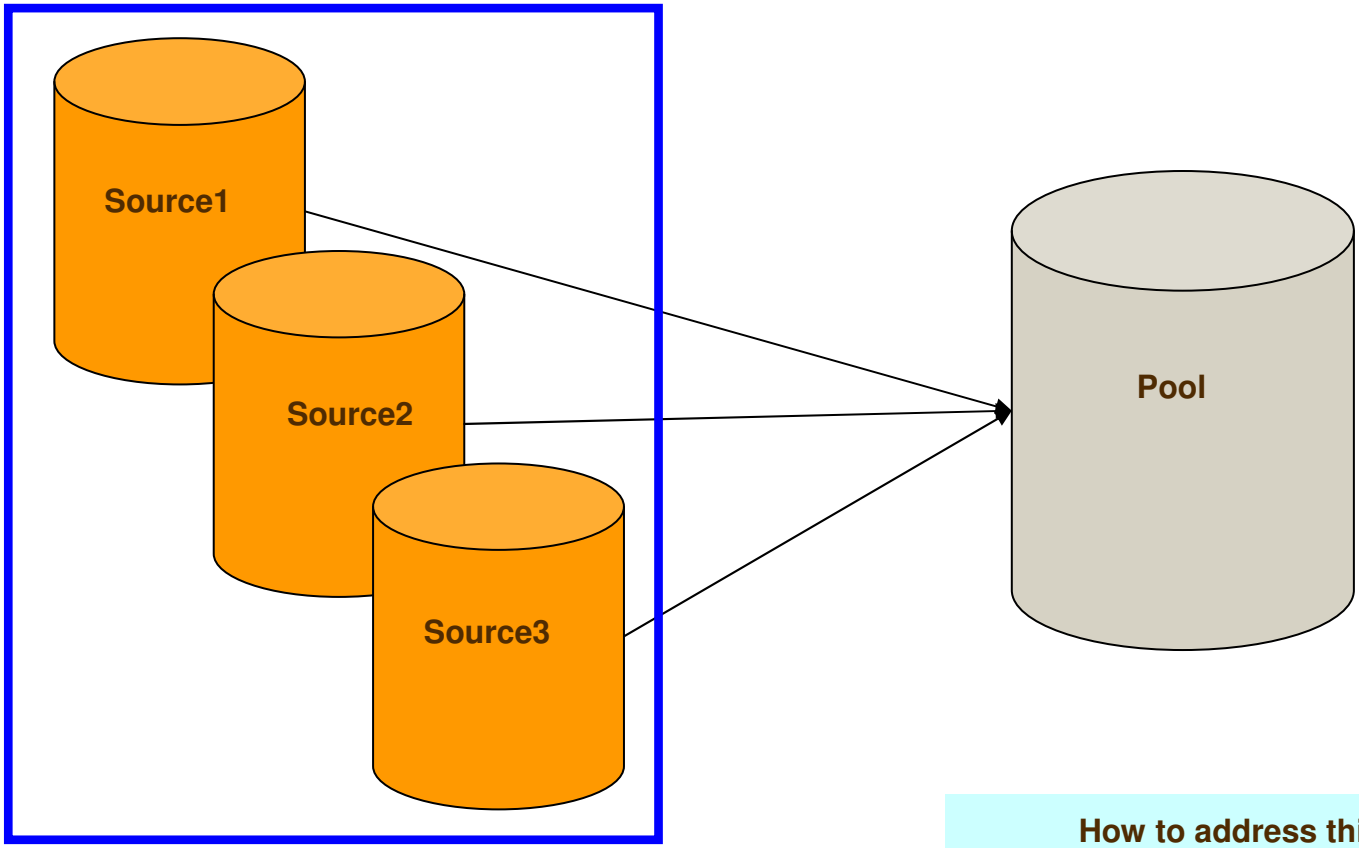
04 May 2011

Coding tidbits

1. Input of macro parameters
2. SAS Metadata
3. Some macro techniques
4. Macro looping
5. Output creation

What is this macro for?

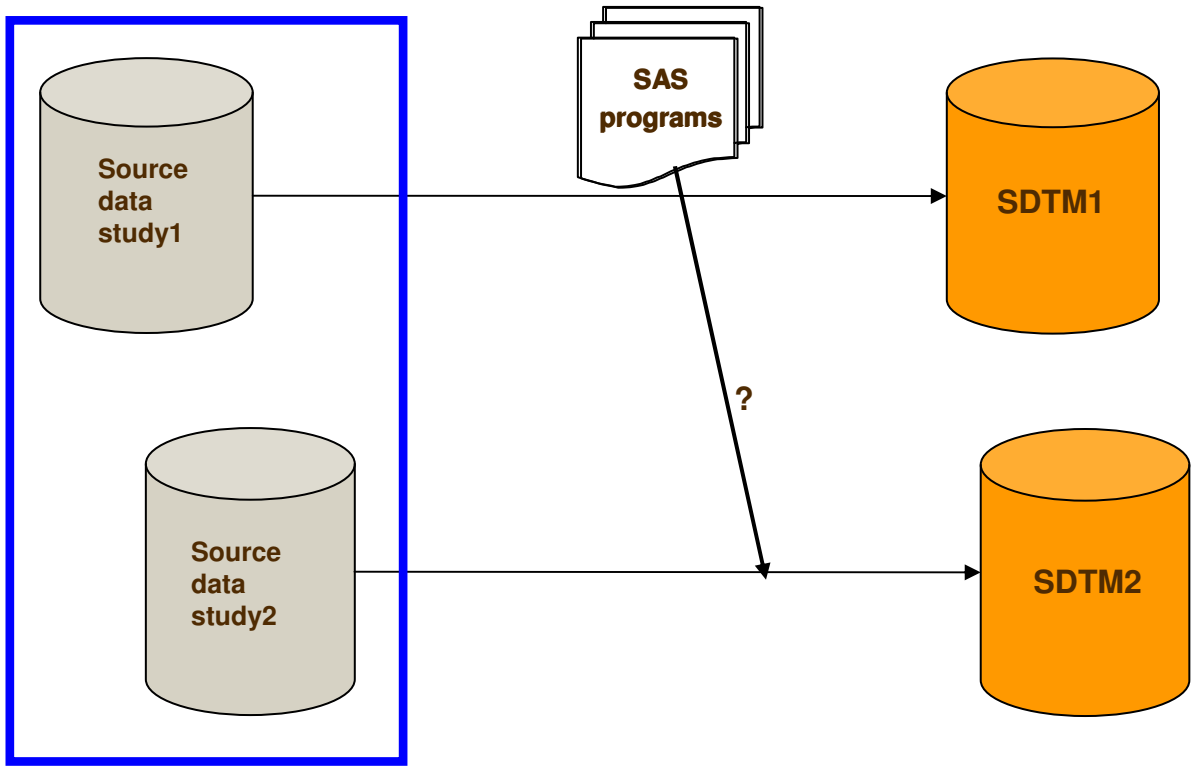
Rationale: Scenario 1



Problem: Input files might have a different structure!!!

How to address this?

Rationale: Scenario 2

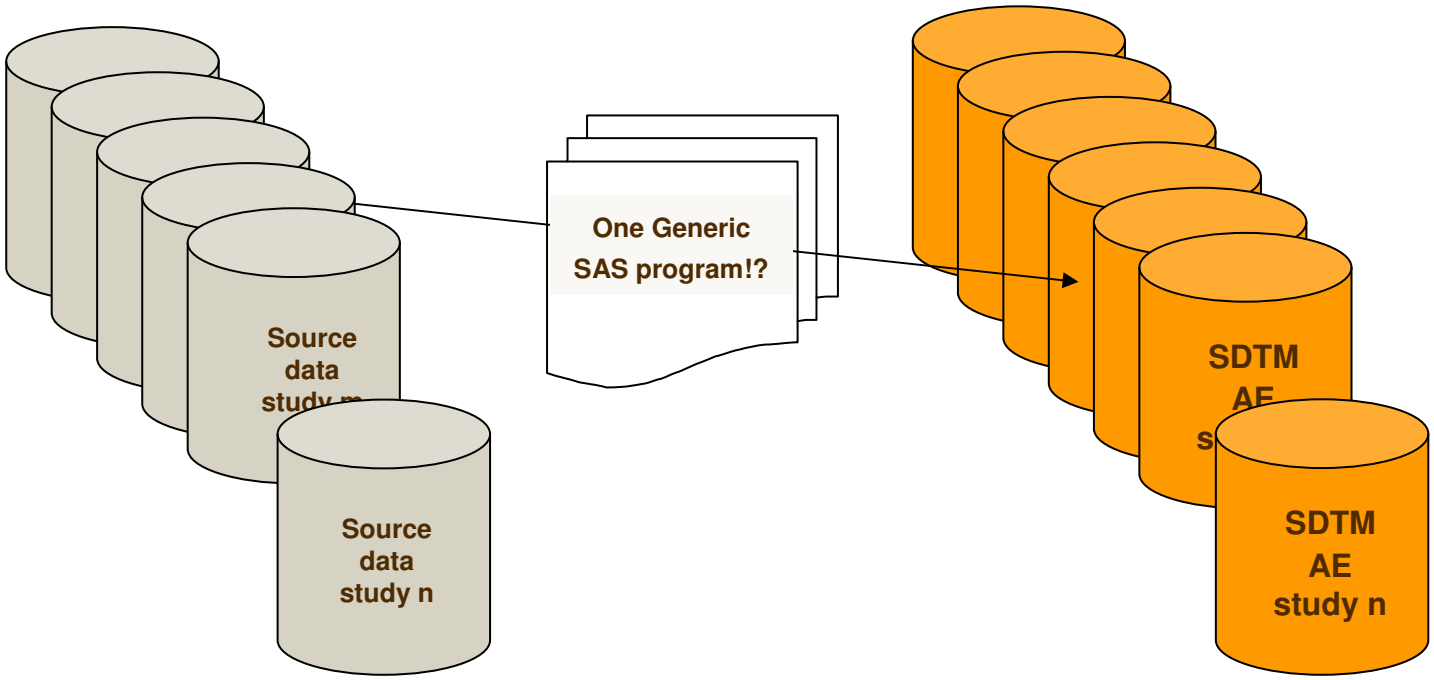


How do the source data differ?

What do I need to adapt?

Rationale: Scenario 3 (extension to Scenario 2)

This was the sarting point

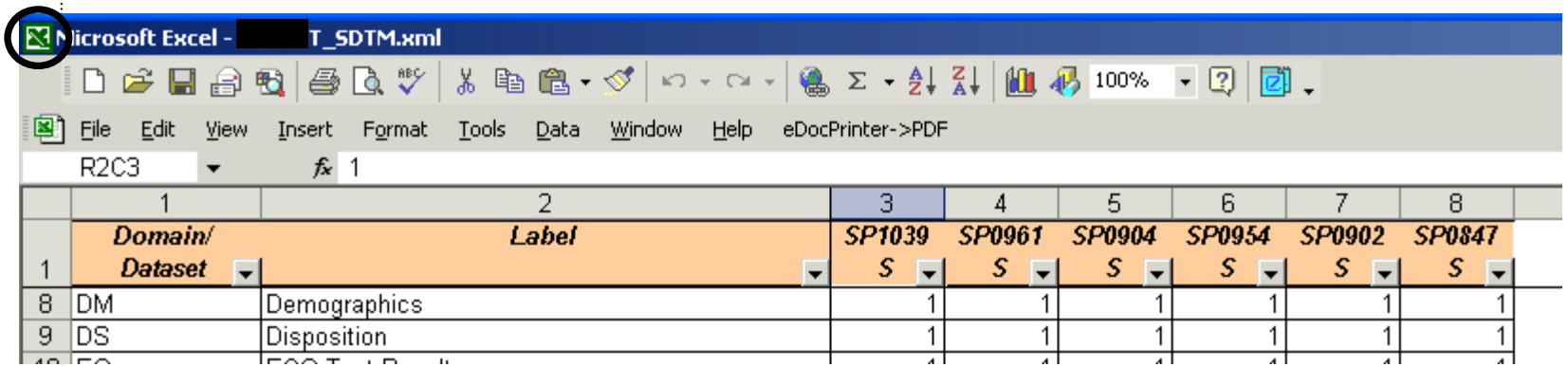


Is there a supportive tool?

Prospective planning (of programming): study comparison

Diagnosis: Compliance to SDTM rules, controlled terminology

The xml-output



	1	2	3	4	5	6	7	8
1	Domain/ Dataset	Label	SP1039 S	SP0961 S	SP0904 S	SP0954 S	SP0902 S	SP0847 S
8	DM	Demographics	1	1	1	1	1	1
9	DS	Disposition	1	1	1	1	1	1

Libnames

Domains

Domain/ Dataset	Label	SP1039 S	SP0961 S	SP0904 S	SP0954 S	SP0902 S	SP0847 S
AE	Adverse Events	1	1	1	1	1	1
CE	Clinical Events	1	1	1	1	1	1
CM	Concomitant Medications	1	1	1	1	1	1
CO	Comments	1	1			1	1
COLB					1		1
DA	Drug Accountability		1		1	1	1
DM	Demographics	1	1	1	1	1	1
DS	Disposition	1	1	1	1	1	1
EG	ECG Test Results	1	1	1	1	1	1
EX	Exposure	1	1	1	1	1	1
EXV			1				
FA	Findings About Events		1	1	1	1	
IE	Inclusion/Exclusion Criteria Not Met	1	1	1	1	1	1
LB	Laboratory Test Results	1	1	1	1	1	1
LB_CODES					1		
MH	Medical History	1	1		1	1	1
PC	Pharmacokinetic Concentrations	1	1				1
PE	Physical Examination	1	1	1	1	1	1
PP	Pharmacodynamic Parameters	1	1				
QS	Questionnaire		1		1		
SC	Subject Characteristics		1		1	1	1
SU	Substance Use	1				1	
SUPPAE	Supplemental for AE	1	1	1	1	1	1
SUPPCE	Supplemental for CE	1	1	1	1		1

Libnames

Domains

SAS Dataset/ Domain	SAS Variable	Var Suffix	Label	# Studies	SP0847S	SP0902S	SP0904S	SP0954S	SP0961S	SP1039S
AE	AEACN	ACN	Action Taken with Study Treatment	6	C	C	C	C	C	C
AE	AEACNOTH	ACNOTH	Other Action Taken	4	C			C	C	C
AE	AEBODSYS	BODSYS	Body System or Organ Class	6	C	C	C	C	C	C
AE	AEDECOD	DECOD	Dictionary-Derived Term	6	C	C	C	C	C	C
AE	AEENDTC	ENDTC	End Date/Time of Adverse Event	6	C	C	C	C	C	C
AE	AEENDY	ENDY	Study Day of End of Adverse Event	5	N	N	N	N	N	
AE	AEENRF	ENRF	End Relative to Reference Period	4		C	C	C	C	
AE	AEMODIFY	MODIFY	Modified Reported Term	6	C	C	C	C	C	C
AE	AEOUT	OUT	Outcome of Adverse Event	6	C	C	C	C	C	C
AE	AEPATT	PATT	Pattern of Adverse Event	4	C			C	C	C
AE	AEREL	REL	Causality	6	C	C	C	C	C	C
AE	AESCONG	SCONG	Congenital Anomaly or Birth Defect	2		C	C			
AE	AESDISAB	SDISAB	Persist or Signif Disability/Incapacity	2		C	C			
AE	AESDTH	SDTH	Results in Death	2		C	C			
AE	AESEQ	SEQ	Sequence Number	6	N	N	N	N	N	N
AE	AESER	SER	Serious Event	6	C	C	C	C	C	C
AE	AESEV	SEV	Severity/Intensity	6	C	C	C	C	C	C
AE	AESHOSP	SHOSP	Requires or Prolongs Hospitalization	2		C	C			
AE	AESLIFE	SLIFE	Is Life Threatening	2		C	C			
AE	AESMIE	SMIE	Other Medically Important Serious Event	2		C	C			
AE	AESPID	SPID	Sponsor-Defined Identifier	6	C	C	C	C	C	C
AE	AESTDTC	STDTC	Start Date/Time of Adverse Event	6	C	C	C	C	C	C
AE	AESTDY	STDY	Study Day of Start of Adverse Event	5	N	N	N	N	N	
AE	AETERM	TERM	Reported Term for the Adverse Event	6	C	C	C	C	C	C
CE	CECAT	CAT	Category for Clinical Event	6	C	C	C	C	C	C
CE	CEDTC	DTC	Date/Time of Event Collection	5	C	C	C	C	C	
CE	CEDY	DY	Study Day of Event Collection	4		N	N	N	N	
CE	CEOCCUR	OCCUR	Clinical Event Occurrence	5	C	C	C	C	C	
CE	CEPRESP	PRESP	Clinical Event Pre-specified	5	C	C	C	C	C	
CE	CESEQ	SEQ	Sequence Number	6	N	N	N	N	N	N
CE	CESPID	SPID	Sponsor-defined identifier	6	C	C	C	C	C	C

Level 1 Datasets | Level 2 Variables | **Level 3 Variable Values**

Libnames

Domains

SAS Dataset Domain	SAS Variable	Value	Total freq	SP0954 S	SP0902 S	SP0904 S	SP0847 S	SP0961 S	SP1039 S
AE	AEACN		1	1					
		DOSE INCREASED	12	2	1	9			
		DOSE NOT CHANGED	971	74	630	245	19	3	
		DOSE REDUCED	50	14	12	21	1	2	
		DRUG INTERRUPTED	3	2	1				
		DRUG WITHDRAWN	48	13	28	7			
		NOT APPLICABLE	222	12	170	5	5		30
	AEACNOTH		1129		842	287			
		CONCOMITANT MEDICATION	24	20				1	3
		Concomitant medication	5				5		
		HOSPITALIZATION OR PROLONGATION OF HOSPITALIZATION	2	2					
		NONE	116	89				4	23
		None	20				20		
		THERAPEUTIC OR DIAGNOSTIC PROCEDURE	11	7					4
	AEBODSYS		68	7	35	21	2	3	
		BLOOD AND LYMPHATIC SYSTEM DISORDERS	5		3	2			
		CARDIAC DISORDERS	5		4	1			
		Cardiac Disorders	2						2
		EAR AND LABYRINTH DISORDERS	21	3	15	3			
		Ear And Labyrinth Disorders	2						2

Major macro parameters


```
4  %libs;
5  %CHECK_PROJECTS(LIBNAMES=SP0847 SP0902 SP0904 SP0954 SP0961 SP1039
6                 ,DSETLIST=AE
7                 ,DSETTYPE=SDTM
8                 ,OUTXMLPATH=&curpath.\[redacted]_SDTM.xml
```

LIBNAMES: List of libnames pointing to the studies

DSETLIST: List of datasets (_ALL_ is default)

DSETTYPE: Determines layout of xml-files and checks performed.

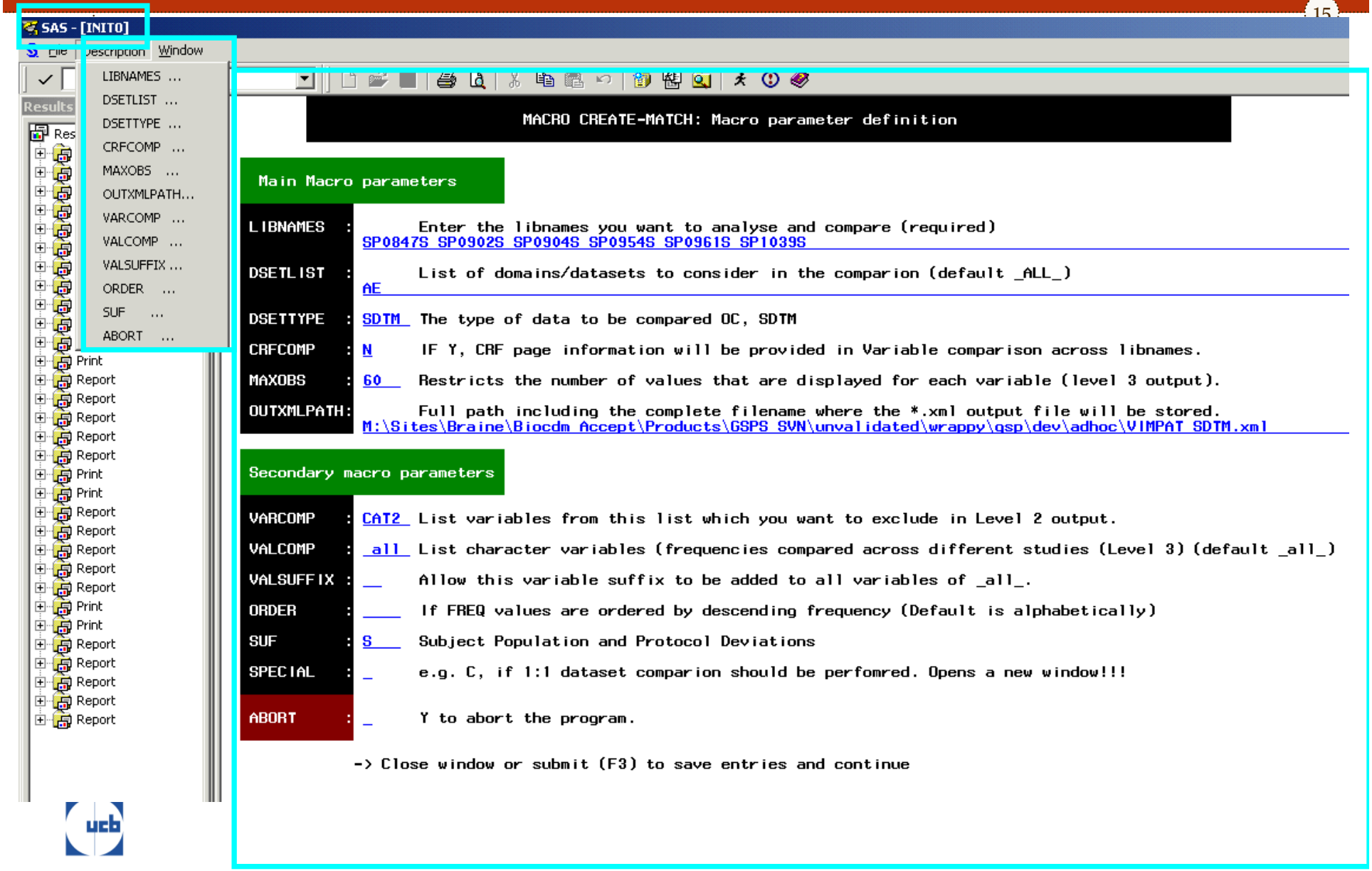
OUTXMLPATH: Output filename

Coding tidbits

1. Input of macro parameters
2. SAS Metadata
3. Some macro techniques
4. Macro looping
5. Output creation

1. Input of parameters

(Macro parameter) Input window



Simple windowing with SAS


```
libname styles "...";
proc pmenu cat=styles.check_projects;
 menu select;
 item "Description" menu=descrip;
 menu descrip;
 item 'LIBNAMES   ' dialog=textl;
 item 'DSETLIST   ' dialog=text2;
...
item 'ABORT      ' dialog=textl2;
 dialog textl 'submit;';
  text #1 @3  "Define libnames outside the macro (e.g. in %nrstr(%%central). One libname is required. List must be space separated.";
 dialog text2 'submit;';
  text #1 @3  "List must be space separated. ";
...
 dialog textl2 'submit;';
  text #1 @3  "Y: Abort the macro";
 run;
quit;
```

Parameter descriptions

```
data check;
%window init0 menu=styles.check_projects.select columns=140 rows=80
 #1   @10  "                                                                                  " attr=(rev_video) color=black
 #2   @10  "                        MACRO CREATE-MATCH: Macro parameter definition            " attr=(rev_video) color=black
 #3   @10  "                                                                                  " attr=(rev_video) color=black

 #5  @3   "                              "    attr=(rev_video) color=green
 #6  @3   "  Main Macro parameters       "    attr=(rev_video) color=green
 #7  @3   "                              "    attr=(rev_video) color=green
 #8  @3  "             " color=black  attr=(rev_video)
 #9  @3  " LIBNAMES  :" color=black  attr=(rev_video) +7 "Enter the libnames you want to analyse and compare (required)
 #10 @3  "             " color=black  attr=(rev_video) +1 libnames 120 color=blue required=yes autoskip=yes attr=underline
 #11 @3  "             " color=black  attr=(rev_video)
...
 #41 @3  " ABORT     :" color=red  attr=(rev_video) +1 ABORT        1 color=blue required=no autoskip=yes attr=underline +5 "Y to abort the program.
 #42 @3  "             " color=red  attr=(rev_video)

 #44 @15  "-> Close window or submit (F3) to save entries and continue" color=black;
%display init0;
run;
```

Input screen

2. SAS Metadata

Metadata in SAS (SAS tables and variables)

Metadata about SAS Variables

```
proc sort data=sashelp.vcolumn
   (where=(libname in ("%_enum (lst=&libnames.,_sep=%QUOTE(","))"))
     keep=libname memname name label type length)  out=vcolumn nodupkey;
   by libname memname name label ;
run;
proc sort data=sashelp.vtable
   (where=(libname in ("%_enum (lst=&libnames., _sep=%QUOTE(","))"))
     keep= libname memname memlabel)  out=vtable;
by  memname memlabel  ;
run;
```

Metadata about SAS Datasets

3. Some macro techniques

macro variable list ↔ single macro variables


```
%if %upcase(&DSETLIST) = _ALL_ %then %DO;
  proc sql noprint;
     select distinct(memname)
      into : DSETLIST separated by ' '
      from vcolumn05
  ;
  quit;
%END;
```

List of existing datasets assigned to &DSETLIST.

&DSETLIST: List of datasets (or _ALL_)

Vcolumn: SAS Metadata

```
/**** - Split up list of datasets into multiple macro variables.  +  ****/
/**** - Determine the number of datasets for later looping (_NDOMAIN)   ****/
  %LET  NDOMAIN=1;
   %DO %UNTIL (%QSCAN(%QUOTE(&DSETLIST.),&_NDOMAIN.) = %STR( ) ) ;
      %LET DSETLIST&_NDOMAIN.=%UPCASE(%QSCAN(%QUOTE(&DSETLIST.),&_NDOMAIN.));
      %LET _NDOMAIN=%EVAL(&_NDOMAIN.+1);
   %END;
```

Splitting a list into single elements

number of elements in a list

&&DSETLIST&J.

1st resolution: (e.g. &DSELIST1)

2nd resolution: (e.g. AE)

Conditional programming

Level 1 Datasets | **Level 2 Variables** | Level 3 Variable Values

```
/****  Variable types per study                                          ****/
proc transpose data=vcolumn25 out=check (drop= name  label );
 by memname name labell %_varlist(_dslst=vcolumn30a,_varlst= dcmnamel) ;
 var type;
 id libname;
run;
```

Conditional programming

Resolve **list of variables** to those contained in a **dataset**

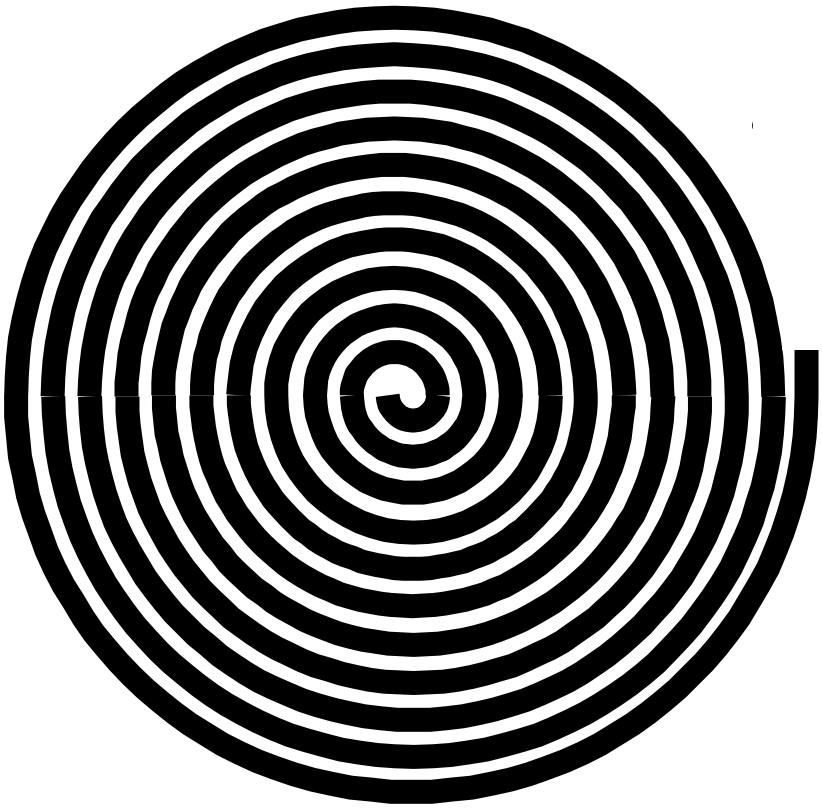
Libnames

Domains

Member Name	Column Name	LABEL1	SP0847S	SP0902S	SP0904S	SP0954S	SP1039S
AE	AEACN	Action Taken with Study Treatment	C	C	C	C	C
AE	AEACNOTH	Other Action Taken	C			C	C
AE	AEBODSYS	Body System or Organ Class	C	C	C	C	C
AE	AEDECOD	Dictionary-Derived Term	C	C	C	C	C
AE	AEENDTC	End Date/Time of Adverse Event	C	C	C	C	C
AE	AEENDY	Study Day of End of Adverse Event	N	N	N	N	
AE	AEENRF	End Relative to Reference Period	C	C	C	C	
AE	AEMODIFY	Modified Reported Term	C	C	C	C	C
AE	AEOUT	Outcome of Adverse Event	C	C	C	C	C
AE	AEPATT	Pattern of Adverse Event	C			C	C
AE	AEREL	Causality	C	C	C	C	C
AE	AESCONG	Congenital Anomaly or Birth Defect		C	C		
AE	AESDISAB	Persist or Signif Disability/Incapacity		C	C		
AE	AESDTH	Results in Death		C	C		
AE	AESEQ	Sequence Number	N	N	N	N	N
AE	AESER	Serious Event	C	C	C	C	C
AE	AESEV	Severity/Intensity	C	C	C	C	C
AE	AESHOSP	Requires or Prolongs Hospitalization		C	C		
AE	AESLIFE	Is Life Threatening		C	C		
AE	AESMIE	Other Medically Important Serious Event		C	C		
AE	AESPID	Sponsor-Defined Identifier	C	C	C	C	C
AE	AESTDTC	Start Date/Time of Adverse Event	C	C	C	C	C
AE	AESTDY	Study Day of Start of Adverse Event	N	N	N	N	
AE	AETERM	Reported Term for the Adverse Event	C	C	C	C	C

4. Macro looping

Looping through LIBNAMES: *&I*	&&LIB&I.
Looping through DOMAINS (DSETLIST): *&J*	&&DSETLIST&J.
Looping through VARIABLES: *&K*	&&FREQVS&K.



Variable level information

Level 1 Datasets | Level 2 Variables | **Level 3 Variable Values**


```
%DO J=1 %TO &_NDOMAIN.-1;  /*** DO-loop over all datasets or domains. ***/
```

STEP1

AEALL
DSALL
etc

```
/****  Dataset consisting of all the libnames is created (for each domain)          ****/
data &&DSETLIST&J..all;
 length &lengthv. source $12;
 set %DO I=1 %TO &COUNT.-1;
      /**** Only datasets with at least one variable will be considered.
         &&LIB&I...&&DSETLIST&J.. (in=&&LIB&I.. keep=%_varlist(_dslst=&&LIB&I...&&DSETL
     %END;;
     %DO I=1 %TO &COUNT.-1;
         if &&LIB&I.. then source="&&LIB&I..";
     %END;
 format _all_;
run;
```

Looping through LIBNAMES: *&I*

```
%END; /* %DO J=1 %TO &_NDOMAIN.; */
```

Variable level information

Level 1 Datasets / Level 2 Variables / **Level 3 Variable Values**


```
%DO J=1 %TO & NDOMAIN.-1;  /*** DO-loop over all datasets or domains. ***/
```

STEP2

```
proc freq data=&&DSETLIST&J..all noprint;
 %DO K=1 %TO &COUNTVAR.-1;
   tables &&FREQVS&K..*source/missing out=freq&K.;
   tables &&FREQVS&K..       /missing out=sum&K.;
 %END;
run;
data freqs&J.;
 length varname source $8 value_x $200;
 set  %DO K=1 %TO &COUNTVAR.-1;
          freq&K.  (in=&&FREQVS&K.. rename=(&&FREQVS&K..=value_x)) sum&k. (in=&&FREQVS&K.. rename=(&&FREQV
      %END;;
      %DO K=1 %TO &COUNTVAR.-1;
          if &&FREQVS&K.. then varname="&&FREQVS&K..";
          if source="" then source="ALL";
      %END;
    /* ... */
run;
    /* ... */
proc transpose data=freqs&J. out=freqlist&J. (drop = _name_ _label_);
 var count;
 id source;
 by varname value_x;
run;
data freqlist&J.;
 set freqlist&J.;
 domain="&&DSETLIST&J.";
run;
%END; /* %DO J=1 %TO & NDOMAIN.; */
```

e.g. AEALL

… Set all freqlists together: Level 3 Variable Values

Level 3 Variable Values

Libnames

Domains

SAS Dataset Domain	SAS Variable	Value	Total freq	SP0954 S	SP0902 S	SP0904 S	SP0847 S	SP0961 S	SP1039 S
AE	AEACN		1	1					
		DOSE INCREASED	12	2	1	9			
		DOSE NOT CHANGED	971	74	630	245	19	3	
		DOSE REDUCED	50	14	12	21	1	2	
		DRUG INTERRUPTED	3	2	1				
		DRUG WITHDRAWN	48	13	28	7			
		NOT APPLICABLE	222	12	170	5	5		30
	AEACNOTH		1129		842	287			
		CONCOMITANT MEDICATION	24	20				1	3
		Concomitant medication	5				5		
		HOSPITALIZATION OR PROLONGATION OF HOSPITALIZATION	2	2					
		NONE	116	89				4	23
		None	20				20		
		THERAPEUTIC OR DIAGNOSTIC PROCEDURE	11	7					4
	AEBODSYS		68	7	35	21	2	3	
		BLOOD AND LYMPHATIC SYSTEM DISORDERS	5		3	2			
		CARDIAC DISORDERS	5		4	1			
		Cardiac Disorders	2						2
		EAR AND LABYRINTH DISORDERS	21	3	15	3			
		Ear And Labyrinth Disorders	2						2

5. Output creation

Xml-Output (in Excel)


```
ods tagsets.ExcelXP file="&FILE." path="&OUTDIR." style=UCB2;
  ods tagsets.ExcelXP   options (frozen_headers="yes" frozen_rowheaders="2"
                        absolute_column_width="10,30 &STUDIES." pages_fitwidth="1" pages_fitheight="200"
                        orientation="landscape" row_repeat="1"
                        autofilter="Yes" sheet_name="Level 1: Datasets" fudge_factor="0.5" formulas="no"
                        autofit_height="Yes" center_vertical="Yes" center_horizontal="Yes" gridlines="Yes");

/**** Output of Level 1 information.                                                    ****/
proc print data=levell1 label noobs;
 label  memname   ="Domain/ Dataset"
        memlabel  ="Label";
 format _char_;
 var memname memlabel; * varlist (_dslst=levell1,_varlst=&libnames.);
run;
   ...
ods tagsets.ExcelXP close;
```

http://support.sas.com/rnd/base/ods/odsmarkup/excelxp_help.html