

SAS Template Programs for Standardized Statistical Output



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Target: Enhance In-House Analysis and Reporting Capabilities

- Better
 - Standardized output (datasets and tables)
 - Reduced error (increased quality)
 - Internal control/flexibility
- Quicker
 - Copy from library and reduce QC time
- Easier
 - No writing programs “from scratch”
 - Similar programming structure makes sharing work easier
 - Training new staff with consistent process/tools

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Project Methodology

- Annotated Standard Table/Listing (TL) shells
- Program templates for standard TLs and associated derived datasets
 - Minimal change for users
 - Clearly commented direction
 - Invoke standard macros (including setup, title and reporting macros)
- User Guide

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Annotated Shells

Protocol: XXX-XXX-XXX

DDMMYYYY HH:MM
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Appendix 16.1.X
Randomisation Scheme and Code

Randomization Sequence Number	Stratum	Block	Treatment Group (a)	Treatment	Site No./ Subject No.
1001	TG=150	1	A	Placebo	XXX / XXXX
1002	TG=150	1	B	XXX	XXX / XXXX
1003	TG=150	1	B	XXX	XXX / XXXX
1004	TG=150	1	A	Placebo	XXX / XXXX
1005	TG=150	2	XXX	XXX	XXX / XXXX
1007	TG=150	2	XXX	XXX	XXX / XXXX
1008	TG=150	2	Placebo	XXX	XXX / XXXX
.....					XXX / XXXX
.....					XXX / XXXX

Input Data Set: RANDOM
Selection Criteria: All data
Sort Order Var: RANDSEQ,STRATC
Footnote Macro Var: FNTRT1_11

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Title Macro Design

- Consolidation: one file for each study to hold “cosmetic” attributes of data contents in tables and listings
 - Footnotes
 - Titles
- These are non-data elements

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Template Program Design

- General Structure:
 - Program header
 - Establish environment
 - Invoke standard macros
 - Invoke study-specific work
- Why not just use macros?
 - Users have freedom – and responsibility – of the statistical program
 - Complete programs easier to maintain than full and complicated macros

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Sample Code: Header

```
=====
/*=====
PROGRAM HEADER
=====
PROGRAM NAME: {1161x_random.sas}
DATE CREATED: {01JAN2012}
AUTHOR: {firstname lastname}
INPUT DATASETS: random
OUTPUT TYPE: APPENDIX
OUTPUT TITLE: Randomization Scheme and Codes
=====
PROGRAM MODIFICATION HISTORY
=====
MOD NUMBER:
MOD AUTHOR:
CHANGE DATE:
CHANGE REASON:
=====
TEMPLATE PROGRAM (do not edit this section)
=====
PROGRAM NAME: 1161x_random.sas
DATE CREATED: 23SEP2011
DEVELOPER: Ben Franklin
SAS VERSION: 9.2
GLOBAL MACROS: %reporter
STUDY MACROS: %title
=====
INSTRUCTIONS
=====
1. Please use annotated randomization listing shell as reference
2. This template can be used for either crossover or parallel
studies
=====
```

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Sample Code: Environment

```
/*-----
Section 1: Call setup and title macros
(a) define location macro variables for setup macro
(b) define setup location
(c) call title macro
-----*/
%macro call_setup;
%global datacut stage output_type;
/*-----
(a) define location macro variables
%datacut, %stage, %output_type
-----*/
%let DATA CUT = level01 ;
%let STAGE = prod ;
%let OUTPUT_TYPE = listings ;
/*-----
(b) define setupmacro location
-----*/
%inc ~/some/path/project/studies/001/utilities/setup.sas' /nosource2;
%end;
%macro call_setup;
%call_setup;
/*-----
(c) Call title macro
-----*/
%title ;
```

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Sample Code: Data Transformation

```
/*-----
Section 2: Get data ready for %report - NO changes are needed
(a) Call and sort input data
(b) Create extra variables for display
-----*/
/*-----
(a) Call and sort input dataset
-----*/
proc sort data = LIB.RANDOM out = INDATA ;
by STRATC RANDSEQ ;
run ;
/*-----
(b) Create extra variable SUBJ for display
-----*/
data RANDOM ;
length SUBJ $20;
format SUBJ $20.;
set INDATA;
/** Combine SUBJNO and SITE **/
if SUBJNO ne then SUBJ =compress(put(SITE, z4.))|| ' ' / ' ||
compress(put(SUBJNO, z3.)) ;
run ;
```

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Sample Code: Reporting

```
%reporter(SORTORD=%STRATC RANDSEQ,
HDLINES=2,
DATA=FINAL,
COLUMNS=%STR(STRATC RANDSEQ STRATC BLOCK TRTR TRTRC SUBJ) ,
DEFINE=%STR(define STRATC / group noprint;
define RANDSEQ / display width=15 format=5. left
'Randomization'Sequence Number';
define STRATC / display width=20 format=$20. left
'Stratum';
define BLOCK / display width=5 format=3.0 left
'Block';
define TRTC / display width=10 format=3. left
'Treatment Group';
define TRT / display width=40 left
'Treatment';
define SUBJ / display width = 25 format=$15. left
'Site No./Subject No.';
)
)
```

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Using Template Programs

- Template programs exist in library
- Copy from library to study folders
- Minor changes are needed
- Utility application which both copies and replaces strings

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Real Observed Benefits

- Operational since mid-2011, used in 14 studies
- Reduced programming time
 - typically around 75%
 - one example: 17 tables in hour by one person
- Non-SAS “experts” can use template programs easily
- Standards compliance is achieved
- Less time spent on QC

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What Has Made This Project a Success?

- Talented and experienced developers
- User community is not large (~ 9 people) and supported by 3 developers
- Timing is right: coincided with release of updated standards
- Timing is right: some users are statisticians and not “programmers” – they welcome use of template programs
- Experienced users don’t start from scratch when they work; template programs offer a substitution for “old” user programs

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