Extreme SAS® reporting II:
Data Compendium and 5 Star Ratings Revisited

Louise Hadden, Abt Associates Inc., Cambridge, MA

ABSTRACT

Each month, our project team delivers updated 5-Star ratings for 15,700+ nursing homes across the United States to Centers for Medicare & Medicaid Services. There is a wealth of data (and processing) behind the ratings, and this data is longitudinal in nature. A prior paper in this series, "Programming the Provider Previews: Extreme SAS Reporting" discussed one aspect of the processing involved in maintaining the Nursing Home Compare website. This paper will discuss two other aspects of our processing: creating an annual data Compendium, and extending the 5-star processing to accommodate several different output formats for different purposes. Products used include Base SAS, SAS/STAT, SG Procedures, and SAS/Graph. New annotate facilities in both SAS/Graph and the SG Procedures will be discussed. This paper and presentation will be of most interest to SAS programmers with medium to advanced SAS skills.

INTRODUCTION

Since 1998, the U.S. Centers for Medicare and Medicaid Services (CMS) has maintained a website, Nursing Home Compare, which provides detailed quality information about every certified nursing home in the country. In December 2008, CMS greatly enhanced the usability of the website by adding an easy-to-understand 5-star rating. Each nursing home receives one to five stars based on performance in each of three key quality domains (health inspections, reported staffing levels, and quality measures derived from mandated assessments of resident health and well-being) plus an overall quality rating. Calculation of ratings requires integration of information from both facility and resident-level data sources. SAS® was used extensively in analysis to support the development of the rating system, and it is currently used to process data to refresh the ratings each month, based on newly collected data in each domain.   It has evolved over time, but the general idea remains the same. The rating process is described in a prior paper, "Measuring Nursing Home Quality – The Five-Star Rating System", presented at SAS Global Forum in 2010.

A preview of the month's ratings in the form of a customized three-page PDF report is generated for each provider for each month. These reports are automatically loaded into providers' e-mailboxes by means of specific identifying information embedded in the file name for each provider's report. The provider previews were the subject of an earlier paper, and have evolved steadily throughout the five years we have been producing them. The data sources for the reports now include the Provider Rating file created at the conclusion of data processing for the month, Quality Measure data, inspection data, staffing data and ownership data. If a provider's ratings put them at risk for being a "special focus facility", a warning paragraph is conditionally printed on the first page of the preview. Information on any changes to the 5 star rating system, Nursing Home Compare and/or the previews is also printed on the first page.   Although the previews have evolved over time, the process is described in a prior paper, "Programming the Provider Previews: Extreme SAS Reporting", presented at NESUG 2011 and SAS Global Forum 2012.

Data refreshes for the Nursing Home Compare web site were originally done in the form of text files generated by data _null_ and put statements. These files were zipped and transferred to project staff at the Centers for Medicare & Medicaid Services, processed further, then transferred to another vendor who again processed the data further before posting on the Nursing Home Compare website each month. In order to calculate ratings and report on our processing, including the provider preview reports, we were already doing much of what CMS and the vendors were doing. To streamline the process, improve consistency and reduce redundant efforts, we undertook an effort to begin generating "web-ready" output for delivery to CMS and its vendors.

In addition to the original output files and provider previews, we now provide:

- Analytic Reports (including state specific ratings spreadsheets containing the ratings for each provider in the state, a ratings spreadsheet for all providers in the U.S., state specific quality measure (QM) spreadsheets containing quality measures for each provider in the state, a QM spreadsheet for all providers in the U.S., staffing details for all providers in the U.S., and assorted reports on thresholds and the change in ratings from month to month.)

- Helpline Database and Materials (including a Microsoft Access data base to assist the call center with questions providers might have, materials to produce a Section 508 compliant version of the Provider Previews, and sample provider previews.)

- Statement of Deficiency (2567) Materials (including an SQL Server database of all 2567s for providers active in a given month and spreadsheets for each CMS region including 2567s for providers active in a given month.)

- Web-ready Tab-Delimited Output (including general provider information with ratings, inspection results, ownership information, quality measures, penalty information, staffing information, date ranges, 2567 detail and other data for providers active in a given month.)

- Data.Medicare.Gov CSV and Microsoft Access Output (including general provider information with staffing ratios, inspection results, quality measures, penalty information, ownership information, and state and national averages across all domains.)

All these outputs present different technical challenges and will be discussed in detail below, with specific examples of solutions shown.

For the Nursing Home Compare project, we also undertook to create a Data Compendium, which will provide interested parties with a wealth of information on the same domains we report on in our monthly processing. The Compendium also provided a number of technical challenges, among which was preparing the final document for Section 508 compliance. Since this is also a repetitive processing project (the Compendium is published every year) our processing needs to be efficient and easily modified to accommodate the shift to a new year's worth of data. This process will also be discussed in detail below.

THE DEVIL IS IN THE DETAILS (MONTHLY PROCESSING)

The original output format is not technically reporting, and is not relevant to this paper. The provider previews have been discussed in a prior paper. Below follows a brief discussion of the challenges and solutions to the other output formats (analytic reports, Helpline materials, 2567s, tab-delimited output, and Data.Medicare.Gov.) It is not the purpose of this paper to discuss the significant data manipulation involved in creating these outputs, but rather to illuminate the actual process of reporting.

Analytic Reports

The analytic reports are varied, ranging from simple ODS RTF reports to complex, multi-sheet workbooks. We will highlight the more complex reports here. As noted, our goal in this process is to produce the desired outputs with the least amount of programmer intervention possible. Several reports were destined to be viewed and used in Microsoft Excel. PROC EXPORT can take a pre-processed file and convert it to Excel, but little formatting is available. Column headers will be variable names, and details like justification, etc. will be lost. In addition, we use Unicode characters (to create stars) and we were unable to pass any information using ODS ESCAPECHAR style overrides and functions through to the workbooks and worksheets.

Using ODS destinations provides a partial solution, as ODS HTML and ODS TAGSETS.EXCELXP DO honor style overrides and functions in conjunction with the "big three" of SAS reporting, PROC PRINT, PROC REPORT and PROC TABULATE. The code snippet and screen shot below are for an ODS HTML table created using PROC PRINT.

```
ods escapechar='^';

proc print data = composite label
        style(header) = {font=("Arial",10pt,Bold) just=center vjust=bottom
        background=lightblue}
        style(obsheader) = {font=("Arial",10pt,Bold) just=left vjust=bottom
        background=lightblue}
        style(data) = {font=("Arial",10pt,Normal) background=grayee} ;
        where state = "&state" ;
id provnum / style(header data)={vjust=bottom font_style=italic
        htmlstyle= "VND.MS-EXCEL.NUMBERFORMAT:@"
        cellwidth=.75in };
var provname
        / style(header data)={vjust=bottom just=left cellwidth=3in } ;
var overall health mdsqm staffing rnstaff
        / style(header data)={vjust=bottom just=center cellwidth=1.25in };
var defscore
        / style(header data)={vjust=bottom just=center
        htmlstyle= "vnd.ms-excel.numberformat:0.00"}; . . .
```


The code snippet and screen shot below are for an ODS TAGSETS.EXCELXP (XML output) table created using PROC TABULATE. Notice the Unicode stars!

```
proc tabulate data=composite  . . .     ;
    class &clsvar statename
        / s={bordercolor=black borderwidth=1
          font=("Helvetica",9pt,Normal)};
    classlev statename  /
        s={bordercolor=black borderwidth=1
        font=("Helvetica",9pt,Normal)};
    classlev &clsvar. / s = {font=("Helvetica",9pt,Normal) background=white } ;
    keyword all / s = {font=("Helvetica",9pt,bold)};
            tables(all={label='All States'
            s={font=("Helvetica",9pt,Bold)}}*{s={font=("Helvetica",9pt,Bold)}}
            statename=' '),
```

```
        (all={label='TOTAL N^{super 1}'
        s={font=("Helvetica",9pt,Bold)}}*{s={font=("Helvetica",9pt,Bold)}}*
        n=' '*f=comma6.*{s={font=("Helvetica",9pt,Normal)
        tagattr='format:#,###'}}
        &clsvar*(n*f=comma5.*{s={font=("Helvetica",9pt,Normal) just=right
        tagattr='format:#,###'}}
        pctn<&clsvar>*f=6.2*{s={font=("Helvetica",9pt,Normal) just=right
        tagattr='format:##0.00'}} ) )
        / printmiss misstext='0';
keylabel pctn ='%' ;
keyword all / s={font=("Helvetica",9pt,bold) just=left};
keyword pctn / s={font=("Helvetica",9pt,bold) just=left};
keyword N / s={font=("Helvetica",9pt,bold) just=right};
format  &clsvar starfmt. ;
```


You may have noticed a slight problem. These outputs are native HTML and XML, respectively, not Excel. If we open the output in Excel (Office 2007 and later) we get the dreaded warning.
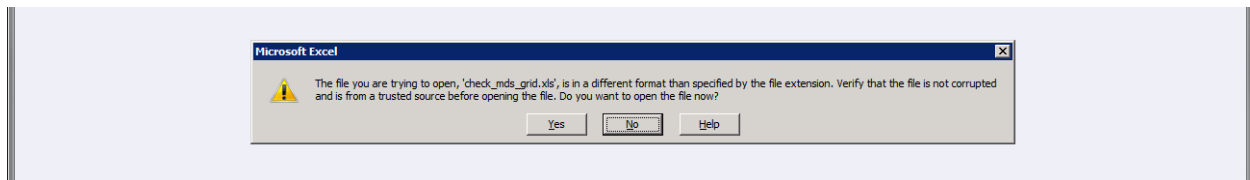
Since these outputs are delivered to a client, we did not want the warnings to appear, and we also did not want to manually open and "save as" the outputs as there are over 100 workbooks generated each month. We use DDE to "save as" and freeze column and row headers in a process described in a Visual Displays paper and presentation, "EXCELing in DDE: Unlock Useful Tools for Processing Excel®".   The outputs are used by a variety of end-users.

Helpline Materials

The provider previews are delivered to providers via electronic mailboxes the week before the new ratings are posted each month on the third Thursday. The helpline is open for the week including the third Thursday, so that providers can alert the helpline and CMS to any problems with the data presented in the previews. The helpline materials are relevant to a paper on reporting in that they highlight the need to have a Section 508 compliance solution for all

materials produced for the government and other entities. The provider previews are produced by SAS in PDF format, which is not "tagged" PDF which is required for Section 508 compliance at this point. Since there are over 15,500 provider previews generated each month, it isn't possible to open and "tag" each preview in third-party software. An access data base is provided with all the data provided on the provider previews along with a template to merge the data into that mimics the appearance of the provider preview for any providers who need to view the provider preview with a reader. The access data base also allows Helpline staff to do look-ups if providers have questions.

Statements of Deficiencies (2567s)

In order to quality for participation in the Medicare and Medicaid programs, nursing homes have to meet certain standards. State governments do health and fire safety inspections of eligible nursing homes and investigate any complaints. CMS has entered into an agreement with state governments to do health inspections and fire safety inspections of these nursing homes and investigate complaints about nursing home care. The standards cover a wide range of topics, from proper management of medications, protecting residents from physical or mental abuse and inadequate care, to the safe storage and preparation of food. Inspections take place about once a year, or more frequently in the case of poor performance. Deficiency citations are issued if a nursing home does not meet a standard. These citations are recorded on a detailed inspection report, form HCFA-2567. One of the elements of the 2567 is a 32,767 byte long free text field including PII and embedded non-printing characters.

CMS publishes 2567s in their entirety on Nursing Home Compare. In order to protect privacy of nursing home residents and staff, the free text field must be redacted. Part of our processing routine for each month includes running these very large files and the very large text field through a redaction process using Perl regular expressions to replace sensitive information with generic statements in brackets.

Reporting on the 2567s presents additional challenges due to the very long text field. We provide the 2567s in three formats: Tab-delimited (discussed in the next section), Excel, and Microsoft Access (converted to SQL server data base.) The redacted 2567 SAS data set (with both the redacted and un-redacted text field) is approximately 10 gigabytes and has approximately 300,000 records. As such, it is too large to export directly. Removing the unredacted text field reduces the file size considerably, but it is still too large to export in its entirety. For the Excel output, we split the file into 10 CMS regions and report on a subset of variables using PROC EXPORT. For the Access output, we split the file into 2 files per month of inspection date, resulting in 24 files, again with a (different) subset of variables, and reported on using PROC EXPORT. Access tables are then loaded into a SQL server data base (for a variety of reasons we cannot directly export the large SAS data base to SQL server.)

Tab-delimited Output

Prior to July 2013, flat text files were being delivered to CMS, who pre-processed the data files and then passed them onto a vendor, who again processed the data in order to refresh the web site. CMS, the vendor and Abt Associates collaborated to deliver the vendor data that could be uploaded to the web site with less duplicative effort. Although the intent is to move to XML in the future, tab-delimited output arranged in a XML-like structure is the current delivery mechanism. In most cases, we provided the pre-processing to arrange the data correctly, and SAS delivered with PROC EXPORT. However, our friends the 2567s begged to differ. There is a 32767 record length limit on delimited output files created using PROC EXPORT. We wrote an "old style" data _null_ and put routine using hard-coded hex tabs in between variables with a longer record length and thought it would be perfect. Unfortunately, the embedded tabs, carriage returns and other "stuff" in the redacted text field wreaked havoc. Even worse, we needed to retain line breaks because multiple deficiencies could be addressed in a single 2567 report and line breaks were the differentiation between deficiencies. We stripped embedded tabs and used the TRANWRD function to convert carriage returns and line breaks to the HTML code for line breaks, and that worked!

Data.Medicare.Gov

There are a number of other compare tools similar to Nursing Home Compare on the Medicare.Gov website: Hospital Compare, Home Health Compare and Dialysis Facility Compare. All of the data that power these web pages is available for download and online access at Data.Medicare.Gov. As of July, we are also providing the Nursing Home Compare data files for Data.Medicare.Gov for minimal pre-processing and upload. This task presented a different challenge. Data files were to be constructed as CSV files, except that more descriptive variable / column names were desired and we needed to be able to preserve formatting in variables (provider number, zip code, etc.) PROC EXPORT to CSV would not work for either of these issues. ODS TAGSETS.CSV did allow us to preserve our formatting by providing the quote by type option. Re-reading the data set in and outputting, replacing variable names with comma delimited text names in row 1 gave us more descriptive column headers. Note that for a large number of variables you should use an appropriate LRECL statement on both the file and infile statements, or your rows will be truncated and there will not be any warning message! (I learned this the hard way.)

```
ods csv file=".\outfiles\intermediate\penalties0.csv" options(quote_by_type="yes");

proc print data=penalties_csv noobs;
run;

ods csv close;

filename in5 ".\outfiles\intermediate\penalties0.csv";
filename out5 ".\outfiles\penalties.csv";

data test;
      line='"Federal Provider Number",
"Provider Name",
"Penalty Date",
"Penalty Type",
"Fine Amount",
"Payment Denial Start Date",
"Payment Denial Length in Days",
"Provider Address",
"Provider City",
"Provider State",
"Provider Zip Code",
"Location",
"Processing Date"';
      file out5;
      if _n_ = 1 then put line;
      infile in5 dlm='0D'x firstobs=2;
      input ;
      put _infile_;
run;
```

THE DEVIL IS IN THE DETAILS (DATA COMPENDIUM)

We are producing the ninth (2012) edition of the Centers for Medicare & Medicaid Services' (CMS) annual Nursing Home Data Compendium. The compendium contains figures and tables presenting data from 2011 on all Medicare- and Medicaid-certified nursing homes in the United States as well as the residents in these nursing homes. A series of graphs and maps highlights some of the most interesting data, while detailed data are available in accompanying tables. The graphs and maps are produced using a combination of SAS/GRAPH and SAS SG Procedures, while the tables are produced using PROC REPORT in conjunction with a custom style template. Processing is designed to be easily rerun for a new year's worth of data, and to require minimal user intervention. In addition to the actual tables (more easily made Section 508 compliant), graphs and maps, "alt text" descriptions of each graph and map are produced within a SAS program for the purposes of generating a final Section 508 compliant document.

Decisions, Decisions

Before we generated final tables and figures, we made some overall formatting decisions. We wished to use color in our tables and figures, but needed to be aware that compendium readers might print out selected tables in graph in black and white. We also wanted to be consistent in our color schemes for tables and figures, and to have our color scheme be compatible with CMS's new logo (yellow and dark blue colors). A custom style template was designed and used for all tables which were generated as RTF files.

Because all figures were generated using the annotate facility in conjunction with either SG procedures or SAS/GRAPH, the style template was not honored for some elements of the figures (i.e. the legends), and the RTF based style template was not used. Instead, consistent CMS logo colors were used in pattern statements, annotate style attributes, background and foreground colors, legends, etc., throughout the SAS programs for creating the figures. To maintain consistency in title colors and styles, RTF shells were prepared for each figure, and SAS-generated PNG files of each figure inserted in its shell.

Maps

Many of the figures are maps of the United States (excluding Puerto Rico, Guam and the U.S. Virgin Islands) with various measures in 2011 state-level data coded into quintiles. Each quintile is color-coded. We explored a number of different options for producing and annotating the maps. We opted for the KISS (Keep It Simple Silly) method shown below. This method (based on one of Robert Allison's amazing examples) features "boxes" for smaller eastern seaboard states color-coded based on the state's quintile for a measure, and a customized legend. In terms of color, after MUCH debate, printing out in gray scale, consultation with Colorbrewer2, we chose 4 levels of blue and white as a 5th color, with light gray for state outlines.
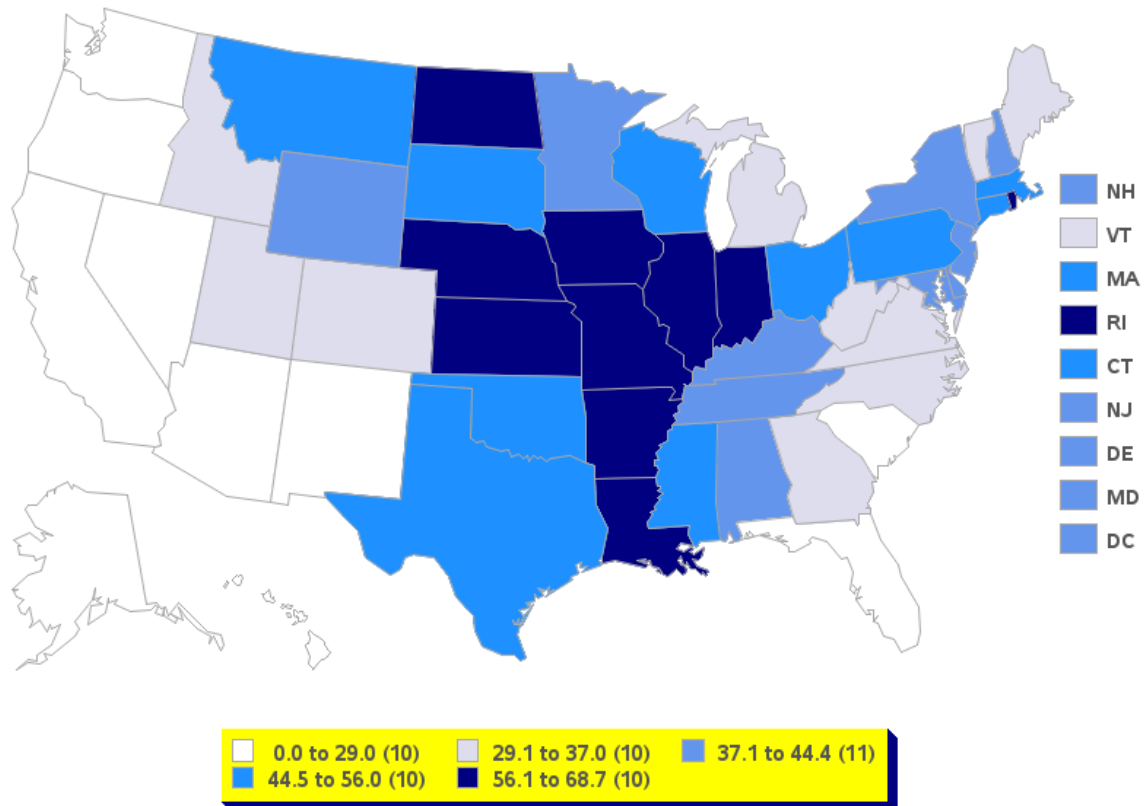
Below are two examples that we didn't end up using, primarily because TOO much information was being conveyed. Both of these maps are based on Robert Allison's examples. The pie chart map is particularly interesting, as the size of the pies vary with the state population, as well as the slices representing 65+ population.
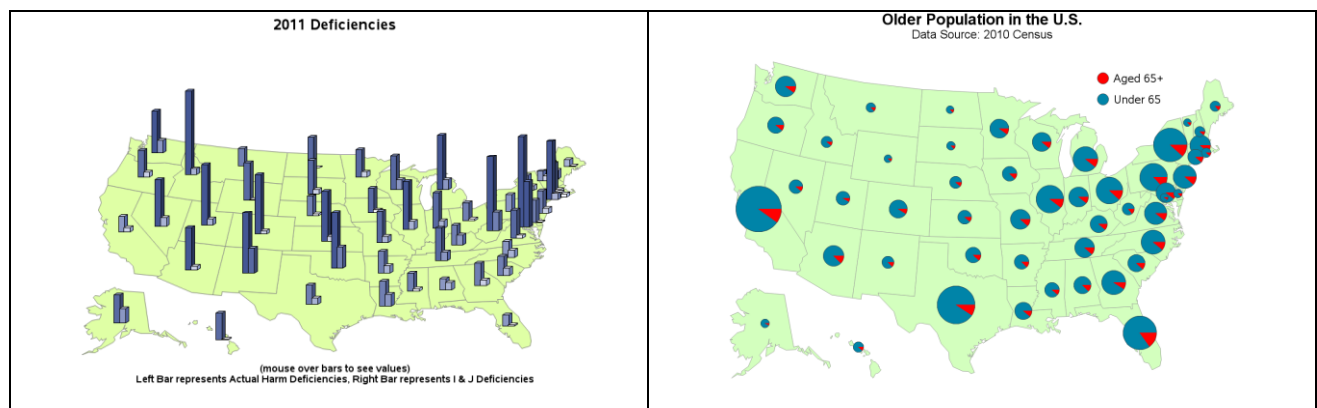
This is possibly the most interesting map. Creating it was very educational. The grid is created in a data step adding x and y values for each corner of each square. The response data (percent of each deficiency type and the marginal percents) is annotated into each box, as are the "row" and "column" labels and the deficiency code. In the process I found that SAS/GRAPH "draws" maps starting from the bottom left hand corner!

	Isolated	Pattern	Widespread	Total
Immediate Jeopardy	0.3 J	0.4 K	0.1 L	0.8
Actual Harm	2.4 G	0.3 H	0.0 I	2.6
Greater Than Minimal Harm	55.8 D	27.5 E	6.2 F	89.6
Minimal Harm	N/A A	3.6 B	3.4 C	7.0
Total	58.5	28.2	6.3	100.0

Other Figures

As with the maps, we explored a number of alternatives. Both the SG procedures and SAS/GRAPH have great annotate capabilities to help customize your output. Below are two early explorations that were not used, but show some interesting capabilities, such as annotating a custom logo in SAS/GRAPH and transparency in PROC SGPLOT.
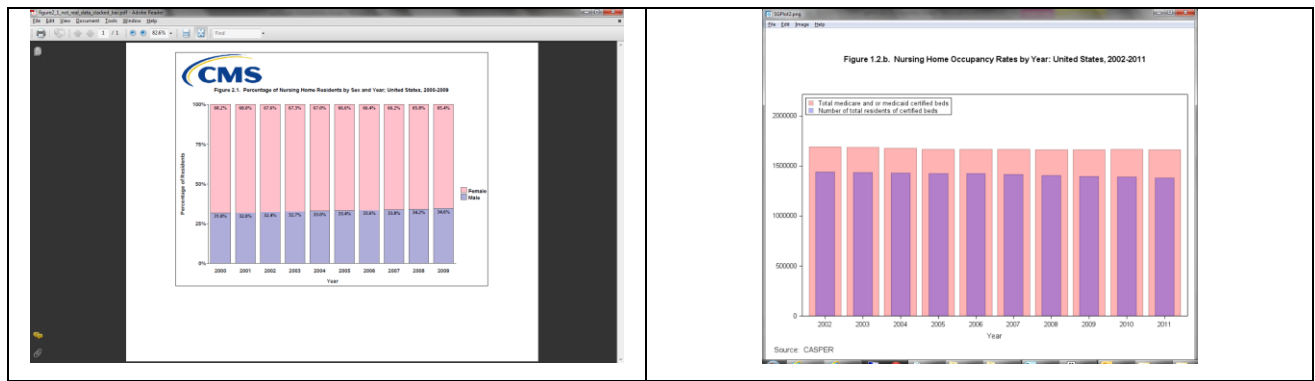
Our final choices reflected our desire to not overwhelm the viewer with too much data, as can be seen in the before and afters presented below.

It was not possible to distinguish Deficiency levels H-L, and we were unable to keep with our blue color scheme.	Additional years of data were added, and levels G-L were collapsed to create a more informative figure.
Viewers felt that the narrow bars inside the wider bars were confusing. In addition, we were unable to annotate numbers on the narrow bars easily. The placement of the legend was also not optimal.	We recreated the figure as a stacked bar chart, added more years of data, and were able to annotate both numbers in each bar as well as the percent occupied at the top of each bar.
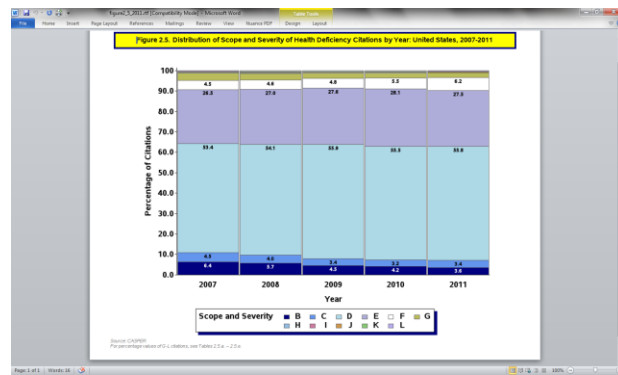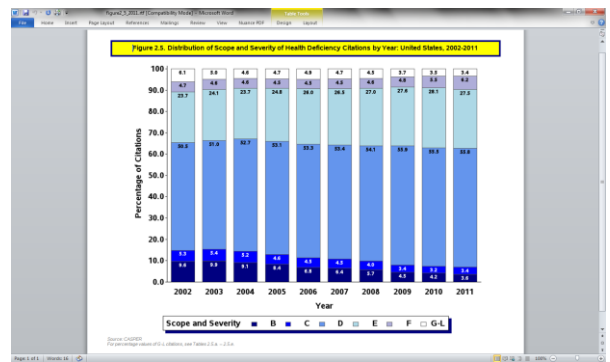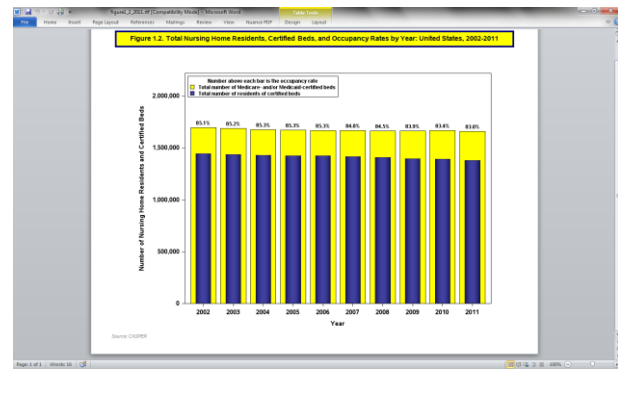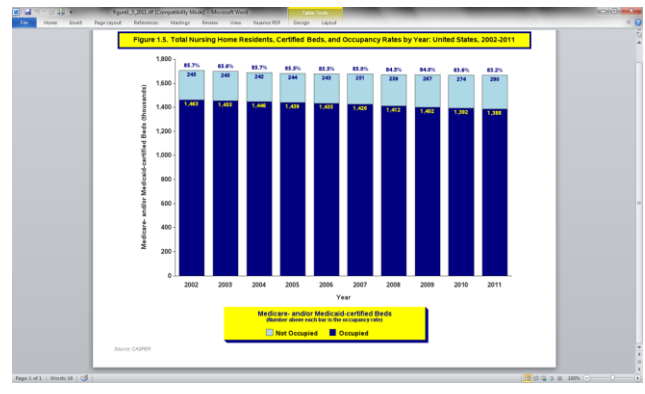
Although our mantra was "less is more", there are also times when useful information can be conveyed by breaking data into pieces for presentation. We use both of these graphs. The second graph shows the same information as the first graph (number of nursing home facilities in the United States by year), but adds subcategories (number of nursing home facilities by bed size by year).

The Data Compendium and Section 508 Compliance
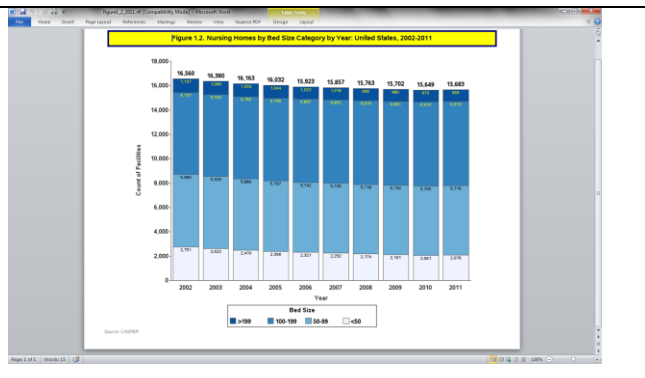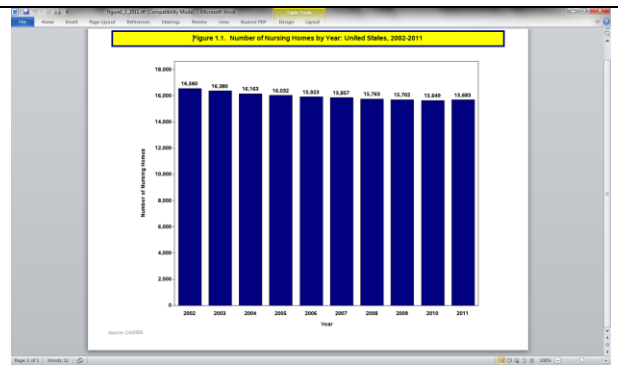
A final production step incorporates all the separate RTF table and figure outputs into a single document, creates a table of contents, adds a cover sheet, and prepares for converting to "tagged" PDF suitable for Section 508 compliance. While the tabular outputs are easily converted to tagged PDF, figures need "alt text" which describe the figure for reading software. The same data that goes into the figures can be used to generate "alt text" for each figure programmatically. We take advantage of the same techniques used to create the sentences in the provider preview to do this. We use macro processing as this is used for multiple figures and will be reused for additional years.

```
%macro gen508(fignum,figvar,figtit,figyear,lctit,outfi,source,infi);

proc freq data=dd.&infi._&figyear.;
    tables &figvar._5*legend_label / missing list out=tryit;
run;  /* sorts omitted from code snippet */

proc transpose data=dd.&infi._&figyear. (keep=state_name legend_label)
    out=tryit2 prefix=st_;
    var state_name;
    by legend_label;
run;

data tryit3;
    length range $ 32 numword $ 6 y $ 2000 ;
    merge tryit tryit2;
    by legend_label;

    x=compress(reverse(substr(left(reverse(legend_label)),1,4)),'()');
    lenrange=length(legend_label);
    if x='9' then y=catx(', ',st_1,st_2,st_3,st_4,st_5,st_6,st_7,st_8,'and',st_9);
    if                  x='10'                    then                    y=catx(',
',st_1,st_2,st_3,st_4,st_5,st_6,st_7,st_8,st_9,'and',st_10);
    if                  x='11'                    then                    y=catx(',
',st_1,st_2,st_3,st_4,st_5,st_6,st_7,st_8,st_9,st_10,'and',st_11);
    y=tranwrd(y,' and,',' and');
    y=catt(y,'.');
    legend_label=compbl(legend_label);
    revleg=left(reverse(legend_label));
    subrev=substr(revleg,1,4);
    if subrev=')9( ' then range=reverse(substr(revleg,5,lenrange-4));
    if subrev in(')01(',')11(') then range=reverse(substr(revleg,6,lenrange-5));
    range=left(range);
    drop revleg subrev st_: _: ;
    if x='9' then numword='Nine';
    if x='10' then numword='Ten';
    if x='11' then numword='Eleven';
 run;

data sent1 (rename=(y=sent1 numword=num1 range=range1 ))
sent2  (rename=(y=sent2 numword=num2 range=range2))
sent3 (rename=(y=sent3 numword=num3 range=range3))
sent4 (rename=(y=sent4 numword=num4 range=range4))
sent5 (rename=(y=sent5 numword=num5 range=range5));
    set tryit3 (keep=&figvar._5 y numword range);
    if &figvar._5=0 then output sent1;
    if &figvar._5=1 then output sent2;
    if &figvar._5=2 then output sent3;
    if &figvar._5=3 then output sent4;
    if &figvar._5=4 then output sent5;
run;

data tryit4;
    length blurb blurb1 blurb2 blurb3 blurb4 blurb5 $ 20000 figtit lctit source $ 500;
    merge sent1-sent5;
    lctit="&lctit";
    fignum="&fignum";
    figtit="&figtit";
    source=cats('^n^n',"&source.");
    constant_text1='Figure';
```
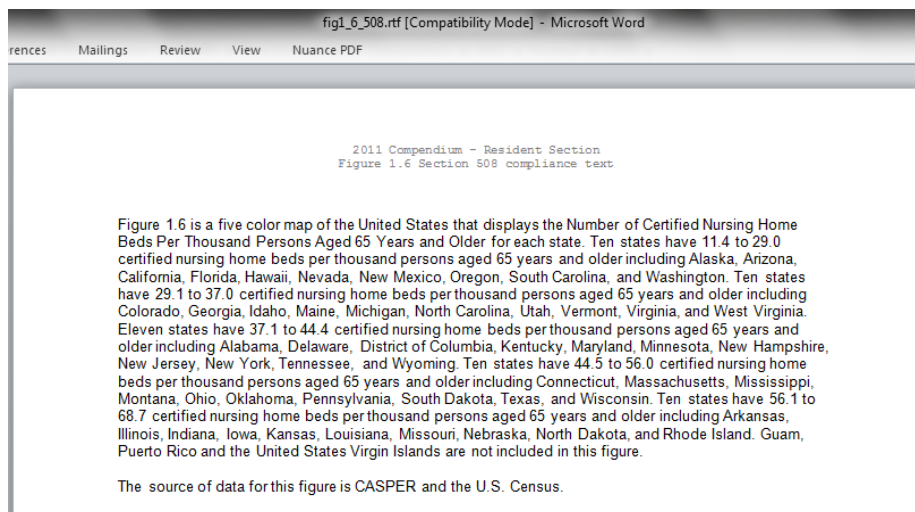
11

```
        constant_text2=' is a five color map of the United States that displays the';
        constant_text3='states have';
        constant_text4='for each state.';
        constant_text5='Guam, Puerto Rico and the United States Virgin Islands are not
included in this figure.';
        blurb1=catx(' ',num1,constant_text3,range1,lctit,sent1);
        blurb2=catx(' ',num2,constant_text3,range2,lctit,sent2);
        blurb3=catx(' ',num3,constant_text3,range3,lctit,sent3);
        blurb4=catx(' ',num4,constant_text3,range4,lctit,sent4);
        blurb5=catx(' ',num5,constant_text3,range5,lctit,sent5);
        blurb=catx('
',constant_text1,fignum,constant_text2,figtit,constant_text4,blurb1,blurb2,blurb3,
            blurb4,blurb5,constant_text5,source);
        blurb=compbl(blurb);
        label blurb =" ";
run;

ods listing close;
ods escapechar='^';

ods rtf file="&outfi..rtf" path=odsout style=styles.noborder;
title2 "Figure &fignum. Section 508 compliance text";
proc report nowd data=tryit4
    style(report)=[cellpadding=3pt vjust=b]
    style(header)=[just=center font_face=Helvetica font_weight=bold font_size=10pt]
    style(lines)=[just=left font_face=Helvetica] ;
  columns blurb ;
  define blurb / style(COLUMN)={just=l font_face=Helvetica
        font_size=10pt cellwidth=1000 }style(HEADER)={just=l font_face=Helvetica
        font_size=10pt };
run;
ods rtf close;
ods listing;
%mend;

%gen508(1.6,beds65p,Number of Certified Nursing Home Beds Per Thousand Persons Aged 65
Years and Older,2011,certified nursing home beds per thousand persons aged 65 years
and older including,fig1_6_508,The source of data for this figure is CASPER and the
U.S. Census.,fig1_6);
```


2011 Compendium - Resident Section
Figure 1.6 Section 508 compliance text

Figure 1.6 is a five color map of the United States that displays the Number of Certified Nursing Home Beds Per Thousand Persons Aged 65 Years and Older for each state. Ten states have 11.4 to 29.0 certified nursing home beds per thousand persons aged 65 years and older including Alaska, Arizona, California, Florida, Hawaii, Nevada, New Mexico, Oregon, South Carolina, and Washington. Ten states have 29.1 to 37.0 certified nursing home beds per thousand persons aged 65 years and older including Colorado, Georgia, Idaho, Maine, Michigan, North Carolina, Utah, Vermont, Virginia, and West Virginia. Eleven states have 37.1 to 44.4 certified nursing home beds per thousand persons aged 65 years and older including Alabama, Delaware, District of Columbia, Kentucky, Maryland, Minnesota, New Hampshire, New Jersey, New York, Tennessee, and Wyoming. Ten states have 44.5 to 56.0 certified nursing home beds per thousand persons aged 65 years and older including Connecticut, Massachusetts, Mississippi, Montana, Ohio, Oklahoma, Pennsylvania, South Dakota, Texas, and Wisconsin. Ten states have 56.1 to 68.7 certified nursing home beds per thousand persons aged 65 years and older including Arkansas, Illinois, Indiana, Iowa, Kansas, Louisiana, Missouri, Nebraska, North Dakota, and Rhode Island. Guam, Puerto Rico and the United States Virgin Islands are not included in this figure.

The source of data for this figure is CASPER and the U.S. Census.

The Future of the Data Compendium

Two options we are looking into (with varying degrees of success) are embedding images (in this case "sparklines" created with PROC SGPLOT) in procedural output. This works well with PROC REPORT in a table. Cynthia Zender of SAS has now incorporated this process in her class on Reporting.
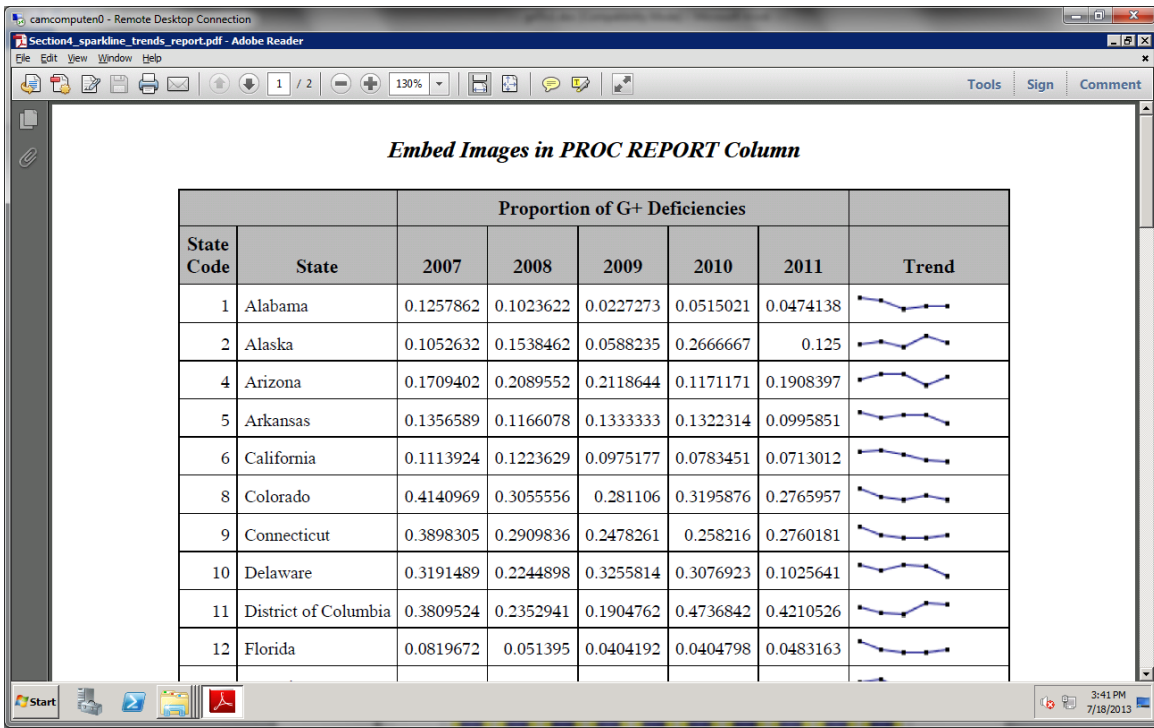

Although SAS has added the capability of annotating images in SAS/GRAPH output including maps, the only two image styles are "tile" and "fit". As you can see in the sample below, the results are less than attractive and informative. Ideally we could have the ability to annotate small images at geographic centroids.
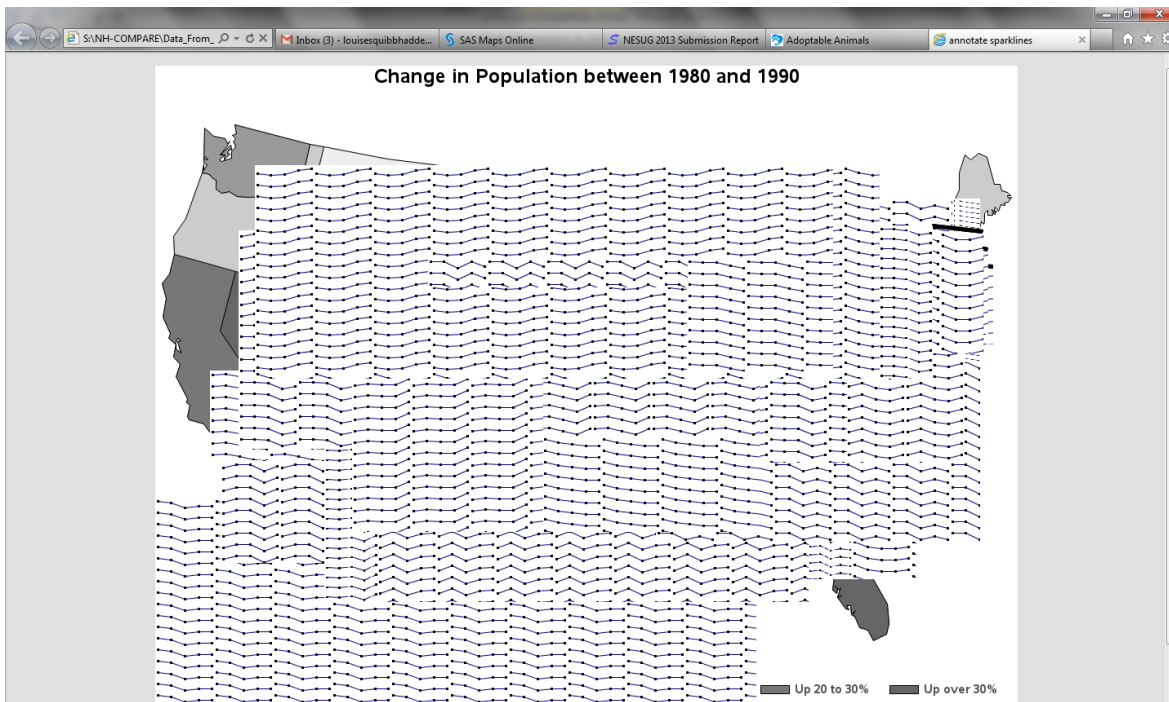
I've submitted an "official" request through Tech Support, and the issue is now on the SASWARE ballot. You can vote via this link. Don't be deterred by the not so informative description of the issue!

https://communities.sas.com/ideas/1178
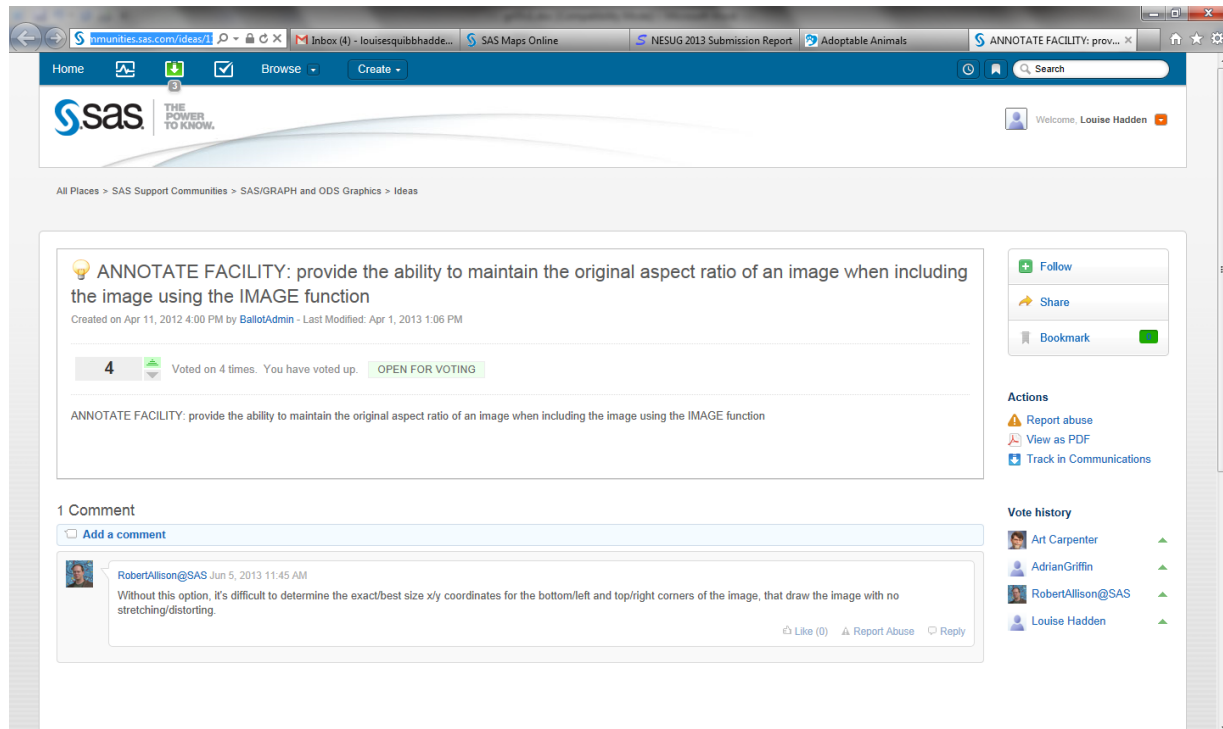
If you are interested in trying out the PROC REPORT with sparklines technique, a zip file with code and sample data is available at http://www.sascommunity.org/wiki/Behind_the_Scenes:_Using_Custom_Graphics_in_SAS.

CONCLUSION

Two very important aspects of our 5-Star Rating project are delivering and describing the data we process and create each month, which is the very essence of reporting. Reporting on the wealth of data we process with several different destinations and use cases is made easy by SAS. Among the options used are custom style templates, annotate, macro processing, SAS/ACCESS for PC files, Unicode characters and other style functions, style overrides, and ODS tagsets. Your reporting can be greatly enhanced by the use of these options.

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CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

Louise Hadden
Abt Associates Inc.
55 Wheeler St.
Cambridge, MA 02138
Work Phone: 617.349.2385
E-mail: louise_hadden@abtassoc.com

Code samples are available upon request. For additional information, visit the paper and presentation's website at http://www.sascommunity.org/wiki/Extreme_SAS%C2%AE_reporting_II:_Data_Compendium_and_5_Star_Ratings_Revisited.

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