At the Crossroads: How to Decide on Your Graphics Path

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ABSTRACT

Have you heard about ODS Graphics or ODS Statistical Graphs and wondered what they mean to you? Do you have legacy SAS/GRAPH® programs and wonder whether there's any benefit going down the ODS Graphics path? Are you at the graphics crossroads and uncertain which way to go?

With the ODS Graphics capability as part of Base SAS® in SAS® 9.3, many users find themselves at the crossroads, trying to decide what path to follow—the traditional SAS/GRAPH path or the new ODS Graphics path. This presentation focuses on helping you make an informed decision. Although some concrete examples are shown, this presentation is aimed at the SAS programmer or SAS® Enterprise Guide® user who wants to know more before they set off down the graphics highway.

INTRODUCTION

We couldn't talk about being at the crossroads without mentioning our musical theme. And no, it's not "It's a Graph World, After All" or "The Graph Not Taken". Blues legend Robert Johnson is the subject of speculation that he made a Faustian deal with the devil in order to learn his distinctive guitar style. The good news is that you don't have to make a deal with the devil at your crossroads in order to learn how to create graphics effectively.

All you have to do is make some informed decisions. And that's the purpose of this paper. We're not going to show you much code. We want to give you enough information in this paper to help you decide which graphics path to follow.

Our musical theme (with apologies to Robert Johnson and Eric Clapton):

I went down to the crossroads, needin' a graph today.
Still stuck at the crossroads, tryin' to choose a way.
Got so many choices, SGPANEL or PROC GREPLAY?

You can use PROC GPLOT, you can use ODS.
You can plot, you can chart, either one is best.
You can still create an image, baby, even an EMF.

I went down to Orlando, tryin' to do a graph.
I'm down in Orlando, two choices in my path.
Asked the SAS/GRAPH guru, "Help me do the math."

We think of SAS/GRAPH as the original graphics road available with SAS, and that makes ODS Graphics the new graph road in town. In this paper, when we refer to SAS/GRAPH we mean "traditional" SAS/GRAPH or "classic" SAS/GRAPH procedures and capabilities.[1]

CREATING GRAPHS WITH SAS: A HISTORICAL PERSPECTIVE

SAS/GRAPH

Since the beginning, SAS/GRAPH has offered, and still offers, procedures to produce plots, charts, maps, and many other types of business and scientific graphics. Also from the beginning, SAS/GRAPH has produced graphics using an underlying architecture called *device-based graphics*. Back in the days when there were no such things as PDF files or Microsoft Word documents, SAS/GRAPH sent its graphs directly to a graphics device such as a terminal, a pen plotter, or a graphics-capable printer. In fact, that was back in the days when you had to walk to school in the snow, uphill, both directions! But as far as SAS/GRAPH was concerned, just about the only thing you could do with your graphics output was to send it to a physical device. Eventually, the ability to create *graphics stream files*, such as JPEG and GIF files, was added. Later, SAS added the Output Delivery System, so that graphs could be included

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[1] The term *ODS Graphics* may seem misleading because you can use ODS to produce graphics output with "traditional" or "classic" SAS/GRAPH. The term ODS Graphics refers to a new underlying architecture and components for producing graphics, starting with SAS 9.2. This is described in more detail in the next section.

At the Crossroads: How to Decide on Your Graphics Path, continued

in documents such as Web pages, PDF files, and RTF files. Nevertheless, the underlying device-based architecture was still used.

To create graphs with SAS/GRAPH, you write programs using procedure code and other SAS/GRAPH statements. Behind the scenes, this creates a device-independent representation of the graph and stores it in a SAS/GRAPH catalog. An advantage of this scenario is that, later on, you can use the GREPLAY procedure to replay the graph to the physical device or image file of your choosing.

All of the SAS/GRAPH device-based procedures are called the "G" procedures, because most of the procedure names start with "G": GPLOT, GCHART, GKPI, GAREABAR, GRADAR, GBARLINE, GMAP, GREDUCE, GREPLAY, and so on. One piece of SAS/GRAPH that does NOT start with "G" is the Annotate facility, which enables you to add extra annotations or extra information to your image.

ODS Graphics

A few years ago, SAS developers observed a couple of trends:

- Although SAS/GRAPH was powerful and flexible, producing some common types of statistical graphs was rather complicated. Producing these graphs often required using a statistical procedure to calculate parameters and statistics and output them to a data set and then using SAS/GRAPH procedures to produce the graphs.

- Most SAS/GRAPH users were not sending their output directly to devices. Instead they wanted to create either documents (HTML, PDF, and so on.) containing graphs or image files (JPEG, WMF, and so on.) that they could include in existing documents.

To address this, *ODS Graphics* was developed. ODS Graphics uses a completely different architecture than SAS/GRAPH uses to produce graphs. The underlying architecture of ODS Graphics uses two different types of templates: *graph templates* and *style templates.* Graph templates control the arrangement of elements in a graph—the type of graph (histogram, bar chart, scatter plot, and so on), and where axes, titles, and data points are positioned. The style template specifies attributes such as colors, fonts, and line and marker appearance.

Graph templates are built using a low-level language called Graph Template Language (GTL). It is possible for users to design customized graphs by creating their own graph templates by writing GTL code. However, the ODS Graphics developers realized that not every SAS user was going to want to learn GTL, so as part of the architecture of ODS Graphics, they designed easier methods for accessing ODS Graphics functionality such as the new "SG" procedures and options in statistical procedures.

There are several components to ODS Graphics:

- The ability to produce graphics was added to most SAS/STAT procedures and to many statistical procedures in other products including Base SAS procedures such as FREQ, UNIVARIATE and CORR. You can access this ability by simply turning on ODS Graphics functionality. This ability eliminates the need to create output files from statistical procedures and then use them to create graphs with SAS/GRAPH.

- The ability to produce graphics was added to some Base SAS procedures, such as FREQ, UNIVARIATE, and CORR.

- The following features were added to SAS/GRAPH in SAS 9.2, and then moved to Base SAS in SAS 9.3:

    o A set of new procedures (SGPLOT, SGSCATTER, SGPANEL) for producing general purpose graphics.

    o The ODS Graphics Designer, a point-and click interface that lets you design your own graphs, and the SGDESIGN procedure.

    o An Annotate Facility, similar to the SAS/GRAPH Annotate Facility, that enables you to add graphics elements (lines, text, and so on) to your graphs. The Annotate Facility for ODS graphics is available in SAS 9.3

    o The ODS Graphics Editor, which enables you to make one-time modifications to already-created graphs.

    o Graph Template Language (GTL) and the SGRENDER procedure for producing customized graph layouts.

The SGPLOT, SGPANEL, and SGSCATTER procedures are designed to produce graphs using the familiar SAS procedure syntax. The SG procedures provide quick and easy-to-learn syntax that, behind the scenes, generates

At the Crossroads: How to Decide on Your Graphics Path, continued

GTL to actually build the graph. SG procedures are designed to surface about 80% of the functionality of the GTL, so they are a good place to start.

When a graph that you want to create is beyond the capabilities of the SG procedures, the chances are good that it can be accomplished using GTL. For example, the SGPANEL procedure requires that each of the graphs in a paneled layout be of the same type, such as all bar charts or all box plots. If you wanted to produce a paneled graph such as that shown in Figure 1, which has a box plot next to a scatter plot, then using GTL is the only way to produce this type of paneled image.

You can also use the ODS Graphics Designer to design such a paneled graph, and the Designer will generate the GTL code for you. Note that while the ODS Designer is easier to use, it does not provide as much control over the appearance of the graph as using the SG procedures or writing your own GTL.
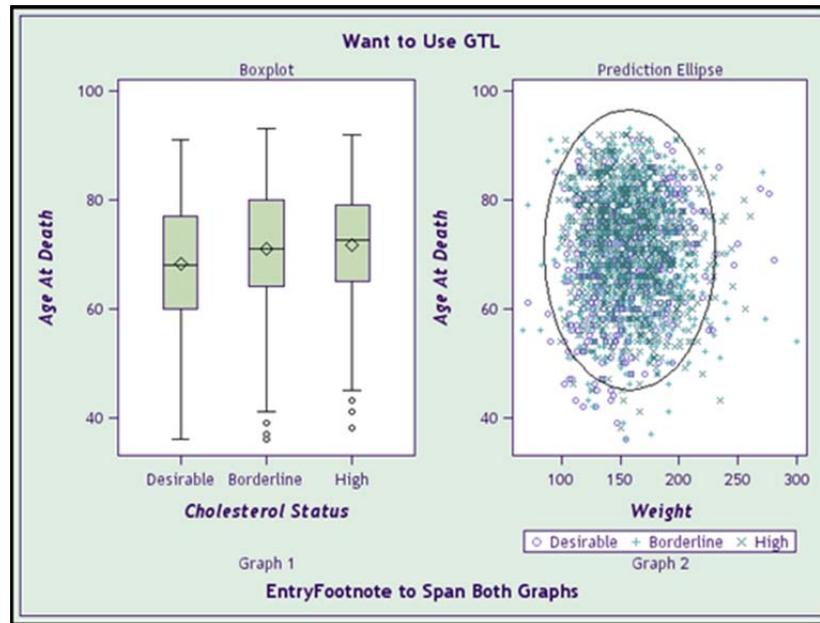

Figure 1: Paneled Graph with Different Graph Types

With traditional SAS/GRAPH, you would need to generate each graph to a catalog entry, and then use the GREPLAY procedure to replay the graphs in order to get the final image.

A learning curve is attached to each method. The question is, which learning curve are you going to tackle?

SOME BASIC DIFFERENCES BETWEEN SAS/GRAPH AND ODS GRAPHICS

Table 1 shows some key differences between SAS/GRAPH and ODS Graphics:

SAS/GRAPH Classic Procedures	ODS Graphics
Output goes to GRAPH1 window or other destinations (including ODS destinations such as HTML, RTF, and PDF)	Output goes to image file or is included as part of an HTML, RTF, or PDF document.
Graph created as a GRSEG entry in a SAS catalog	No catalog entry created
GREPLAY procedure replays graphs stored in catalogs	No GREPLAY capability available
SAS/GRAPH Annotate Facility available to add elements to existing graphs	SG Annotate Facility available in SAS 9.3
GOPTIONS statement sets general graphics options	ODS GRAPHICS statement sets general graphics options. Many other options specified in procedure statements.
Many graphics attributes are global and are set by global AXIS, SYMBOL, PATTERN, and LEGEND statements.	Axis, marker character, legend, and fill attributes are not global and can be controlled with style options in

At the Crossroads: How to Decide on Your Graphics Path, continued

	procedure syntax, with style template changes, or in GTL.
Use PROC GREPLAY to place multiple graphs on a page.	Use the SGPANELor SGSCATTER procedures, or GTL to place multiple graphs on a page.
Very high degree of flexibility in controlling the appearance of output.	Moderately high degree of flexibility in controlling the appearance of output.

Table 1: Some Differences between classic SAS/GRAPH and ODS Graphics

SOME COMPARATIVE EXAMPLES

The following example uses the SAS/GRAPH GCHART procedure to produce a vertical bar chart::

```
proc gchart data=orion.back_orders;
   vbar region;
   title 'Back Orders by Region';
run;
```


Figure 2: Code and Output from PROC GCHART

Here is an example of code used to produce ODS Graphics output with Base SAS and SAS/STAT procedures together with the output created by the code:

```
ods graphics on;
proc freq
data=orion.back_orders;
   tables region/plots=freqplot;
   run;
ods graphics off;
```

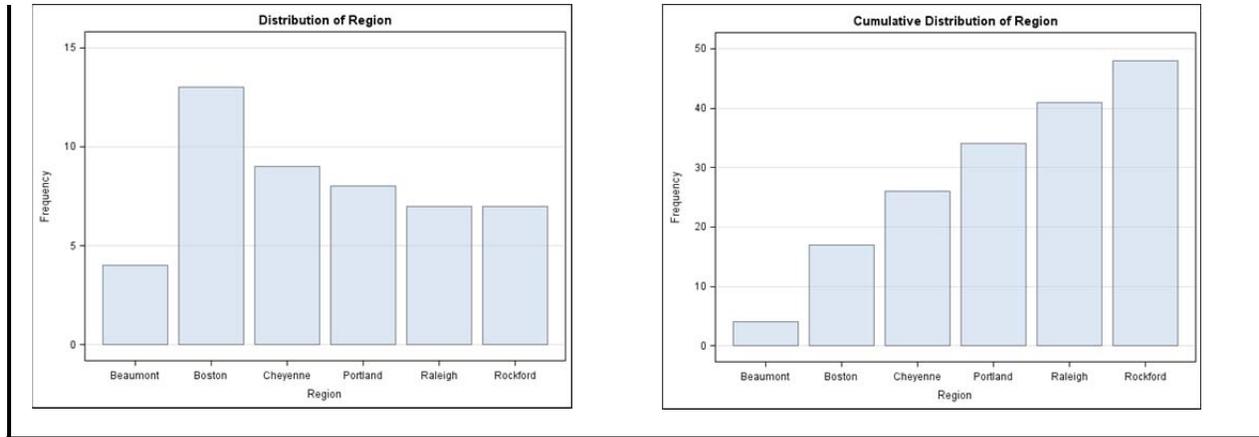At the Crossroads: How to Decide on Your Graphics Path, continued

Figure 3: Code and Graphics Output from PROC FREQ

The following example uses the SGPLOT procedure to produce a vertical bar chart::
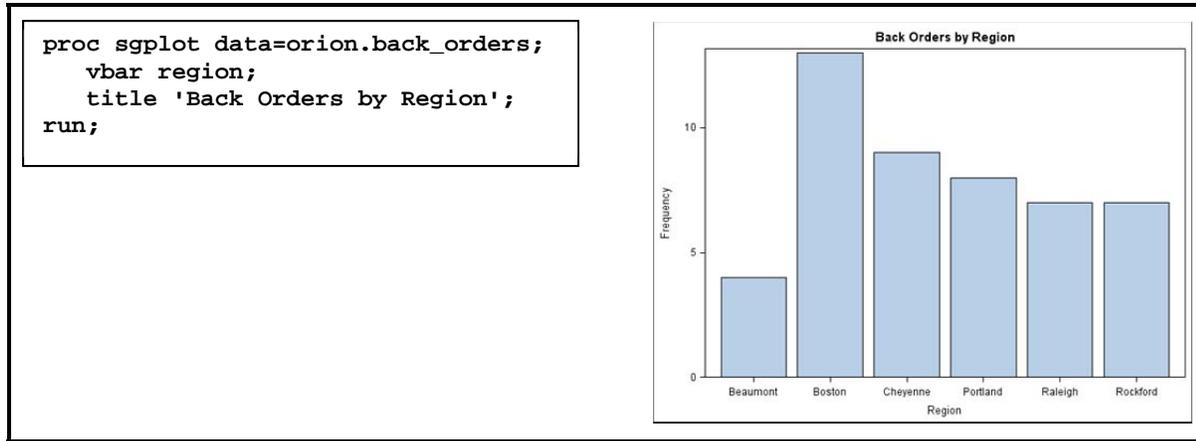
```
proc sgplot data=orion.back_orders;
    vbar region;
    title 'Back Orders by Region';
run;
```


Figure 4: Code and Output from PROC SGPLOT

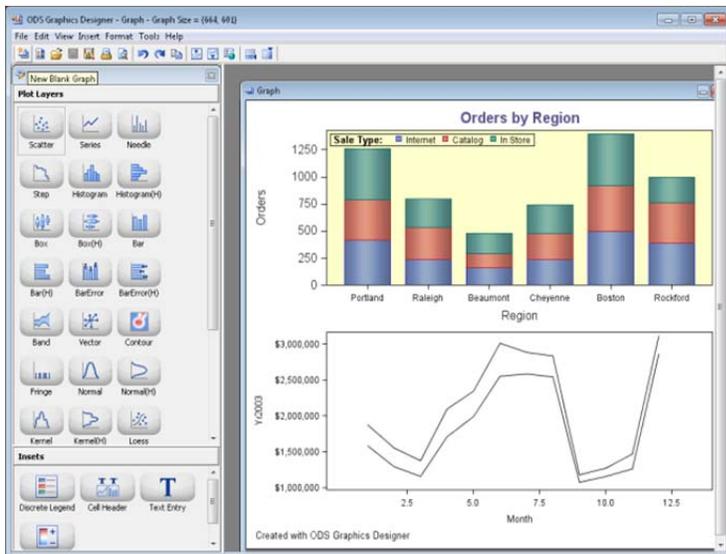The following example shows a graph created using the ODS Graphics Designer:

Figure 5: ODS Graphics Designer and Output

At the Crossroads: How to Decide on Your Graphics Path, continued

AT THE CROSSROADS

So, how do you choose your graphics path? If you want a "one size fits all" answer, then stop reading now. There is no right answer to this question. You have to take many factors into consideration. To outline them, we will ask you some questions. Some of the questions will clearly point to one path or the other. Some of the questions might not be immediately relevant to your situation, but perhaps understanding the question will shed some light on your graphics path.

SOME QUESTIONS ARE EASY

SAS/GRAPH has been around for a long time and is **not** going away. If you have a SAS/GRAPH license and are not using (at least) SAS 9.2, then your graphics path is easy to determine. If you don't have SAS 9.2 yet, you can only use classic SAS/GRAPH techniques to produce your images.

However, one of our underlying assumptions is that you probably have SAS 9.2 or higher, so let's move on to the first real question.

QUESTION 1: DO YOU HAVE EXISTING SAS/GRAPH CODE?

Do you have existing SAS/GRAPH code (using, for example, the GCHART, GPLOT, or GREPLAY procedures or the Annotate Facility) that you have to use and maintain?

If you have existing SAS/GRAPH programs that generate specific output or reports, then you need to maintain that code. If you need to create images for many different physical devices, and the customizations that you need can be controlled by a procedure option, global statement, or global option, SAS/GRAPH has those control mechanisms by the score. If the options aren't enough to do what you want, there's always the Annotate Facility. There are many examples of how to generate SAS/GRAPH output in the documentation, in user group papers, and in books.

Traditional SAS/GRAPH is a very robust way to produce everything from a simple bar chart to the dashboard shown in Figure 6, which was created by Robert Allison.

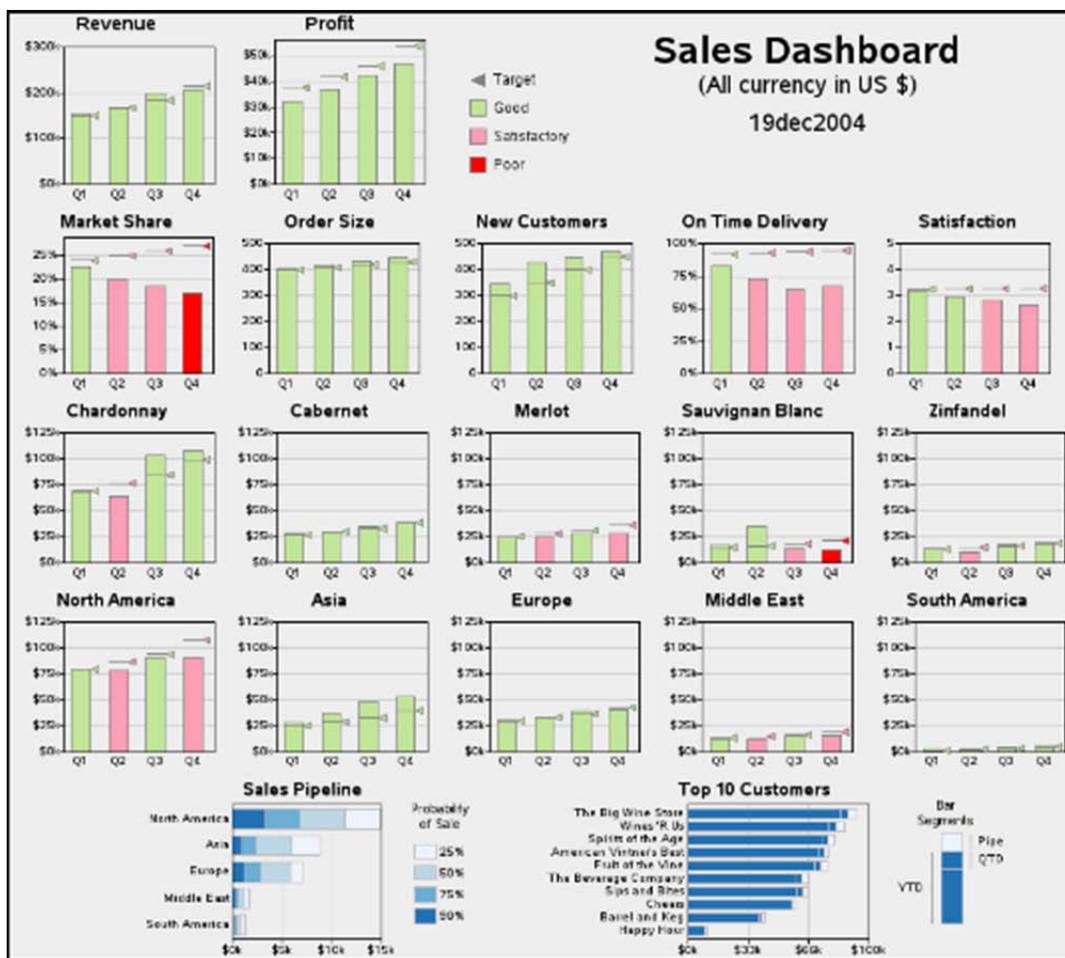At the Crossroads: How to Decide on Your Graphics Path, continued

Figure 6: DM Review Dashboard Winner Created with SAS/GRAPH

This example was the winner of the 2005 DM Review magazine Data Visualization Contest. On Robert Allison's public Web site, http://www.robslink.com/SAS/Home.htm, you can see the code that generated this graph and many, many more examples. There are multiple SAS/GRAPH procedures (including the GREPLAY procedure) and Annotate data sets involved in creating this dashboard image. If you have legacy SAS/GRAPH code, whether it is this complex or not, then you will want to keep one foot firmly planted on the traditional SAS/GRAPH road.

QUESTION 2: DO YOU NEED SPECIALIZED TYPES OF GRAPHS?

Both SAS/GRAPH and ODS Graphics can produce most of the common types of graphs, such as scatter plots, bar charts, regression plots, box plots, and histograms. But what if you have other needs? Maybe you need to produce a type of graph called a tile chart, or sometimes, "tree map", as shown in Figure 7.

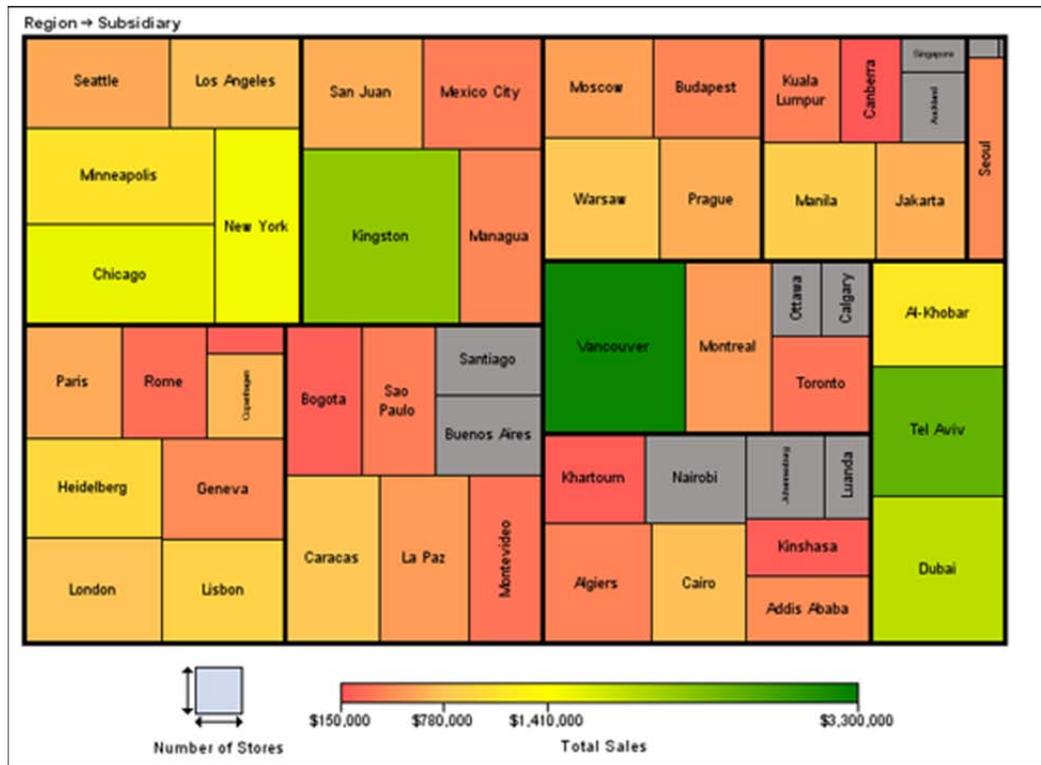At the Crossroads: How to Decide on Your Graphics Path, continued

Figure 7: SAS/GRAPH GTILE Procedure Example

This is just one of the graphs that can be produced by specialized SAS/GRAPH procedures that are not available with ODS Graphics. Some other types of graphs that can only be produced by SAS/GRAPH include:

- Radar charts (PROC GRADAR)
- KPI charts (PROC GKPI)
- Donut charts and star charts (PROC GCHART)
- Display-only annotation or text (PROC GSLIDE and PROC GANNO)

In addition, the following types of graphs can be produced by SAS/GRAPH procedures, but not by the SG procedures in ODS Graphics. They can, however, be produced by using the GTL directly:

- Maps (PROC GMAP)
- Contour plots (PROC GCONTOUR)
- 3-D surface and scatter plots (PROC G3D)
- Pie charts (PROC GCHART)

If these are the types of graphs you need to produce, then again, all signs point to the SAS/GRAPH road.

On the other hand, there are a few types of graphs that can be produced only with (or much more easily by) ODS Graphics using the SGPLOT or SGPANEL procedures. These include:

- Dot plots
- Vector plots
- Horizontal box plots
- Ellipse plots
- Distribution curves

If you need to produce any of these graphs, then you will probably want to use ODS Graphics.

At the Crossroads: How to Decide on Your Graphics Path, continued

QUESTION 3: HOW MUCH CUSTOMIZATION DOES YOUR GRAPH NEED?

Both SAS/GRAPH and ODS Graphics provide you with the ability to customize your graph by controlling the appearance of graph elements such as plot points, bars, axis labels, legends, titles, and footnotes.
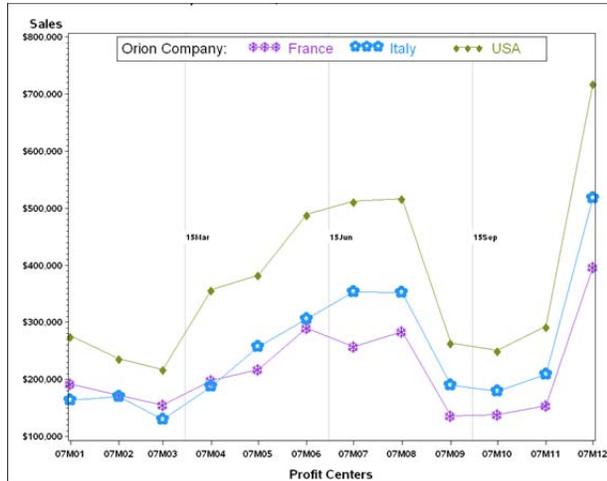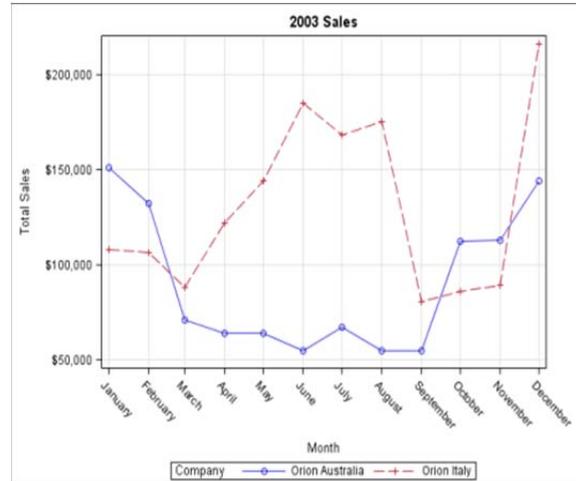

Figure 8: Customized SAS/GRAPH Output

Figure 9: Customized ODS Graphics Output

Although customization is available with both methods, SAS/GRAPH currently provides more options and flexibility. For example, with ODS Graphics, you can specify plotting symbols, but you are limited to a list of pre-defined symbols. With SAS/GRAPH, you can use any character in any font as a plotting symbol. Both SAS/GRAPH and ODS Graphics provide control of axes and legends, but SAS/GRAPH provides more detailed control,for example, the ability to assign a different color to each tick mark label on an axis.

Both SAS/GRAPH and ODS Graphics (in SAS 9.3) provide an Annotate Facility. The capabilities of both facilities are similar.

QUESTION 4: ARE YOU A PROGRAMMER?

Are you comfortable with programming and writing code, or do you like to use point-and-click techniques to generate graphic images?

The fact is that both SAS/GRAPH and ODS Graphics can produce graphs if you write code. In fact, the code to produce some types of charts is strikingly similar (as shown in Figures 2 and 4). The output shown for each procedure is the output that is produced by the simplest code with no axis, color, or font changes implemented. There are many ways to customize both of these graphs, but that is a topic for another paper. The fact is that if you're a programmer, either method of producing graphs will work for you.

If you **really** like to sling code, we have code for you to sling on either path. The TEMPLATE procedure code below[2] uses GTL to create a graph template that generates the graph in Figure 10.

```
proc template;
define statgraph sgplot;
dynamic _NEGATIVE_;
dynamic _ticklist_;
begingraph /;
EntryTitle "Back Orders by Region" /;
layout overlay / xaxisopts=(type=Discrete
discreteOpts=(tickValueList=_ticklist_))
yaxisopts=(linearopts=(Integer=true));
   if (_NEGATIVE_)   ReferenceLine y=0 / lineattrs=GraphAxisLines;
   endif;
```

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[2] The graph that GTL produces in this example could also be easily produced by using the SGPLOT procedure. It is shown here to illustrate GTL.

At the Crossroads: How to Decide on Your Graphics Path, continued

```
    BarChartParm X=Region Y=_FREQUENCY_ / primary=true LegendLabel="Frequency"
NAME="VBAR";
endlayout;
endgraph;
end;
run;
```
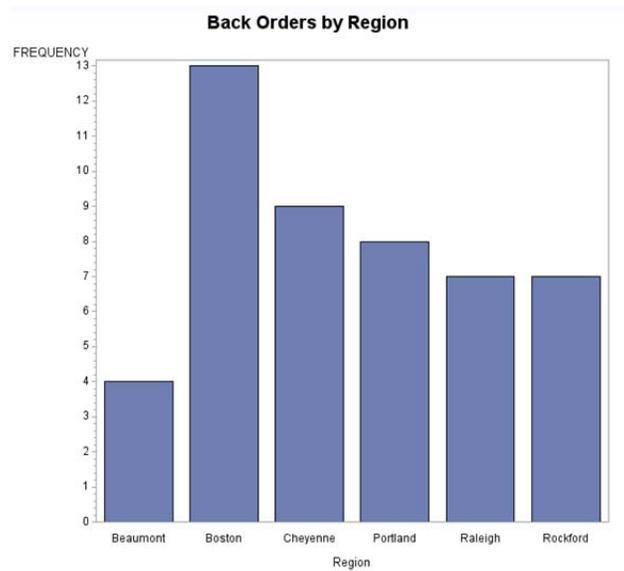

Figure 10: Graph Produced Using GTL

You can modify the GTL code above, or write your own code to customize the layout of the graph.

SAS/GRAPH does not make available a low-level language like GTL, but it does offer a wide range of customization options, such as AXIS and LEGEND statements and the Annotate Facility, which enable you to control the layout of your graph.

So, this question is not going to lead you to one road or the other.

What if you're **not** a programmer? We've got you covered there, too. What you need to know is that both SAS/GRAPH (through SAS Enterprise Guide Tasks and Wizards) and ODS Graphics (through the ODS Graphics Designer) let you create graphs without programming.

QUESTION 5: DO YOU NEED STATISTICAL GRAPHS?

If you've been on the SAS/GRAPH road, then you know that traditional SAS/GRAPH can, and does, produce highly customized statistical graphs. Let's start with a simple example.The following code produces a LOESS plot:

```
proc loess data=Melanoma;
   model Incidences=Year;
ods output OutputStatistics=Results;
run;

symbol1 color=black value=dot;
symbol2 color=black interpol=join value=none;

proc gplot data=Results;
title1 'Melanoma Data with Default LOESS Fit';
plot DepVar*Year Pred*Year/
        hminor=3 vminor=3 overlay;
run;
```

If you use traditional SAS/GRAPH, then you need to use the LOESS procedure to capture your data points in a SAS data set (WORK.RESULTS), and then use those data points with a SAS/GRAPH procedure, such as the GPLOT

At the Crossroads: How to Decide on Your Graphics Path, continued

procedure. However, if you know the LOESS procedure and you are using SAS 9.2 or higher, you could produce an equivalent graph using ODS Graphics by submitting only the following code:

```
ods graphics on;
   proc loess data=Melanoma;
      model Incidences=Year / select=DF2(7);
   run;
ods graphics off;
```

The output from the above code is compared to the output from the SAS/GRAPH code in Figure 11.
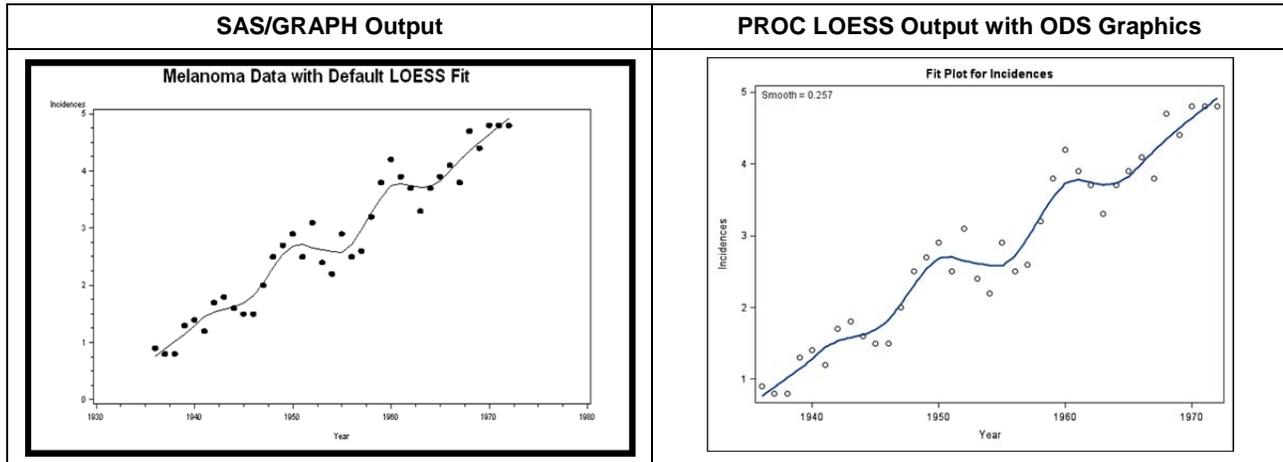
SAS/GRAPH Output	PROC LOESS Output with ODS Graphics

Figure 11: SAS/GRAPH Output Compared to PROC LOESS Output

The underlying architecture of ODS Graphics is designed so that ODS Graphics can easily create statistical graphs. The automatic graph generated by the LOESS procedure required only two extra statements. If you wanted more legend or symbol control, then you could actually use either the SGPLOT procedure or the GTL to produce a LOESS plot. The SGPLOT procedure code, using the LOESS statement, is shown below.

```
proc sgplot data=Melanoma;
  title1 'Melanoma Data with Default LOESS Fit';
  loess x=year y=incidences;
run;
```

The output from the SGPLOT procedure with the LOESS statement is shown in Figure 12.
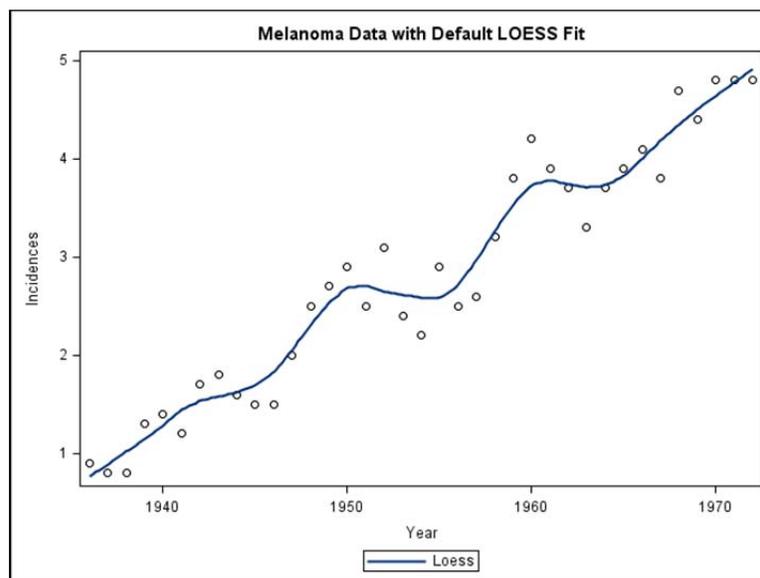

Figure 12: SGPLOT and LOESS Statement Output

At the Crossroads: How to Decide on Your Graphics Path, continued

So, if you understand statistics and know which graphs you need to create, ODS Graphics is your superhighway to statistical graph nirvana. Where SAS/GRAPH is good, ODS Graphics is superior.

From very simple usage (using ODS GRAPHICS ON/OFF with statistical procedures) to slightly more verbose usage (using the SG procedures such as SGPLOT) to more complex usage (writing GTL code directly, which is not shown for this example), the ODS Graphics approach is sure to please when you need to generate statistically related graphs. Even if you do have existing SAS/GRAPH code to produce statistical graphs, you can follow some of the same steps we did with PROC LOESS to see whether the statistical procedure can produce the graph you want out of the box and in most cases, you'll be creating images with one pass through the data. For statistical graphs, ODS Graphics is the best choice.. For statistical graphs, ODS Graphics is the best choice.

QUESTION 6: DO YOU WANT PANELED PLOTS OR CHARTS?

ODS Graphics can produce paneled plots or charts more easily than classic SAS/GRAPH. With SAS/GRAPH, you must create individual graphs, and then use PROC GREPLAY to replay them into a paneled layout. Robert Allison's Web site has numerous examples of creating paneled output, such as the DM Review dashboard, which make heavy use of the GREPLAY procedure.

However, if you want the look of Edward Tufte's "small multiples", without the learning curve of SAS/GRAPH and the GREPLAY procedure, then consider using the SGPANEL procedure. With ODS Graphics, you can produce paneled graphs easily using the PANELBY statement in the SGPANEL procedure. Or, you can create paneled graphs using the ODS Graphics Designer or GTL. Consider the following code.

```
proc sgpanel data=orion.profit;
   panelby company;
   series x=yymm y=sales;
title "Sales by Company";
run;
```

Output from this code is shown in Figure 13, and you can see how the small multiple layout can facilitate quick comparisons between categorical groups, such as Sales by Company.
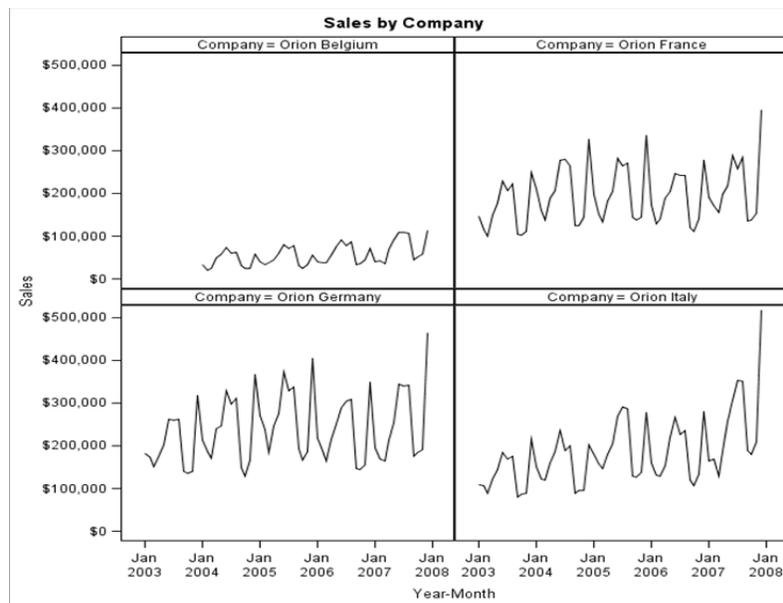

Figure 13: SGPANEL Output

The SGPANEL procedure statements are quite easy because they build on the SGPLOT procedure statements. The only new statements that you really have to learn are the PANELBY statement and the ROWAXIS and COLAXIS statements for axis control. By adding options to the PANELBY statement:

```
panelby company/layout=columnlattice onepanel;
```

you can quickly produce other layouts, such as the columnar arrangement of panels as shown in Figure 14.

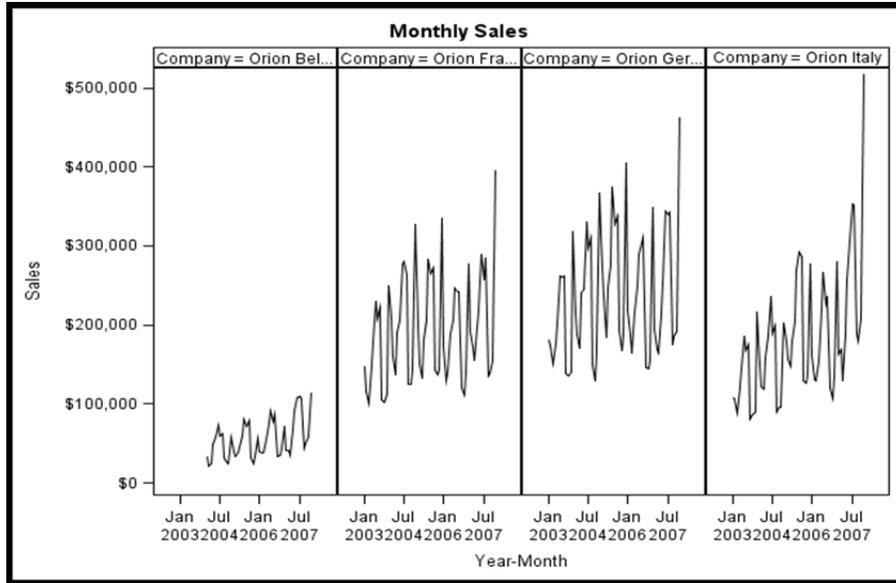At the Crossroads: How to Decide on Your Graphics Path, continued

Figure 14: SGPANEL Output with PANELBY Option

The output that you see is what you get out of the box, with a minimum number of code changes. Imagine what you can do if you invest your time on learning how to navigate this road!

QUESTION 7: DO YOU WANT MULTI-CELL PLOTS OR SCATTERPLOT MATRICES?

ODS Graphics can also produce multi-cell plots or scatterplot matrices very easily using the SGSCATTER procedure. Features of the SGSCATTER procedure include the ability to produce various grids of scatter plots, include fit and confidence overlays, use automatic paging, and use BY groups. The difference between the SGPANEL procedure and the SGSCATTER procedure is that the SGPANEL procedure creates a separate cell for each value of a category variable or variables, while the SGSCATTER procedure creates cells for different combinations of variables (such as sales by month and cost by month for all observations).

Compare the PLOT statement output with the MATRIX statement output as shown in Figure 15. The code that produced each image is shown.

PLOT Statement Example	MATRIX Statement Example
```proc sgscatter data=sashelp.iris; plot sepalwidth*sepallength petalwidth*petalwidth / group=species reg; run;```	```proc sgscatter data=sashelp.iris; matrix sepalwidth sepallength petallength petalwidth / group=species; run;```

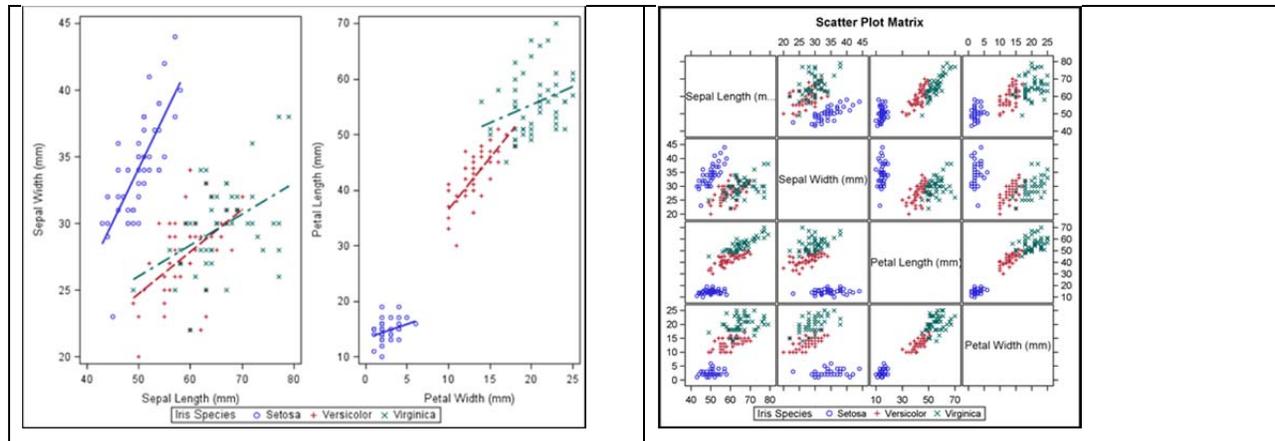At the Crossroads: How to Decide on Your Graphics Path, continued

Figure 15: SGSCATTER PLOT and MATRIX Statement Output

Again, these small multiple images or paneled images are quite easy to produce with a minimum of code. And again, you can bypass the code completely if you use the ODS Graphics Designer. If you need multi-cell plots or scatterplot matrices, the ODS Graphics road is for you.

CAN I HAVE MY CAKE AND EAT IT TOO?

One advantage you have over Robert Johnson is that you can take **both** highways. You can easily produce documents that contain graphs produced by both SAS/GRAPH and ODS Graphics. Consider the following code, which produces the HTML page shown in Figure 16:

```
ods html file='sgf.html';
proc sgplot data=orion.back_orders ;
   vbar region;
title 'Bar Chart Created With ODS Graphics';
run;
proc gmap data=orion.back_orders map=maps.us all;
   id statecode;
   choro number_of_orders;
title 'Map Created With SAS/GRAPH';
run;
ods html close;
```
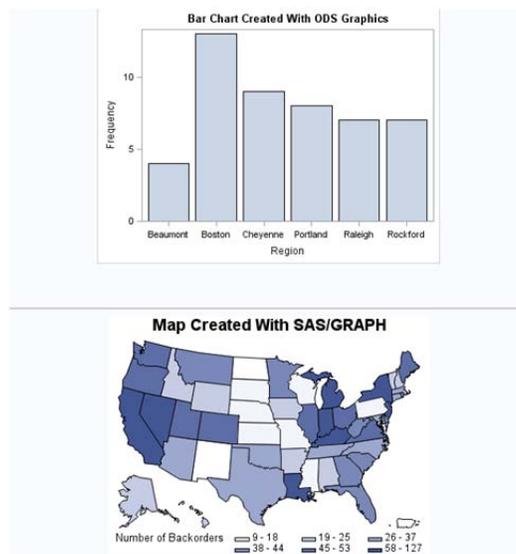

Figure 16: HTML Output Containing SAS/GRAPH and ODS Graphs

14

At the Crossroads: How to Decide on Your Graphics Path, continued

Note that while you can combine SAS/GRAPH and ODS Graphics output in the same document or on the same page, you can't create a single graph containing components from both.

SOME DECISIONS ARE PERSONAL

Sometimes the decision about whether to adopt a new technology is not driven by business but by your learning style or personality.

If you are an "early adopter" and you like to experiment with new technologies and capabilities, then learn about and use ODS Graphics.

If you prefer "tried and true" techniques, if your image needs are not that complex or statistically-oriented, and if you do not need any of the new capabilities, then learn about and use classic SAS/GRAPH. You will need a SAS/GRAPH license in addition to your Base SAS license. Or, if you are already creating graphs for a specific application using "classic" SAS/GRAPH procedures, continue to use them (they won't go away).

For many graphs, there is no single road to graph production; either road will accomplish the task. But, you can't stay at the crossroads indefinitely. Eventually, whether you're Robert Johnson learning hot guitar licks, or a business analyst who needs a paneled bar chart, or a statistician who needs to produce a survival analysis, you're going to have to pick up an instrument and start playing.

CONCLUSION

We've asked some questions that only you can answer, based on your work, what you need to produce, and what you have available to produce it with.

The fact is that both SAS/GRAPH and ODS Graphics offer code methods and point-and-click methods to produce graphs. You might stay on one graph road for your whole career as a SAS user. But you might, at some point, need to switch over to the other road, or better yet, spend some time on both roads. In an ideal world, you'd have infinite resources and no deadlines, and you'd create the perfect graph the first time you tried. If you find that road, send us the directions to it. In our world, everybody makes mistakes; nothing works without trial and error; and the only way to get to Carnegie Hall is to practice, practice, practice.

Training for each method that we've discussed is available now (SAS/GRAPH) or is under development (ODS Graphics). Visit support.sas.com/training and look at the Report Writer learning path to review the course outlines and offering dates for the graph training. In addition, each statistics class includes training on the use of ODS Graphics with statistical procedures.

If you learn best by following a model, then make use of our reference section. There are some very good graph examples that will help you get started no matter which path you choose.

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ACKNOWLEDGMENTS

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