

## **Streamlining Reports: A Look into Ad Hoc and Standardized Processes**

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### **Abstract:**

This paper provides a conceptual framework for quantitative reporting processes using SAS® in conjunction with Microsoft applications, specifically Excel and PowerPoint. A variety of efficiency challenges, ranging from data compilation in SAS to creating the final comprehensive output for distribution, are addressed separately for both Ad Hoc and standardized reporting processes. This paper offers a theoretical framework for reporting and is primarily concerned with the interaction of reporting tools that provide an optimal path for summarizing information, depending upon the task at hand. The framework presented draws from 4 years of on-the-job reporting experience in the financial/banking industry. The reporting techniques presented leverage SAS, the SAS Add-In for Microsoft, and the Microsoft applications.

### **Introduction:**

As is well known, the SAS software is leveraged across business lines, companies and industries around the globe for its power to disseminate, manipulate, and summarize large quantities of data. SAS offers users the ability to draw a summarized and comprehensive report or picture of these large datasets that can be used for a variety of purposes. Reporting processes using the SAS software can be framed in a countless number of ways, requiring the user to think creatively about the goal of their report and how to arrive at that goal.

When creating a report with SAS, every user must consider the same questions prior to coding their program and producing the final report in order to make the most efficient use of time. These questions can be divided into three categories; the type of report, the report audience, and the resources needed to produce the report. An analyst can make the most efficient use of their time creating their report upon addressing these basic questions. The following sections will cover a few different approaches to report generation using both SAS and Microsoft applications. The choice of techniques depends largely upon the report type, report audience, and resources available.

### **Reporting Considerations:**

#### Report Type:

A user producing an ad hoc report is often trying to investigate a particular problem or answer a specific question. In this case, the user often has a smaller time window upon which to work and may not be as concerned with creating an aesthetically pleasing report. The SAS program should be easy to read and offer the user flexibility to change how they are viewing the data “on the fly”. This type of report often involves less

sophisticated coding (ie. Macros, Do Loops) and less coding efficiency considerations than is the case for standardized reporting procedures.

Standardized reports are often produced on some time interval and are performed to summarize data in the same manner over time (ie. monthly, quarterly, and annually). Efficiency and visual appeal are given higher priority when producing a standardized report. Thus, these reports need to be more automated and may require the interaction with external software applications, like Microsoft PowerPoint, Word or Excel.

#### Report Audience:

Not only does the SAS user need to consider the type of report but they also must be aware of the report audience. The program upon which your report is distributed, the looks of the report, the report length/depth and size/scope, as well as security issues must all be addressed when considering the primary consumers of the report.

#### Available Resources:

Lastly, the SAS user must operate within the resources which are available to create the report. The analytical tools and software applications available to one user may be quite different than those available to another. The approaches presented below leverage SAS and involve a heavy reliance on the SAS Add-In for Microsoft feature, as well as the Microsoft applications.

Not only is the user subject to creating the report within the means of the analytical resources available, they also must work within their own strengths. It is quite possible that the user will be subject to leveraging the tools in which they are familiar, instead of expending the time and money it takes for training in other methods. The best way to produce a report using SAS depends on the consideration of the skill set of the analyst and what they have available to them with respect to time and software.

### **Reporting Techniques:**

#### Ad Hoc Approach:

When it is determined that the type of report is ad hoc in nature, the analyst should leverage the fastest, the most reliable and flexible approach to creating a report. An ad hoc report is often used to answer questions such as; what are the loss rates within a particular population segment and why is production volume spiking during a specific time period? These types of reports can be time sensitive and the optimal analytical techniques may not be obvious where several iterations of the analysis may need to be performed in order to answer your question or problem. Therefore, it is important to leverage the fastest and most flexible approach to showing the results. Coding in SAS should be relatively simple and easily read. The final output should be easily manipulated and changed in order to quickly display the data in a variety of ways.

The best technique is to leverage the tools and skills the analyst has available and is most comfortable putting into practice. For instance, if the analyst is most comfortable displaying their summary data, charts, graphs, by coding in PROC MEANS, PROC SUMMARY, PROC TABULATE or SAS graph then perhaps this approach makes the most sense. In this case, SAS will do most if not all the processing and the analyst simply relies on their programming skills in order to assess results and manipulate table/charts where needed. However, one must compare this programming intensive process to an approach which leverages the SAS Add-In for Microsoft Office.

The SAS Add-In for Microsoft was originally designed for decision makers who know Microsoft Office but have limited SAS programming knowledge. However, one could make a strong argument that an analyst can leverage both SAS programming skills and their knowledge of the Microsoft Office applications to make for an effective and efficient Ad Hoc reporting tool. The primary function of the SAS Add-In for Microsoft is that it offers the ability to leverage the reporting and analytics of SAS directly through Microsoft Office applications. The tools provided include approximately 80 different analytical procedures (regressions, multivariate and time series analyses, summary statistics) that can be run and generated within Microsoft yet processed within the SAS environment.

The SAS Add-In for Microsoft can be useful in situation where one would like to offer the capability of another party, call them the “non-programmers” to look at data, processed by SAS, in a variety of ways using a SAS interface in Microsoft Excel, for instance. The programmer can even go as far as to create macro variables that the non-programmer can adjust in order to change the way the SAS reads data and manipulate the permanent SAS dataset feeding into their analysis. Put simply, the programmer will write code which creates a permanent SAS dataset and the non-programmer uses the SAS Add-In for Microsoft software to point to this dataset and run a variety of analyses. Once a permanent SAS dataset is created, the analysis can be shown in the form of tables, charts, and pivot tables and can be easily refreshed and changed without any coding whatsoever. This functionality simplifies the coding process and offers a great deal of flexibility when analyzing and summarizing the data. Whether or not the process involves several parties or is centralized to a single analyst, the functionality of the SAS Add-In for Microsoft make it an excellent ad hoc reporting tool.

The benefits of the SAS Add-In for Microsoft do come with some notable limitations and things to consider. The first is with respect to size limitations when trying to read the SAS data into Excel. There is some transfer time associated with reading the data and the size of the file upon which Excel will read and the length of time will vary depending on the computer resources available to the analyst. Minimizing the size of the permanent dataset read into Excel with the use of PROC SUMMARY and PROC MEANS will help alleviate transfer time. Additionally, linking tables and charts in Microsoft to the SAS dataset with the SAS Add-In for Microsoft software can significantly increase the size of the Microsoft file. Too many pivot tables linking to several data sources can lead to slower processing and make it more challenging to electronically share the file. This problem can be hedged, to a certain degree, by linking the pivot tables and charts to one

another instead of individually linking them to the data source (SAS permanent dataset). The third limitation identified and worth noting is the inability for SAS Formatting, created via PROC FORMAT, to successfully transfer to the output in Microsoft. Any formats applied to the data must therefore be hard coded within a DATA or PROC SQL step. It is also important to consider other potential limitations with respect to more complex analytical procedures that perhaps do not exist within the SAS Add-In for Microsoft interface prior to implementing such an approach.

#### Standardized Approach:

The ultimate goal of the analyst creating a standardized report is automation. In other words, the report should be created with as little manual processing as possible. The goal is to let SAS do most, if not all of the processing and data summarization. This way the analyst can spend little time creating the report and more time focusing on analyzing the information presented.

A standardized report will typically pull data from the same location and be presented in the same fashion several times within a given time horizon. The framework of the process will depend on the presentation and distribution guidelines specific to the report. There are more formal reports which require PowerPoint presentations, including several tables and charts that include relevant verbiage explaining the results. Other more informal reports may simply require a copy/paste of SAS output into a Microsoft Word, or perhaps an e-mail. The requirements will certainly impact the framework of the report but the primary goals of efficiency and automation hold throughout. This section will assume the standardized report will be displayed and distributed using one of the Microsoft applications.

#### *Report Finalized in Excel*

A standardized report can be easily finalized and distributed within Microsoft Excel. The goal is to have SAS do most of the programming and summarization and to keep manual Excel work to a minimum. One might assume that the SAS Add-In for Microsoft would be an ideal tool to complete this task. However, limitations to the output style (Charts/Tables), file size, and formatting issues could make the SAS Add-In for Microsoft less efficient in the long run.

Another option to creating a standardized report in Microsoft Excel, using SAS, would be to create a text file in SAS and export into Microsoft Excel, to then be read into charts and tables. This could very well suffice as an efficient process but there are limitations as to how many rows Excel can handle. If the analyst can successfully summarize the data to Excel's specifications, export the data to excel so that charts and tables automatically link to that data, then this option becomes worth consideration. This process has served sufficient in my experience but has often involved utilizing Excel to further summarize the exported data into pivot tables so that it can be easily graphed. This involved additional manual updating and led to the potential for further optimization, which leads to a more optimal solution.

In the last example, the step of summarizing the text data further in Excel can be moved to SAS. Let's think of a Microsoft Excel pivot table as simply a cross tabulation of variables which can easily be created using PROC TABULATE or PROC REPORT in SAS. In this way, we can essentially create the pivot table in SAS and present it as HTML output. This summarized output can be exported or merely copy/pasted into an Excel worksheet which is linked to Microsoft Excel tables automatically. This process can be optimized such that the analyst updates macros, runs the SAS program, and copies the output into Microsoft Excel. Any work beyond that point would be in the form of customized verbiage which explains the information presented and the overall distribution of the file. The question can be begged as to whether this is really the most automated and efficient method available. The answer is probably no. An analyst savvy in SAS Graph could write SAS code to create the HTML output necessary to replace any graphing in Excel and have it automatically output to an Excel workbook. However, those familiar with SAS graph knows that there are limitations and that the demand for specific reporting requirements could exceed the capabilities of SAS Graph. The optimal way will again depend on the expertise of the analyst and the resources available.

#### *Scenario II: Report Finalized in PowerPoint*

Similar to the standardized report in Excel, there are several options to producing an effective report by transporting SAS output into a presentable PowerPoint format. The first option is to make use of the SAS Add-In for Microsoft. If the final tables and charts are simple and straight forward, a programmer could feasibly read their permanent SAS dataset using the SAS Add-In for Microsoft software and refresh tables and charts with the 'click of a button'. However, this is not a good option for more sophisticated reports that require more customization than is offered through the SAS Add-In for Microsoft.

The second option involves coding the tables and charts to produce and export the results in an HTML format from SAS directly to PowerPoint. This is certainly an option for those who are comfortable with SAS Graph and other summarization procedures within SAS. If these procedures are sufficient to meet reporting needs, this approach could effectively cut out the need for a mid-step process such as bringing data into Excel to create the tables and charts prior to exporting to PowerPoint. If the report, on the other hand, requires tables and charts that are more readily tailored in Excel, there are some efficiency options to consider.

To begin, the example in Scenario I above is a great starting point to create Excel tables and charts from SAS output efficiently and with very little manual work. The next step is to simply link these Excel charts and tables into a PowerPoint presentation. The linking property available through Microsoft offers an easy way to read information without having to copy and paste. The important thing to consider when creating a standardized report is that its good practice to save an additional copy of the presentation each time the report is updated and to keep a separate independent version that is only used for updating verbiage and refreshing the links. The steps to link an Excel chart into PowerPoint are as follows:

1. Copy location of cells or chart within Excel document
2. Select Paste Special from the Edit tab in PowerPoint
3. Click on the “Paste Link” button
4. Refresh the chart by simply right clicking and moving to “Update Link”. Multiple links can be updated at once by clicking “Links” in the Edit tab and selecting all the links to be updated.

At any rate, keeping in mind the goal of automation, this is another efficiency consideration when creating a standardized report. This same procedure can be used for reports that need to be created and distributed within Microsoft Word, as well as, any data transition necessary from Microsoft Access.

### **Conclusion:**

Several considerations must be considered before creating a report; the type of report, the report audience, and the resources needed to produce the report are all important factors to keep in mind when creating the most efficient process possible. This paper makes many assumptions about the tools available to the analyst, for instance, a focus is placed on the SAS Add-In for Microsoft and the potential benefits it brings to ad hoc processes. A general framework for creating the most efficient report, assuming SAS output needs to eventually feed into the Microsoft applications is provided. The optimal path for report creation is dependent upon several variables and the information presented ought to be interpreted as such. However, a few approaches have been presented to tackling efficiency issues when creating both ad hoc and standardized reports.

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Your comments and questions are valued and encouraged.

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