

Using SAS® Visual Analytics™ to Solve Excel-based Reporting Problems

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ABSTRACT

Using Excel as an analytics tool is pervasive and nearly inescapable in many corporate environments. While it can be an ideal tool for many basic ad hoc analyses, it can easily morph into an unscalable, error-prone, and undocumented reporting solution with significant limitations on end-user functionality. When this occurs, SAS® Visual Analytics™ can provide a new and improved reporting solution that addresses many of Excel's pitfalls. This paper uses a real-world example to illustrate the advantages of moving Excel-based reporting to SAS Visual Analytics. Kaiser Permanente's Data and Information Management Enhancement (DIME) team replaced a highly manual Excel-based reporting solution that supported the needs our regional call center business partners with a SAS Visual Analytics solution. This paper discusses several key advantages of the SAS Visual Analytics solution including: consolidating a plethora of Excel files into a small list of dynamic reports, greatly reducing the risk of human error in reports, reducing the number of resource hours needed to maintain and enhance reports, and providing end-users with the advanced functionality they need for effective decision making.

INTRODUCTION

Many are familiar with the challenges associated with Excel-based reporting. Reporting done in this tool is often characterized by dozens of disparate files with numerous tabs, all inter-connected through macros and formulas, and reliant on manual upkeep. Until recently this was the foundation of Kaiser Permanente Northwest's (KPNW) call center reporting solution. SAS Visual Analytics provides an attractive alternative for addressing and improving many of the pitfalls associated with this type of reporting.

This paper reviews the history of call center reporting at KPNW and the factors that led to an unsustainable, Excel-based reporting solution. It highlights how SAS Visual Analytics enhanced reporting in this area by:

- Consolidating numerous reports into a small list of dynamic SAS Visual Analytics reports
- Reducing the risk of human error in reports
- Reducing the number of resource hours needed to maintain and enhance reports
- Providing end-users with advanced functionality needed for effective decision making

Additionally, several lessons-learned and tips for success are discussed.

BRIEF HISTORY OF CALL CENTER REPORTING

For KPNW, two major factors contributed to the evolution of call center reporting into its unsustainable Excel-based state. First, the region had multiple source systems for call data and these systems underwent numerous changes and replacements. In most cases, the source systems had some basic canned reports available through a reporting tool, such as Business Objects. Data from the various sources systems, however, was not integrated and made available in a data warehouse. As a result, analysts used Excel exports from these reporting tools to combine data across source systems.

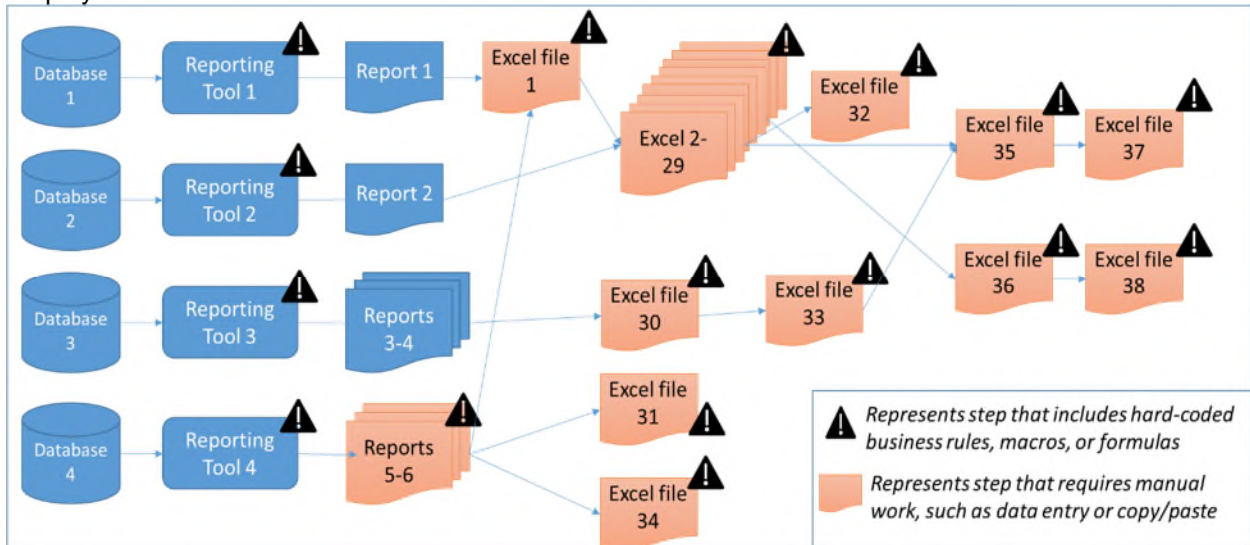
Second, organizational and leadership changes in the call center business area contributed to the abundance of Excel spreadsheets. Often each file would meet the specific needs of a current or former business partner. The DIME team could not track report users or frequency of views, thus monitoring the on-going utility of these reports presented a challenge. It was difficult to identify and decommission reports that were no longer need and new reports were continually requested. The number of reports and the resources required to maintain them made this reporting solution overdue for an overhaul. 'Fixing the

phones data' became a major goal of the DIME team in 2017 and SAS Visual Analytics was employed to solve the problems associated with the legacy reporting solution.

CONSOLIDATING NUMEROUS EXCEL FILES INTO A SMALL LIST OF DYNAMIC REPORTS

The team began this project with a thorough review of the legacy reporting process including an evaluation of data sources, documentation of business rules, cataloging of reports, and identification of all the manual steps necessary for report creation. Display 1 is an overview of the data flow from the source systems to the various reporting tools and the numerous Excel reports. Most steps in the process included hard-coded business rules, fragile macros and formulas, and/or manual data entry.

Display 1



Display 1. Legacy Reporting Data Flow

The ability to consolidate many of the Excel files required in the legacy solution to 7 core SAS Visual Analytics reports is one of the key benefits of the new solution. Many of the Excel reports were almost identical and varied only in the call queue being displayed. Display 2 is a piece of one of the legacy reports displaying call metrics for the Primary Care queue. Similar Excel files contained data for each of the 27 different call queues. Every year an analyst created new Excel 'shells' to hold the new year's data. When a new call queue emerged, an analyst created a new Excel file with all the associated updates to formulas, upstream reports, and macros.

SAS Visual Analytics easily solves these problems by creating one report and assigning the call queue field to a Drop-Down List control. This allows users to select different call queues and automatically update the metrics. Display 3 illustrates this functionality.

Display 2. Legacy Excel Primary Care Report Example

| Appointing Primary Care 2017 | | Volume | | | | | | | Avg Wait Seconds | | Service Level | | | | Longest Wait | | Average |
|------------------------------|-----------|--------------|-------------------|------------|-------------------------|--------------|---------------|-------------------|------------------|----------------|---------------|-----------|-----------|------------|-------------------------------|---------------|-----------|
| DOW | Date | Total Demand | Outgoing External | KP.ORG Msg | Incoming Calls Received | ACD Answered | ACD Abandoned | Percent Abandoned | Before Answer | Before Abandon | In 30 Sec | In 60 Sec | In 90 Sec | In 180 Sec | Avg of worst 15 minute period | Time Occurred | Talk Time |
| | (vlookup) | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| Tue | 01/03/17 | 1,210 | 100 | 100 | 1,010 | 1,000 | 10 | 1.0% | 30 | 50 | 0% | 80% | 0% | 0% | 500 | | 175 |
| Wed | 01/04/17 | 1,210 | 100 | 100 | 1,010 | 1,000 | 10 | 1.0% | 30 | 50 | 0% | 80% | 0% | 0% | 500 | | 175 |
| Thu | 01/05/17 | 1,210 | 100 | 100 | 1,010 | 1,000 | 10 | 1.0% | 30 | 50 | 0% | 80% | 0% | 0% | 500 | | 175 |
| Fri | 01/06/17 | 1,210 | 100 | 100 | 1,010 | 1,000 | 10 | 1.0% | 30 | 50 | 0% | 80% | 0% | 0% | 500 | | 175 |
| Sat | 01/07/17 | 1,210 | 100 | 100 | 1,010 | 1,000 | 10 | 1.0% | 30 | 50 | 0% | 80% | 0% | 0% | 500 | | 175 |
| Sun | 01/08/17 | 1,210 | 100 | 100 | 1,010 | 1,000 | 10 | 1.0% | 30 | 50 | 0% | 80% | 0% | 0% | 500 | | 175 |
| Mon | 01/09/17 | 1,210 | 100 | 100 | 1,010 | 1,000 | 10 | 1.0% | 30 | 50 | 0% | 80% | 0% | 0% | 500 | | 175 |
| Tue | 01/10/17 | 1,210 | 100 | 100 | 1,010 | 1,000 | 10 | 1.0% | 30 | 50 | 0% | 80% | 0% | 0% | 500 | | 175 |
| Wed | 01/11/17 | 1,210 | 100 | 100 | 1,010 | 1,000 | 10 | 1.0% | 30 | 50 | 0% | 80% | 0% | 0% | 500 | | 175 |
| Thu | 01/12/17 | 1,210 | 100 | 100 | 1,010 | 1,000 | 10 | 1.0% | 30 | 50 | 0% | 80% | 0% | 0% | 500 | | 175 |
| Fri | 01/13/17 | 1,210 | 100 | 100 | 1,010 | 1,000 | 10 | 1.0% | 30 | 50 | 0% | 80% | 0% | 0% | 500 | | 175 |
| Sat | 01/14/17 | 1,210 | 100 | 100 | 1,010 | 1,000 | 10 | 1.0% | 30 | 50 | 0% | 80% | 0% | 0% | 500 | | 175 |
| Sun | 01/15/17 | 1,210 | 100 | 100 | 1,010 | 1,000 | 10 | 1.0% | 30 | 50 | 0% | 80% | 0% | 0% | 500 | | 175 |
| Mon | 01/16/17 | 1,210 | 100 | 100 | 1,010 | 1,000 | 10 | 1.0% | 30 | 50 | 0% | 80% | 0% | 0% | 500 | | 175 |

Display 2. Legacy Excel Primary Care Report Example

Display 3

NWTC Queue Detail Report

Call Day | Day of Week | Total Demand - Customer & Consult | Routed Other - Customer & Consult | Outbound | KP.ORG Msg | Entered - Customer & Consult | Accepted - Customer & Consult | Abandoned - Customer & Consult

- RAS Primary Care
- RAS Mother/Baby
- RAS Neurosciences
- RAS OBGYN
- RAS Orthopedics & Podiatry
- RAS Physical Medicine
- RAS Primary Care
- RAS Primary Care Lead Line
- RAS Pulmonary & Sleep Medicine
- RAS Solutions Desk
- RAS Specialty Care Main
- RAS Urology
- RTMC Doctor
- RTMC Support Agent
- Vision Essentials

Display 3. SAS Visual Analytics Report with Drop-Down List Control

Another report, shown in Display 4, allows the user to select specific days or date ranges, as well as call queue combinations to customize the resulting table of metrics.

Display 4

NWTC Combined Queue Report

Select Call Year: 2017

Select Queue Group:

- Advice General Surgery
- Advice Mental Health Triage
- Advice OBGYN
- Advice RAN - CC
- Advice RAN - ER
- New Member Welcome Desk
- PBX IVR

Select Call Day:

- 30Nov2017
- 29Nov2017
- 28Nov2017
- 27Nov2017
- 26Nov2017
- 25Nov2017
- 24Nov2017

Select Day of Week:

- Sun
- Mon
- Tue
- Wed
- Thu
- Fri
- Sat

01Jan2015 to 30Nov2017

Call Day | Day of Week | Total Demand - Customer & Consult | Routed Other - Customer & Consult | Outbound | KP.ORG Msg | Entered - Customer & Consult | Accepted - Customer & Consult | Abandoned - Customer & Consult | Abandoned Short - Customer & Consult

Display 4. SAS Visual Analytics report allowing for customization of filters across call queues,

days, and date ranges

The new reporting solution allowed for the consolidation of approximately 35 Excel reports with over 500 tabs into 7 SAS Visual Analytics reports with 30 tabs. These 7 reports increased the flexibility and customized views of the key metrics. More consolidation of reports is planned after users become familiar with the new tool and the added functionality it provides.

Another key benefit achieved through this consolidation effort was the standardization of metric names across all reports. In the legacy solution, it was common for the same metric to have 4-6 different names. In the new SAS Visual Analytics solution, the metrics are consistently named and each report includes a definitions tab which provides descriptions and important business rules related each metric.

GREATLY REDUCING THE RISK OF HUMAN ERROR IN REPORTS

The legacy Excel reporting solution was fraught with opportunities for human error. For example, each day an analyst populated metrics from one Excel file to another. This and the inconsistent metric naming across reports, made data entry errors unavoidable. Additionally, most of the Excel reports included formulas scattered across metrics in various tabs. An error in one formula, on one tab, could have a cascading effect, causing errors across the report.

The new SAS Visual Analytics reporting solution reduced the risk of human error by:

- Automating metric calculations through the ETL process that creates the datasets used to build the SAS Visual Analytics reports
- Creating a call center report template including all additional calculated fields and aggregated measures needed for reporting
- Documenting all business rules, source system information, and user-defined mappings
- Creating specification documents for each report
- Peer-review and user acceptance testing of all reports prior to go-live
- Establishing a monthly release process to ensure consistent implementation of changes to reports

These process improvements will help to reduced risk of human error in the SAS Visual Analytics reports moving forward.

REDUCING THE NUMBER OF RESOURCE HOURS NEEDED TO MAINTAIN AND ENHANCE REPORTS

Maintaining the Excel reports shown in Display 1 required almost a full FTE.

- Each day an analyst would ensure automated reports ran as scheduled, open automated output files and copy/paste data into downstream files, run macros in downstream files to update data in files even further downstream, and manually create and screenshot a summarized view of key metrics for distribution to a large user group via email.
- Every Monday, three times the work was needed to update reports through the weekend.
- Several monthly dashboards required manual maintenance and significant work was needed at the end of each year to generate new files to hold the next year's data.

In the new solution, two fact tables load daily to the SAS Visual Analytics LASR server. A fully automated ETL running in SAS® Enterprise Guide™ generates the fact tables. Reports automatically refresh each morning following the data load with no manual intervention required. Additionally, the custom filtering capabilities provided in the SAS Visual Analytics tool reduced the need for many of the manually maintained monthly reports.

One of the most valuable benefits gained through this project was the ease and simplicity of report development in SAS Visual Analytics. The team completed report design, development, and UAT within a two-month timeframe. Ongoing maintenance of the Visual Analytics reports:

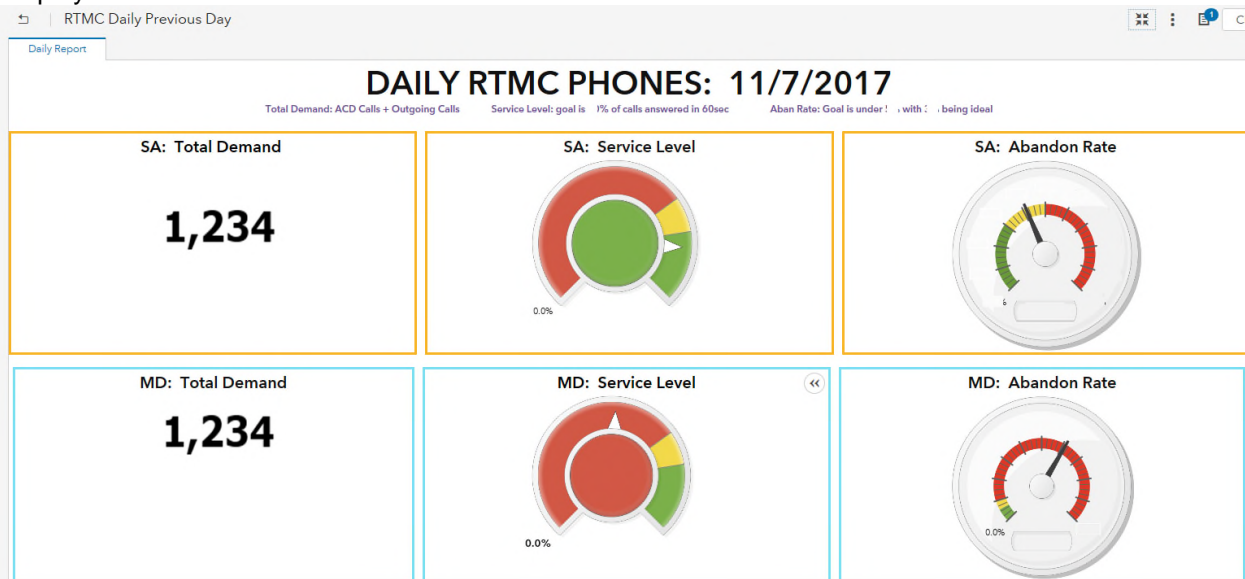
- does not require year-end updating or re-builds
- enhancements and/or business rule changes can be more efficiently implemented through the streamlined process

SAS Visual Analytics gives end-users the power to customize reports or develop their own. During report design and development work sessions, business partners saw report changes implemented quickly and easily. This led to a desire to create reports themselves. As part of the new solution, ten business partners received power user training. This training took less than two hours to conduct and covered basic SAS Visual Analytics concepts. The training and tool were well received and allowed business partners to develop custom reports prior to the official go-live of the new solution. This also allowed for the re-direction of analyst time to more complex requests.

PROVIDING USERS WITH ADVANCED FUNCTIONALITY NEEDED FOR EFFECTIVE DECISION MAKING

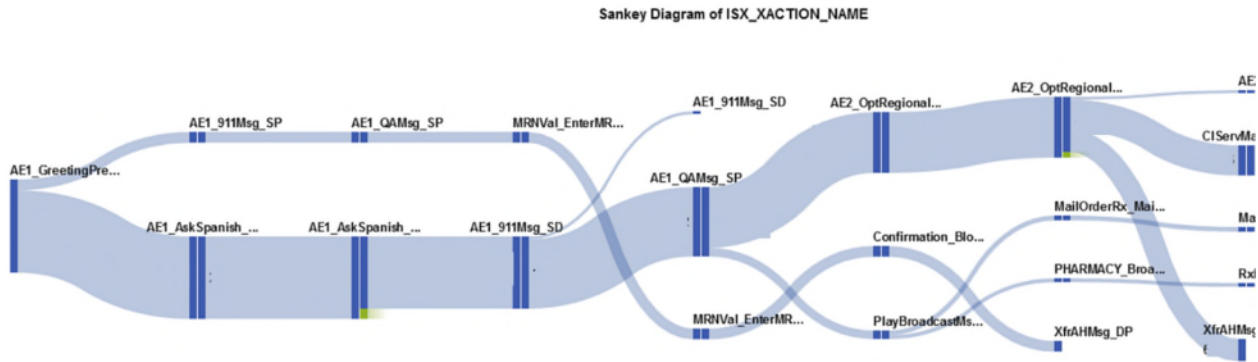
In the initial roll-out of DIME's new SAS Visual Analytics solution reports were deliberately kept simple. This was a conscientious choice made to make the transition to the new tool and reports manageable for business partners. The process did provide opportunities to introduce end-users to some of the more advanced visualization options available in VA. For example, the Power User training provided a walk-through of creating a bubble plot and several gauges with various display rules. Additionally, a related call center project around Kaiser's phone tree illustrated the use of a Sankey diagram to depict member's navigation through the phone tree. Displays 5 and 6 illustrate these options.

Display 5



Display 5. Power User Custom Report

Display 6



Display 6. Sankey Diagram of Phone Tree Data

LESSONS LEARNED AND TIPS FOR SUCCESS

Within one year, the team completed an overhaul of the Call Center reporting solution. Business partners gave extremely positive feedback on the new SAS Visual Analytics tool and reports. Below are several lessons learned and tips for success.

- Allow sufficient time for source system analysis, requirements gathering, and business rule validation. This is the most time-consuming, but also the most critical part of the overall work effort.
- Consult with IT partners with a role in the Visual Analytics solution early in the project. Discuss data volumes, user support, and other set-up issues.
- Be prepared for the change management work associated with any tool change. Be receptive to business partner feedback on report design. Plan to conduct training sessions and develop user-guides and tip sheets.
- Make standardization and following best practices a priority in report development.

While SAS Visual Analytics is an excellent and easy-to-use tool, it's not immune from becoming an inconsistent and undocumented mess. Metrics can easily be renamed; calculated fields and aggregated measure can start to vary across reports. Throughout the call center project, the team focused on thorough documentation of each step in the reporting process. A reporting overhaul such as this provides a great opportunity to start fresh and establish discipline in maintaining a clear and consistent solution.

CONCLUSION

Moving DIME's call center reporting solution from Excel to SAS Visual Analytics reduced the number of reports by more than 20 and provided end-users with added functionality. The simplicity of SAS Visual Analytics allowed for the rapid development of new reports. Significant benefits were achieved through the automation of manual steps, standardization of business rules and measure names, and the ability to redirect analyst time away from manual maintenance work to more value-added projects. These benefits make SAS Visual Analytics a great Excel alternative for groups in similar situations.

CONTACT INFORMATION

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