

## Creating a Departmental Standard SAS® Enterprise Guide® Template

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### ABSTRACT

This paper describes an ongoing effort to standardize and simplify SAS® coding across a rapidly growing analytics team in the health care industry. The number of SAS® analysts in Kaiser Permanente's Data and Information Management Enhancement (DIME) department has nearly doubled in the past two years, going from approximately 25 to 50. The level of experience and technical skill varies greatly across the team – some analysts need to use SAS daily as part of their toolset, and some may not touch it for weeks. Analysts are required to provide quick turn-around on a large volume of analytical requests in this dynamic environment. An effort was initiated in 2016 to create a SAS® Enterprise Guide® template to standardize and simplify coding across the department. This paper focuses on the process in which the template was initiated, drafted, and socialized across a diverse team of SAS® analysts.

### INTRODUCTION

Establishing coding standards across a large team of developers has numerous benefits. It can facilitate easier collaboration and code hand-offs amongst analysts, speed development time, increase efficiency by using SAS® best practices, and improve the quality and consistency of data and reporting. However, initiating and gaining user adoption of coding standards can be challenging due to differences in individual coding styles and varying levels of analyst skill and experience.

In this paper we highlight the process in which Kaiser Permanente's Data and Information Management Enhancement (DIME) team utilized SAS® Enterprise Guide® to increase the consistency and efficiency of SAS® coding across a diverse team of analysts. We will focus on the initial drafting and introduction of the template to the team, the key content areas included, and team feedback. We will conclude with key tips and lessons learned from this effort.

### DRAFTING AND INTRODUCING THE TEMPLATE

Conversations around code sharing and code standardization were common in the DIME department in the years leading up to the formalization of these ideas through the development of the SAS® Enterprise Guide® template. A kick-off for this effort occurred in early 2016 at the department's analyst Show & Tell meeting.

#### TEAM BRAINSTORMING SESSION

The DIME Show & Tell meeting is forum for sharing information amongst DIME analysts, and is informal – managers typically do not attend. It provided an ideal venue for the introduction of the idea to create a department standard SAS® Enterprise Guide® template. During this kick-off meeting, lead analysts proposed the purpose and benefits of creating such a template. The template would include a set of code shells and predefined processes that are commonly used in most SAS® jobs. The primary goals would be to bring more consistency to the analytical products we deliver to our business partners, allow the team to read and troubleshoot code, capture experienced analysts' lessons and coding styles, and make it easier to transition jobs to the department's Production Support team.

The kick-off built a consensus among the team to commit to developing the template. The group spent time brainstorming and sharing example code that would be beneficial to include. Additional recommendations from this discussion included identifying an owner for the template, using the Show & Tell meeting to regularly review and update the template, and using the department's SAS® Peer Review process to ensure quality.

#### CREATING THE TEMPLATE AND ONGOING MAINTENANCE

In the weeks following the Show & Tell discussion, analysts were asked to provide additional examples of code they would like included in the template. A small team formed to review the example code and

create an outline for the content to include in the first draft. The team iteratively created and reviewed several drafts template. The first official version was introduced to the wider DIME team in the fall of 2016 during a lunch-time training and Q&A session. The team reviewed why the project was developed, using it with live data, and how it would be managed going forward. Analysts were encouraged to try the template on their new projects – there is no mandate or requirement to use it by leadership

The DIME team held a follow-up discussion to get user feedback in early 2017. The team created a second draft of the template based on the discussion and code shared following this meeting. The department's SAS® Peer Review team reviewed this enhanced version, and provided excellent feedback on additional areas to clean-up, documentation to include, and content to add.

The template team introduced the new version in a second training session and demonstrated added content and functionality. The group discussed the plan for ongoing maintenance of the template which includes a semi-annual review and periods for enhancements. The team also posted key information, fact sheets, presentations, and recorded trainings in DIME's Analyst Handbook Wiki, which is an online tool designed to support analysts to work more efficiently, build capacity, and share knowledge.

## **CONTENT OVERVIEW**

DIME's current version of the SAS® Enterprise Guide® template includes 27 individual programs. We organized the code examples into six different Process Flows to make navigation within the template quick and effective, and creating custom flows from the programs easy.

### **STARTER CODE**

The Starter Code section contains the basic pieces of SAS® code that are needed in nearly all SAS® jobs. It is a single program designed as the starting point for all new jobs. Code from other sections of the template can be copied into this program and modified as needed. This program includes:

- A job header documenting the job title, description, schedule, recovery information in case of errors, dependencies, output location, analyst owner, business partner, and modification history. The header provides basic, but critical information on the code and is required before jobs can be transitioned to the department's Production Support team. It also provides key information to analysts that inherit jobs from others.
- Log-in information and commonly used libraries. All connections are set up to reference encrypted passwords and are designed to increase data security through preventing the hard-coding of passwords.
- A master date macro establishing key begin and end dates in commonly needed formats (date9., yymmdd10.)
- Other common macros establishing output path location, standard report footer information, email distribution lists, and output FTP mappings.

### **BASIC CODE EXAMPLES**

This section contains additional documentation and examples of commonly needed code that can be copied and modified as needed into the Starter Code. It includes:

- Instructions and examples on setting up and storing individual log-in files with encrypted passwords
- Details on using the DIME standard report footer macro
- SQL Pass-Through examples for the database systems used by Kaiser Permanente
- Expanded Date Macro examples
- Commonly modified SAS System Options
- Additional examples of how to connect to tools and databases commonly used by DIME analysts

### **COMMON PROC EXAMPLES**

This section contains examples of commonly used SAS procedures including PROC MEANS, PROC TABULATE, PROC TRANSPOSE, PROC IMPORT, PROC EXPORT, PROC SGPLOT, and PROC REPORT. All examples utilize the SASHELP datasets and can be run 'as-is' allowing result outputs to be viewed.

## **ODS EXCEL AND EMAIL EXAMPLES**

This section includes examples of how to export data using ODS EXCEL. It includes common ODS EXCEL options and using BYGROUP to output data on multiple sheets. The email examples include the department's standard email template, examples of attaching zipped files, and using TEXT/HTML to embed a PROC output directly into an email.

## **SUBJECT AREA QUERIES**

This section includes commonly used queries in key subject areas used by multiple analysts in the department. For example, one query pulls membership information that is often needed across numerous functional areas. Other subject area queries include pulling claims, hospital, and referral data. Each example query is stored in a separate SAS® program that's linked into the EG Project file. The owner of each program can make updates and changes as needed. This is an informal "code library", where analysts can provide a central copy of known working code to the team – both to serve as an introduction to the data of different areas, and reduce "copy and paste" code sharing that can become obsolete as data and rules change.

## **ADVANCED EXAMPLES**

This section contains more advanced examples demonstrating how to utilize and document SAS® macros. Examples include creating a DO LOOP in a macro, using PROC SQL to create a macro, using a macro within a macro, and using a macro to rename all variables in a dataset.

## **USER FEEDBACK**

After the demonstration of the enhanced version of the template, the template team conducted a short survey to gain user feedback. The survey was designed to gauge user adoption, identify the sections of the template that were the most/least useful, and collect general feedback and suggestions.

The survey was administered to 68 DIME analysts and managers and 39 responses were collected. 69% of respondents indicated that they used SAS® daily to complete their work. Respondents were asked how many years of experience they had working with SAS® and the result were evenly distributed across the team:

- Less than 1 year (17%)
- 1-2 years (19%)
- 3-5 years (25%)
- 5-10 years (25%)
- More than 10 years (14%)

All respondents indicated that they were aware of the template, showing that at a basic level communication about the template has been effective. Results were split on how frequently the template is used:

- Daily (3%)
- About once a week (22%)
- About once a month (31%)
- Never (44%)

Given that SAS® is not the primary tool used by all analysts, it is not surprising that a rather large portion of the team has not yet tried the template. However, for those that do use SAS® daily, these results indicate that more work is needed to establish it as a standard tool for daily work.

Respondents were also asked which sections of the template they found most useful. The top 5 sections identified were the Starter Code, Dates examples, ODS Excel examples, Email template, and Individual Log-in file example. Future enhancements to the template can utilize these responses to keep the template clean and potentially eliminate some of the lesser used sections.

Finally, respondents were asked for open-ended feedback on the template. The responses below show a general acceptance of the template concept, as well as some areas to focus on for future improvements:

- “Great work for putting those useful codes together! Very helpful in daily work! Thank you!”
- “Have not had the chance to use it yet. Look forward to doing so. It's a brilliant concept, and it looks like it's been executed really well.”
- “I think it's great that we've been shown a few different examples of how people utilize the template. As more people gravitate towards the template, I'd encourage more people to present the approach that they take when utilizing the template. The organization of the template into different SAS jobs by topic makes it easy to navigate.”
- “I like having the template for reference but also having the freedom to code the way that works for me. It's a good balance. The only thing I would say is that the template is pretty big now, which is good, but can take a while to close and be cumbersome if you are making a copy of it and deleting what you don't want.”
- “This is a wonderful idea to be sure. But in looking at the sheer size of the template, I'm reminded of the myriads of thick SAS books and references that one had to plow through to get the information needed to complete a program, only to find that the fastest solution was often to either ask a colleague or turn to an older program that might have had the code in it that was desired. The online SAS references are very useful too, but can again take a bit of time to reference. I'm sure that the continued use of the template especially by SAS novices, will improve it and our ability to write meaningful code.”

## CONCLUSION

### KEYS TO SUCCESS

Several factors contributed to the success of the template project within the DIME department. Below are some tips for any department considering implementing something similar.

- Gauge user buy-in prior to formally initiating a project. Try to build support by developing the template from the ground-up rather than top-down.
- Identify an analyst owner and champion of the effort. Allow this individual the appropriate time to coordinate the development effort.
- Utilize existing forums and tools to socialize the concept as much as possible.
- When introducing the template to the team, provide live demonstrations on how it can be used. Highlight features that are designed to make coding easier and more efficient.
- Create a plan for ongoing maintenance and allow sufficient resource time to make updates.

## CONTACT INFORMATION

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