

Interactive Live Clinical Data Monitoring Dashboards with Drill-Down Using SAS & Microsoft Excel
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ABSTRACT

Periodical data review is very important and highly recommended for all the ongoing clinical studies to ensure the data integrity and quality. Each clinical study requires experts from various functional groups like SAS® programming, Biostatistics, Data Management and so on. Each one of them have various data review requirements and one cannot expect everyone to be familiar with SAS programming as clinical data sets are often available as SAS data sets. Statisticians prefer summary level data whereas others might need to look at the summary level as well as granular level data. These reports are static and hence end users do not have any choice to customize or drill down the reports on their own. Currently it is always directed to a SAS programmer to update the reports which is an overall time consuming process.

INTRODUCTION

Every clinical study is constrained with budget and it might be too expensive for the study team to purchase a sophisticated tool. This paper proposes an easy and cost effective approach to have an Interactive Live Clinical Data Monitoring Dashboards with Drill-Down Using SAS & Microsoft Excel. These dashboards are created only once for each study using SAS, Excel VBA & Excel Pivot Table.

DASHBOARD FEATURES

The proposed excel based dashboard contains the following features.

- Multi user access at a time
- Live Interactive Summary Reports / Graphs
- No Programming is required for the end user
- 100% Menu Driven
- Auto Refresh
- Custom Filters
- Drill Down to Raw Data

The excel dashboard file can be copied by each user to their local machine and each one can play around with the locally saved reports without impacting the source files.

CHALLENGES

The following are the challenges faced during the developmental stage along with their solutions.

1. SAS Formats cannot be applied while creating excel files using proc export

Solution: SAS macro program is written.

2. The Source data path changes of Pivot reports while moving the reports

Solution: There is an immense discussion can be seen on how to solve the pivot source data path changes while moving the files with pivot tables. None of the solutions discussed online are simple and reliable. We have fixed this issue in a very easy way. The simplest solution is open the file and using SAVE AS option save it in the desired location.

3. Pivot based reports are static with the number of rows in excel. But for an ongoing study, this will be increasing and every time user cannot change their reports for the rows.

Solution: While creating the pivot reports, 50000 rows are selected for each pivot report regardless of the data availability. Whenever any SAS data set exceeds 50000 rows, email notification is sent.

4. Date based filtering criteria is one of the frequently used criteria for the data monitoring. Excel pivot does not provide an option to filter data using specified date ranges.

Solution: Fortunately, this is solved using the concept of SLICER available in excel 2010 onwards.

CURRENT SCENARIO

From the Figure 1, it is evident that most of the reports are created by SAS programmers for the team and hence for any small changes / requirements on the existing reports should be done by the programmers by tweaking the programs. These ad-hoc requirements will not change the reports completely but slightly which could have been done by the end user themselves. These reports might be specific to the individual user or may be one time requirement. Whatever the requirement is, it involves back to back email communication, versioning the existing programs & reports, documentation and so on.



Figure 1. Flow Chart

PROPOSED APPROACH

Excel files are the data source for the proposed dashboard (Figure 2). SAS programs are written to import SAS data sets into excel files. Any additional variables/derivations can be added in the SAS program. These programs are scheduled which runs in a scheduled time to keep the excel files updated. If there

are several reports to be created excel VBA can be used. Otherwise manually it can be done for fewer reports. The dashboard main page with hyperlink to the several reports is created.

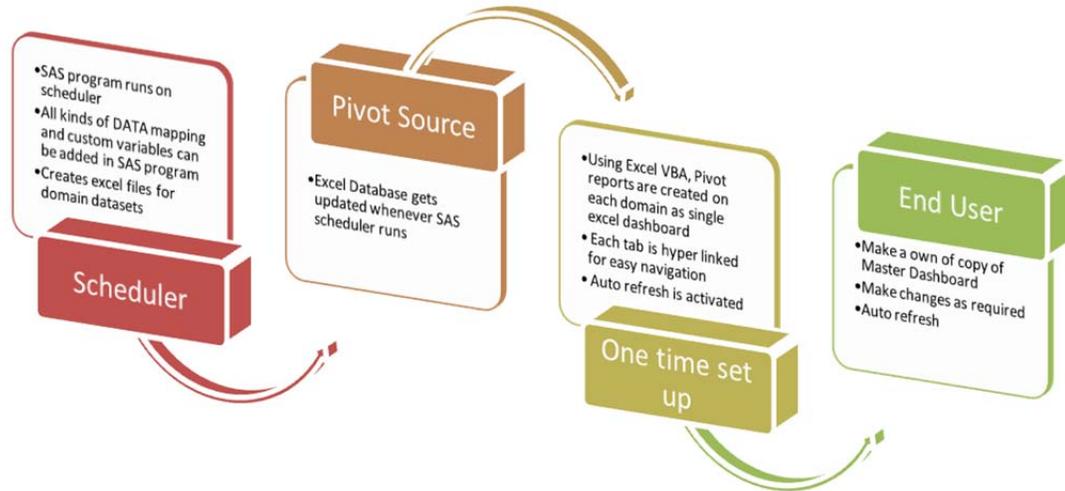


Figure 2. Process Flow

DASHBOARDS

Figure 3 shows our proposed dashboard's main page which resembles to a typical table of content and is easy to navigate. Each item on main dashboard provides a hyperlink to dashboard for a particular endpoint.



Figure 3. Dashboard's main page

Figure 4 shows an individual dashboard which is interactive and easy to customize using various filters provided on the right. A user can either refer to one of the several dashboard templates provided in excel as a starting point or build a dashboard from scratch to meet the reporting needs. In figure 4 we have shown a dashboard with ability to drill down to a subject level.

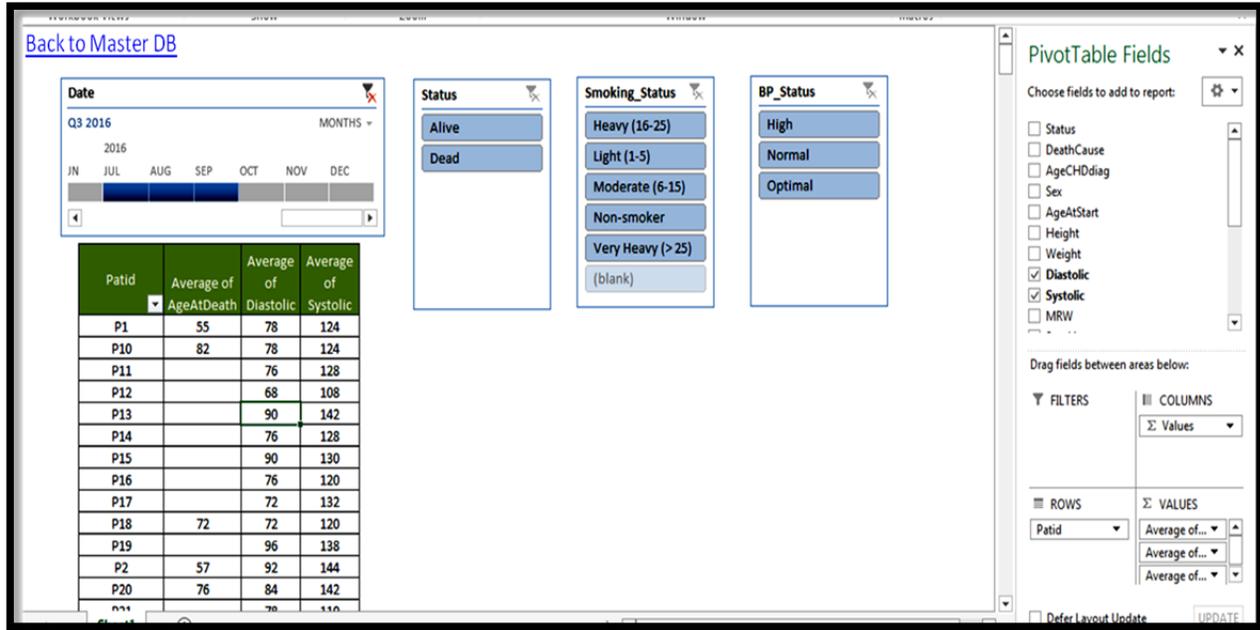


Figure 4. Sample report

CONCLUSION

The proposed dashboard is useful and helps the team to review the latest data instantaneously. Depending on the study requirements, any number of reports can be added using excel VBA. The main advantage of the dashboard is that it allows the users to maintain their own version without impacting the data source.

CONTACT INFORMATION

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