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Migrating Dashboards from SAS® BI Dashboard to SAS® Visual Analytics

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ABSTRACT

SAS® BI Dashboard is an important business intelligence and data visualization product used by many customers worldwide. They still rely on SAS BI Dashboard for performance monitoring and decision support. SAS® Visual Analytics is a new-generation product, which empowers customers to explore huge volumes of data very quickly and view visualized results with web browsers and mobile devices. Since SAS Visual Analytics is used by more and more regular customers, some SAS BI Dashboard customers might want to migrate existing dashboards to SAS Visual Analytics to take advantage of new technologies. In addition, some customers might hope to deploy the two products in parallel and keep everyone on the same page. Because the two products use different data models and formats, a special conversion tool is developed to convert SAS BI Dashboard dashboards into SAS Visual Analytics dashboards and reports. This paper comprehensively describes the guidelines, methods, and detailed steps to migrate dashboards from SAS BI Dashboard to SAS Visual Analytics. Then the converted dashboards can be shown in supported viewers of SAS Visual Analytics including mobile devices and modern browsers.

INTRODUCTION

As a mature and reliable product, SAS BI Dashboard is widely used by lots of customers in various areas. After using the product for many years, you might have accumulated plenty of digital assets, including data, dashboards, indicators, contents, designs, alerts, and so on. You might still depend on them to do daily work. It was costly to create them and would be even more costly to re-create them manually in the future.

With the rapid development of technologies, SAS introduced a new generation of business intelligence product - SAS Visual Analytics based on SAS® Viya™. It adopts a new data model, which is different from the one in SAS BI Dashboard. When you upgrade to SAS Visual Analytics and want to continue to use the dashboards from SAS BI Dashboard, data interoperability between them will be the most important issue. It could be really challenging, time-consuming, and error-prone to manually migrate dashboards from SAS BI Dashboard to SAS Visual Analytics. In order to facilitate and automate the migrating process as much as possible, we designed and developed a special conversion tool after investigating the complex and massive dashboard and report objects in both products. Our goal is to provide a complete and convenient solution so that you can do the migration relatively easily.

THE DIFFERENCE IN OBJECTS BETWEEN SAS BI DASHBOARD AND SAS VISUAL ANALYTICS

OBJECTS IN SAS BI DASHBOARD

SAS BI Dashboard objects include:

- dashboard (.dcx)
- indicator (.idx)
- indicator data (.imx)
- range (.rdx)

In addition, SAS BI Dashboard dependent objects include tables, cubes, information maps, stored processes, and reports, which are mostly data sources. Beginning with Version 4.31, dependent objects are included in the same package as SAS BI Dashboard objects.

OBJECTS IN SAS VISUAL ANALYTICS

The SAS Report Object Model is a specification that defines a standard format and semantics for reports in SAS products. Many SAS products generate reports. Reports consist of data represented as tables, graphs, images, text, and other visual indicators. The Report Object Model defines the structure of a SAS report. It is commonly represented as XML and persists in the SAS Report Repository as an XML file with an .srx extension.

The SAS BI Report Definition is a document model that is a successor to and partly based on the aforementioned Report Object Model. Similar to its predecessor, the newer SAS BI Report Definition is also an XML-based composite document standard for packaging SAS BI reports and dashboards. The SAS Visual Analytics suite of products (including SAS® Mobile BI) uses the SAS BI Report Definition as the basis for persistence, transmission, viewing, and editing of all SAS Visual Analytics reports.

DATA CONVERSION AND THE SPECIAL TOOL

The migration from SAS BI Dashboard to SAS Visual Analytics is very complex. One of the most complicated aspects is data conversion. The data must be extracted from SAS BI Dashboard and converted into a format that SAS Visual Analytics can recognize. We use the SAS Package as the transport file between the two products.

SAS PACKAGE

The SAS Package is a transport file format used by SAS applications for promotion. It is basically a ZIP file with an .spk extension that can contain the following:

- SAS file
    - SAS catalog
    - SAS data set
    - SAS database (such as DMDB, FDB, and MDDB)
    - SAS SQL view
- Binary file (such as Excel, GIF, JPG, PDF, PowerPoint, and Word)
- HTML file (including ODS output)
- Reference string (such as a URL)
- Text file (such as a SAS program)
- Viewer file (an HTML template that formats SAS file items for viewing in email)

MAIN WORK FLOW OF THE CONVERSION TOOL

As shown in Figure 1, the main sequence of conversion is as follows:

1. The Data Input module reads an .spk file, which is exported from the SAS BI Dashboard server with SAS Management Console, and parses it into the SAS BI Dashboard model.
2. The Conversion Engine module is the core program that maps the data model from one format to another and generates a new data file. It has two key functions: data mapping and code generation.

3. The Data Output module writes a new data model in an XML file as a SAS report file, which can be imported into the SAS Visual Analytics server later.

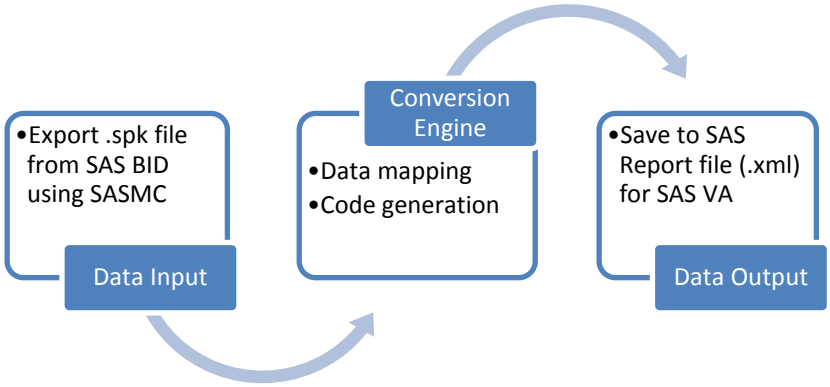


Figure 1. Main Work Flow of the Conversion Tool

MAPPING FLOW OF THE DATA MODEL

Figure 2 focuses on the mapping flow:

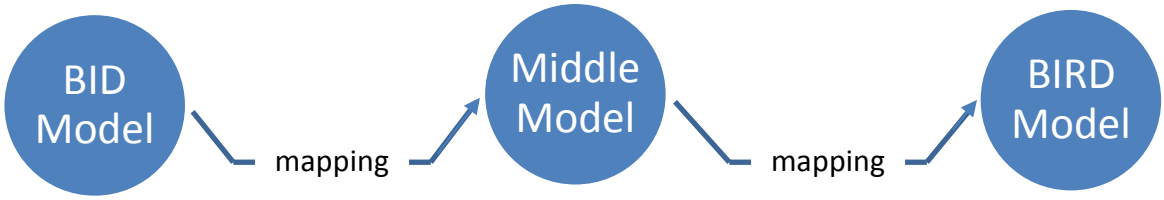


Figure 2. Mapping Flow of the Data Model

1. The SAS BI Dashboard model is parsed from an .spk file, which includes a dashboard, indicator, indicator data, range, and interaction objects.
2. The Middle model is defined and used by the Conversion Engine only. It allows a more object-oriented, elegant design and implementation from a programmer's perspective. It's also beneficial to the future extension and maintenance of this tool.
3. The SAS BI Report Definition model is mapped from the Middle model and used by SAS Visual Analytics.

CODE ARCHITECTURE OF THE TOOL

- The SPK package is sent to the SAS BI Dashboard Model Factory and adapted to the Object Model tree, which is used as the Middle model.
- The Middle model (Object model) is passed to the SAS BI Report Definition Transform functions, where it is parsed into the SAS BI Report Definition model. Then a corresponding SAS BI Report Definition model XML file is generated.
- Each object has an independent adaptor class or transformation class. All SAS BI Dashboard adaptors and all SAS BI Report Definition transforms are only dependent on the Middle model (Object model), instead of specific SAS BI Dashboard or SAS BI Report Definition models.

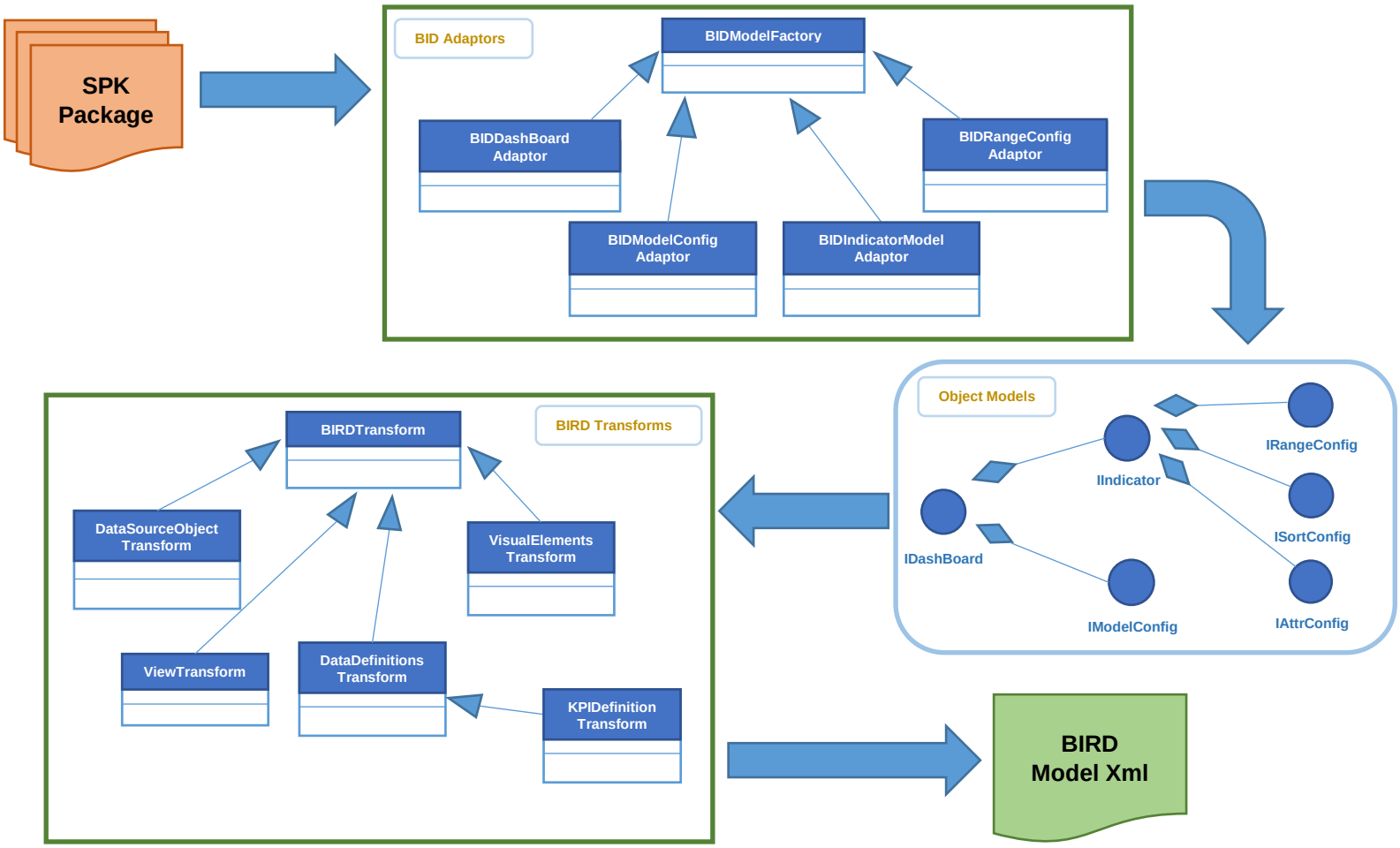


Figure 3. Code Architecture of the Tool

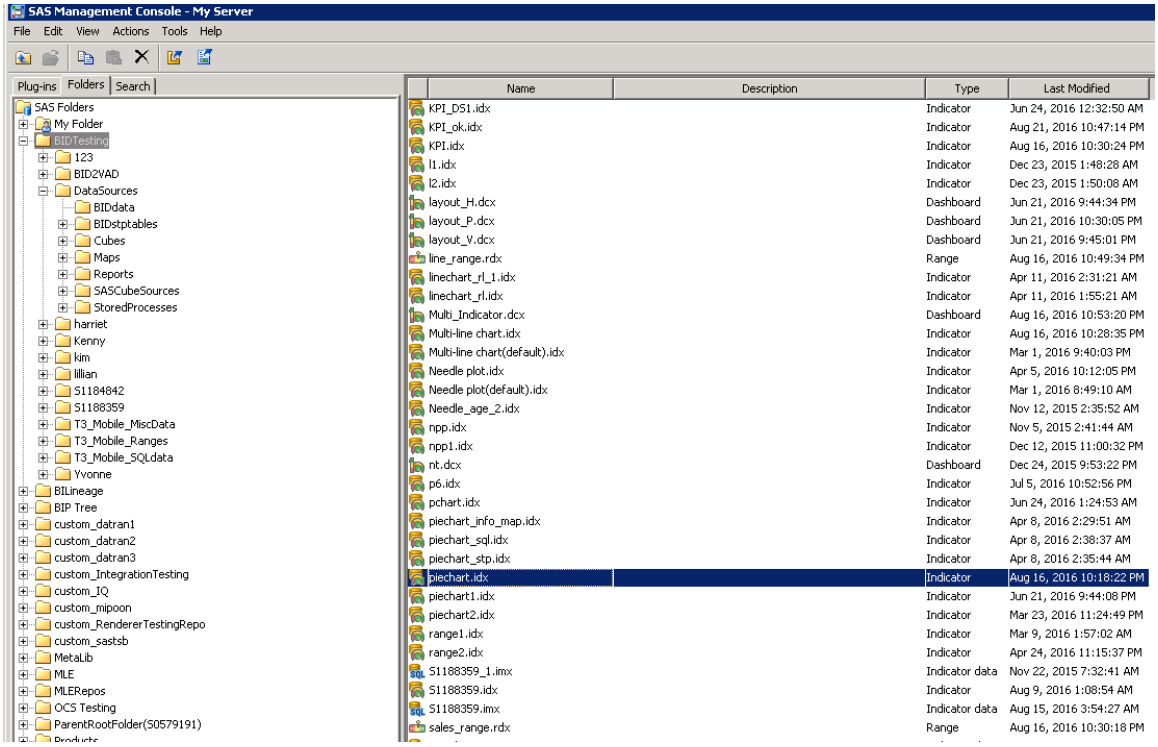
BEST PRACTICES OF CONVERSION

There are two major stages of the conversion. The first exports the SAS BI Dashboard SPK package and transforms it into a SA BI Report Definition XML file using the tool. The second loads the SAS BI Report Definition XML file and shows indicators in SAS Visual Analytics Designer. In this section, you will see all the detailed steps. Before the conversion, a relevant data source must be duplicated from SAS BI Dashboard to SAS Visual Analytics. This data source preparation step is beyond the scope of this paper. If necessary, please read appendix - Importing SAS data sets from SAS BI Dashboard to SAS Visual Analytics.

EXPORT AND TRANSFORM THE SAS BI DASHBOARD SPK PACKAGE INTO THE SAS BI REPORT DEFINITION XML

1. Prepare the SPK package

- Open SAS Management Console (Version 9.4, for example), connect to the SAS BI Dashboard server, and select the indicator (**PieChart.idx**, for example) you want to show in SAS Visual Analytics.

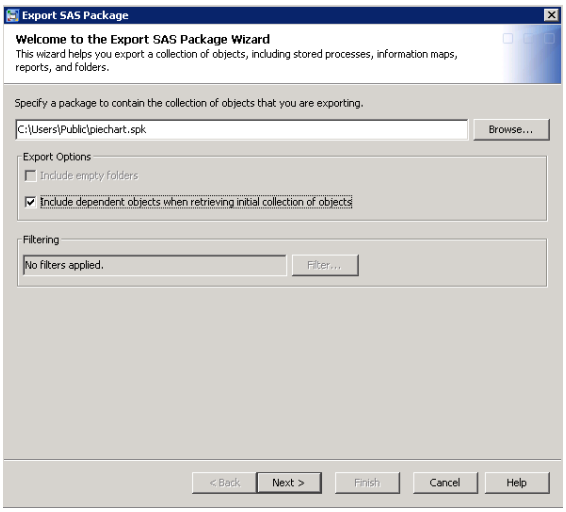


Display 1. Prepare SPK Package

- Right-click on the file, and choose **Export SAS Package…**.

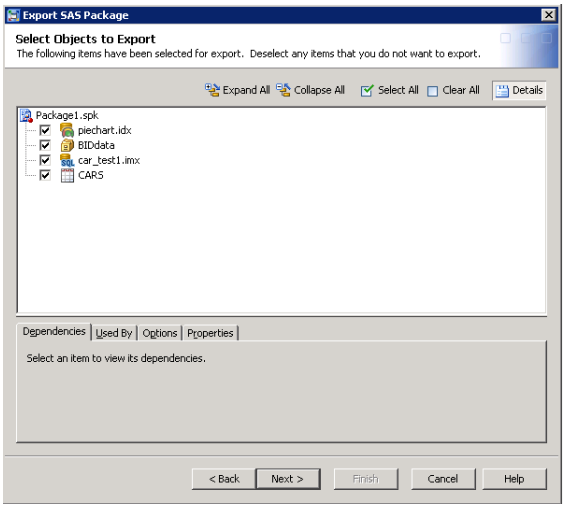
Display 2. Export SPK Package

- Enter a filename, select **Include dependent objects when retrieving initial collection of objects**, and then click **Next**.



Display 3. Export SPK Package (Step 1)

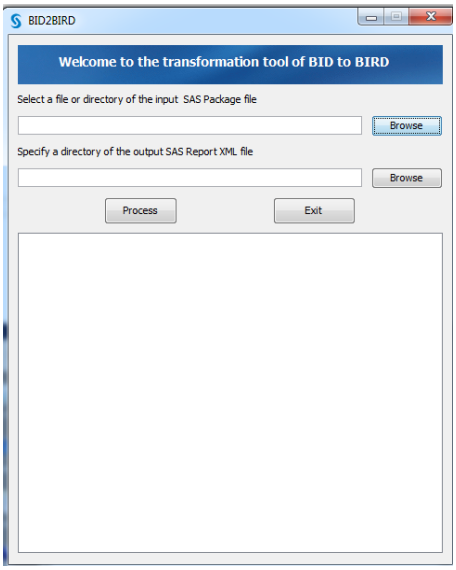
- Then click **Next** until the export process completes without error.



Display 4. Export SPK Package (Step 2)

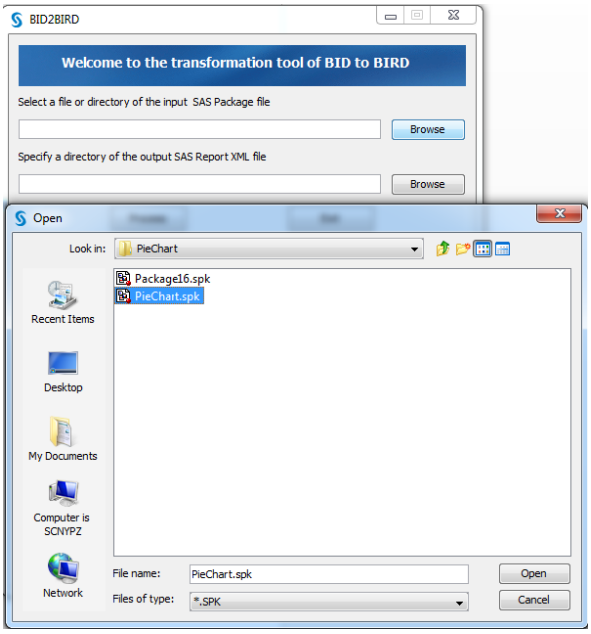
2. Transform the SPK package into SAS BI Report Definition XML:

- Launch the BID2BIRD conversion tool.



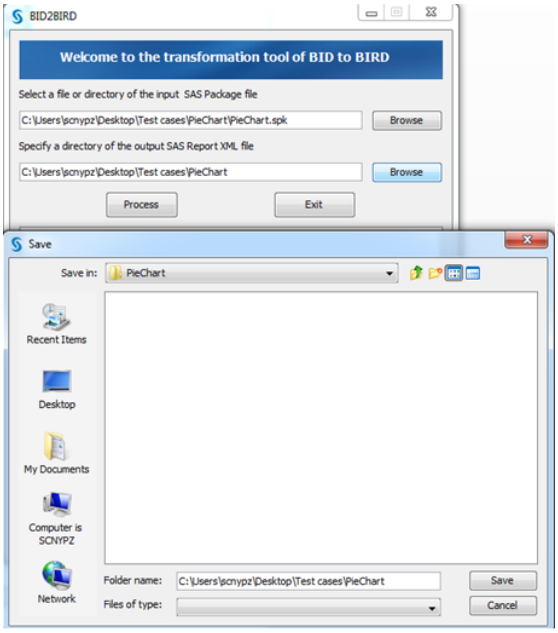
Display 5. Main User Interface of the BID2BIRD Tool

- Click the upper **Browse** button, navigate to the specified location, select the exported .spk file (**PieChart.spk**, for example), and click **Open**.



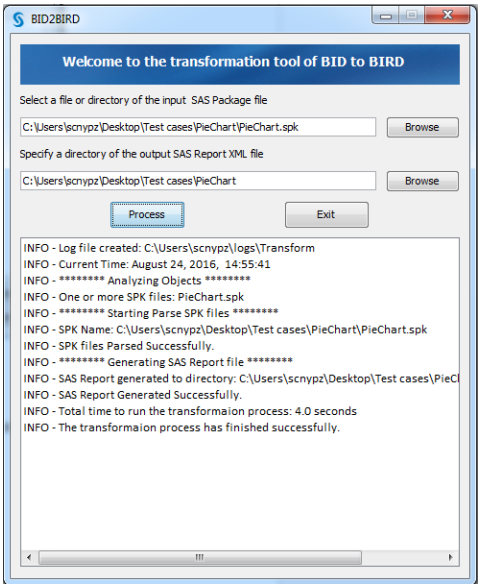
Display 6. Select .spk File

- Click the lower **Browse** button, navigate to the specified location, and save the resulting SAS BI Report Definition XML file (**PieChart.xml**, for example).



Display 7. Save as XML File

- Click **Process** to perform the actual transformation. A log will be displayed in the main console window. It shows specific information about the progress and errors during transformation.

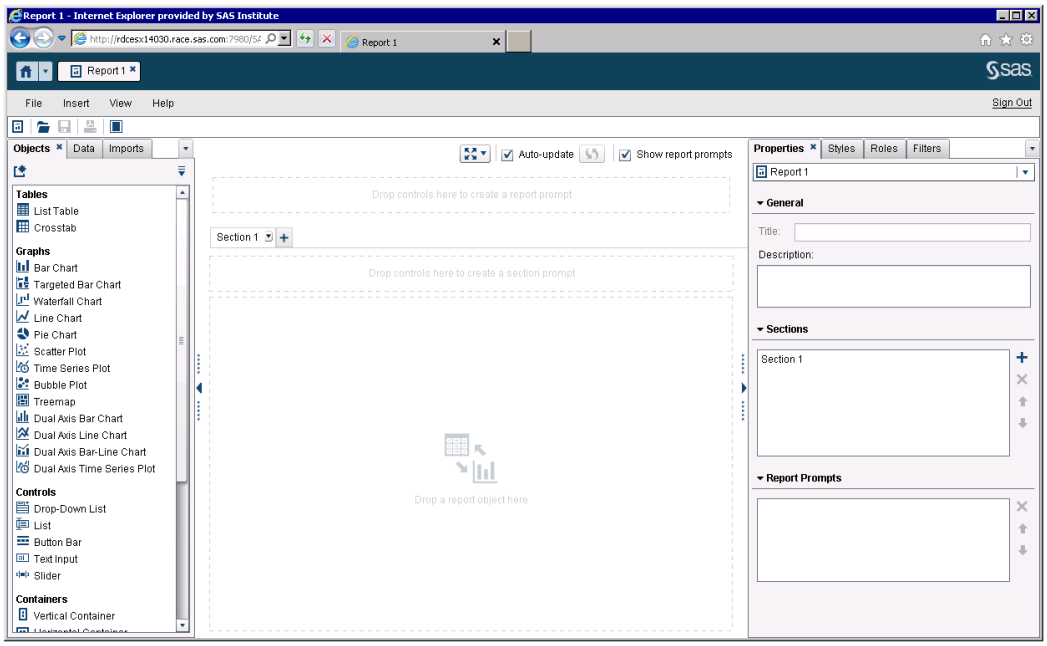


Display 8. Transformation Log

LOAD SAS BI REPORT DEFINITION XML FILE IN SAS VISUAL ANALYTICS DESIGNER TO SHOW INDICATORS

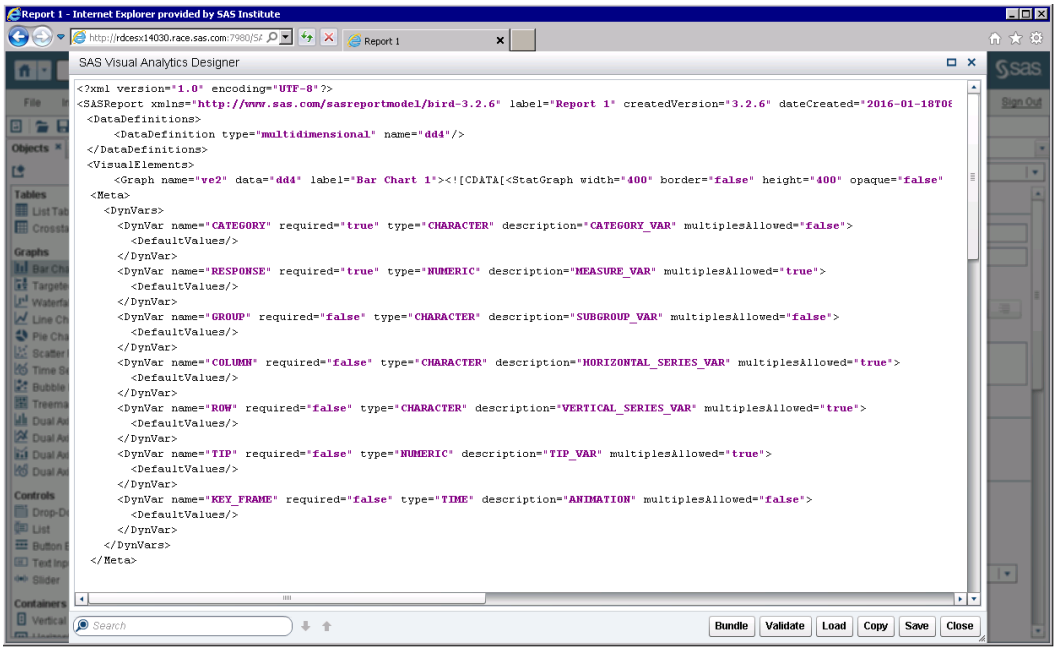
1. Show the indicators in a modern browser:

- Open **SAS Visual Analytics Designer** in a web browser.



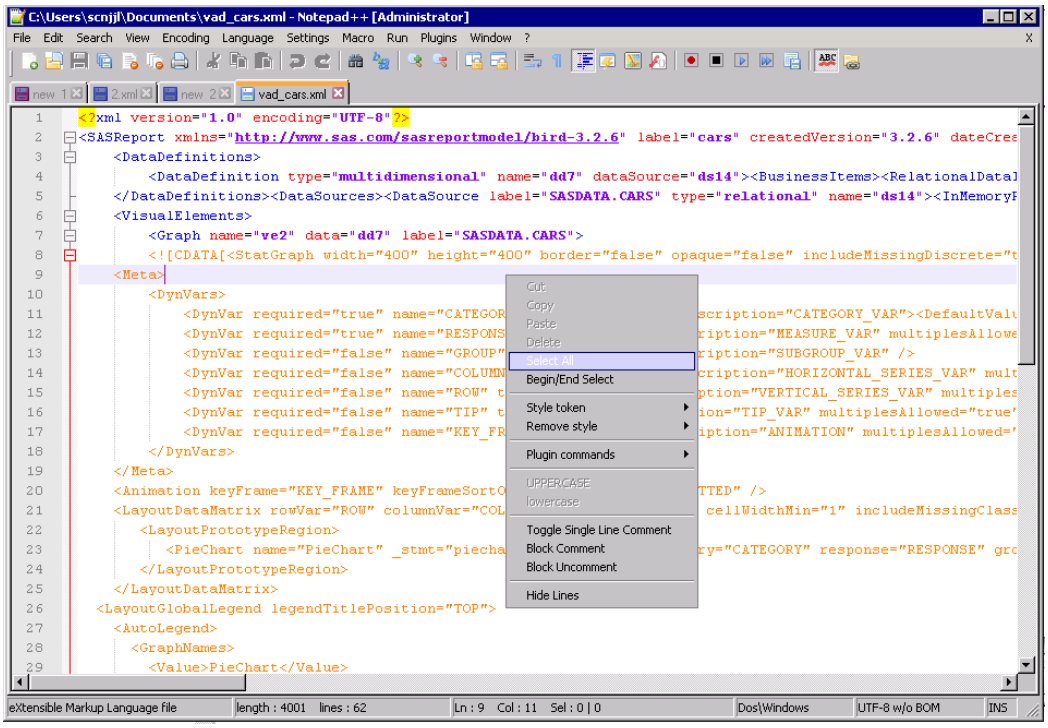
Display 9. Main User Interface of SAS Visual Analytics Designer

- Press Ctrl+Alt+B to open the SAS Visual Analytics Designer Report Editor window. (If there is no response, open the Objects window on the left of the form to gain focus.) In this window, the user can edit a SAS report file at will and also verify whether the file can be loaded correctly.



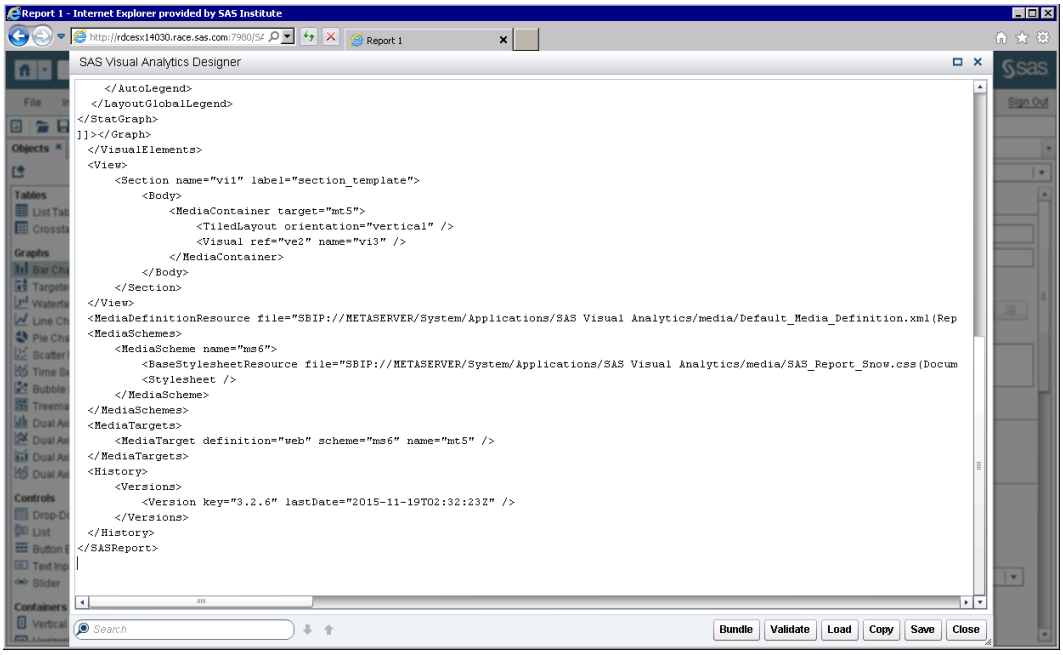
Display 10. Open SAS Report Editor Window

- Open the SAS BI Report Definition XML file that was exported previously (**PieChart.xml**, for example) with a text editor. Then choose **Select All** and copy the contents.



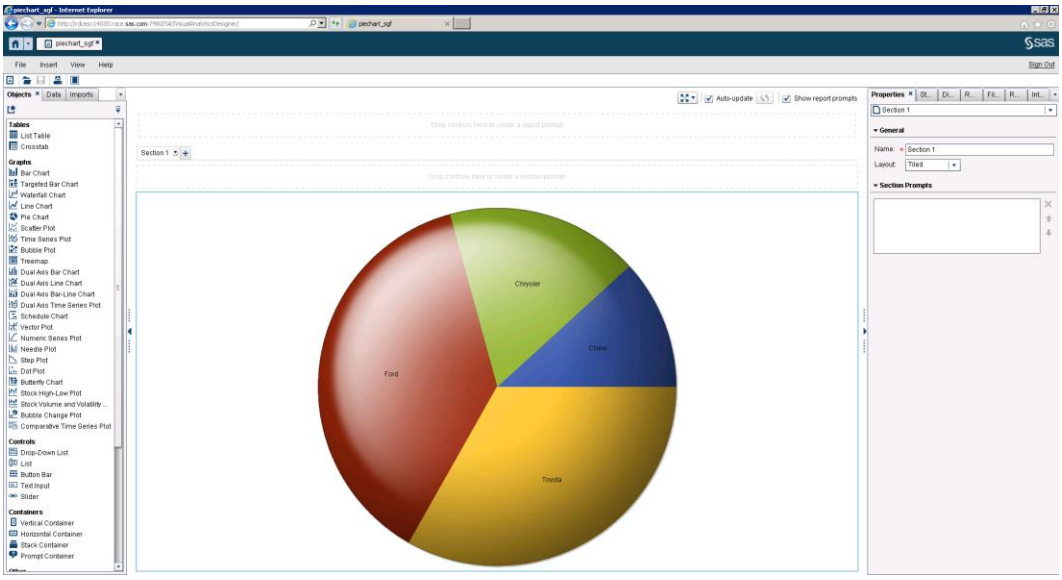
Display 11. Copy SAS BI Report Definition XML File Content

- Paste the copied contents into the SAS Visual Analytics Designer Report Editor window. Then click **Validate** to verify that this report file is ok. If there is no problem, a No validation issues dialog box will appear.



Display 12. Paste SAS BI Report Definition XML Content to SAS Report Editor

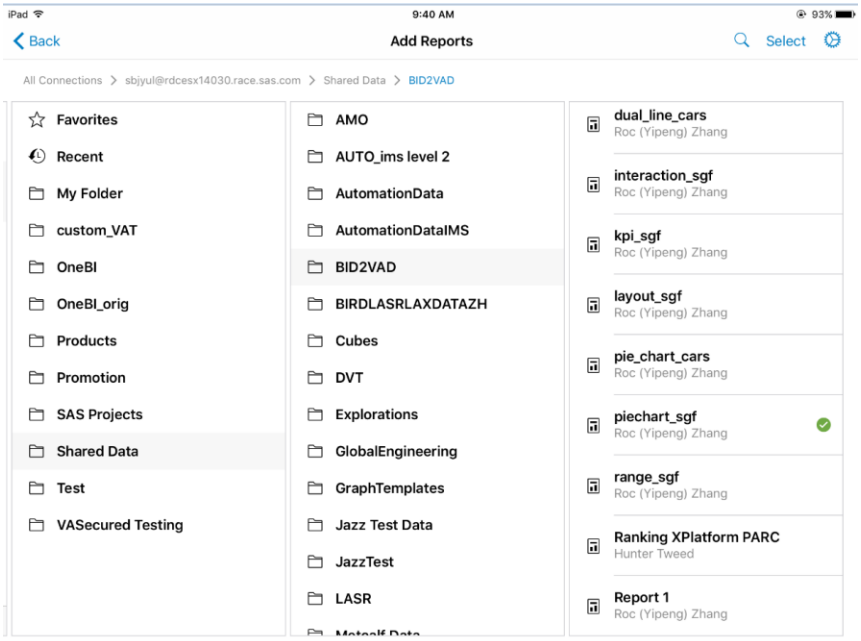
- Click **Load** to load this SAS report file. It will show the converted result in the web browser. Then you can save this file as a new SAS BI Report Definition report.



Display 13. Load the Converted Report

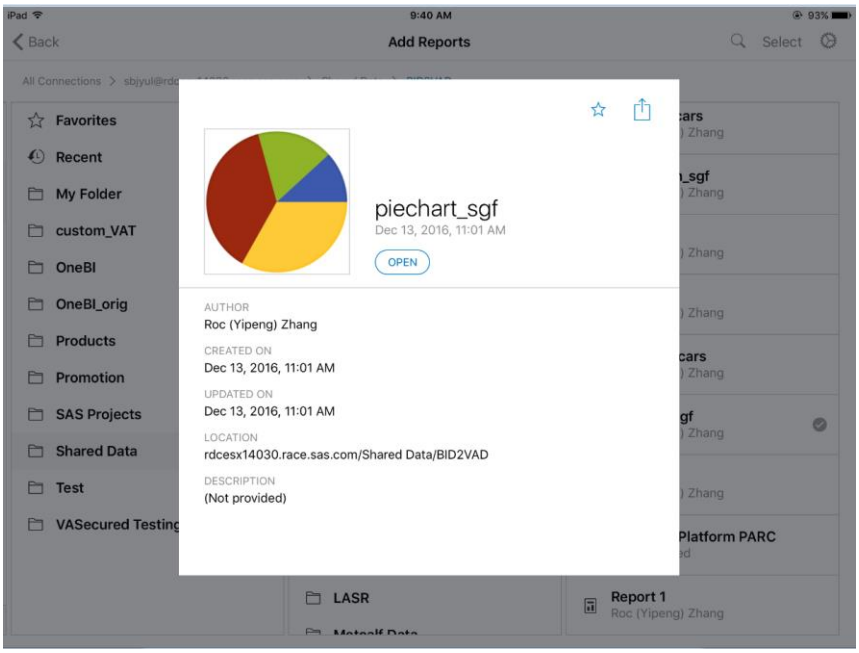
2. Show the indicator in SAS Mobile BI

- You can continue to open this converted SAS report file in SAS Mobile BI on iPad and Android devices. After connecting to the SAS Visual Analytics server from mobile clients, you can find the file (PieChart_SGF) that was just saved in the previous step.



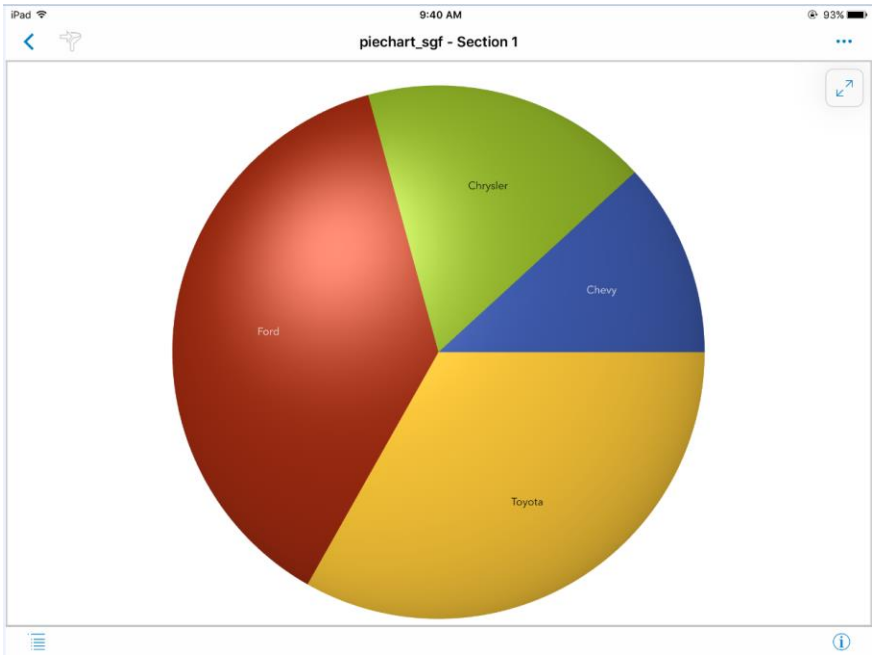
Display 14. Open the Converted Report in SAS Mobile BI

- Select this SAS report file to show its summary information.



Display 15. SAS Report File Summary Information

- Click **OPEN**. You will see the same result in SAS Mobile BI.



Display 16. Load the SAS Report File in SAS Mobile BI (iPad)

RESULT COMPARISON

SAS BI Dashboard supports many types of objects, including indicator (BarChart, BubblePlot, DualLineIndicator, NeedlePlot, ScatterPlot, and so on), Key Performance Indicator (KPI), interaction, range, dashboard, style, and layout among others. Our special tool can seamlessly convert most of them. In Table 1, you can see the comparison of some converted results.

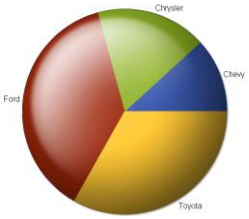
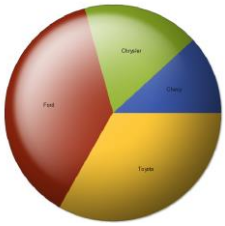
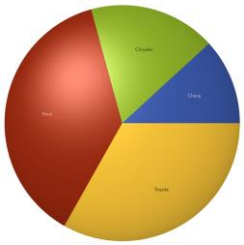
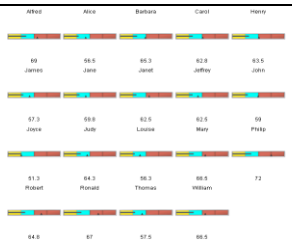
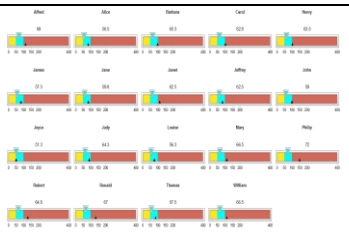
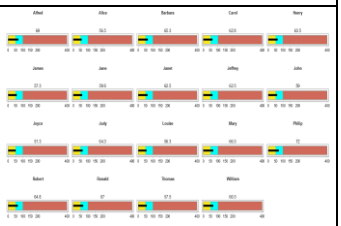
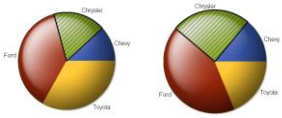
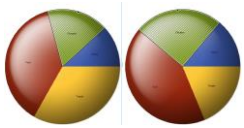
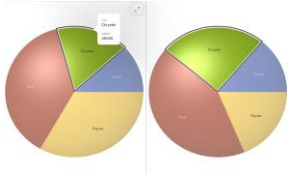
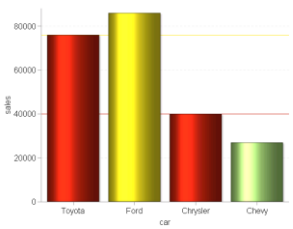
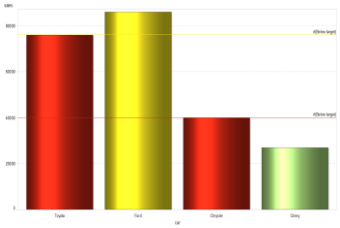
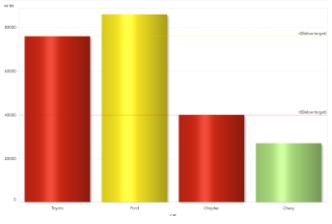
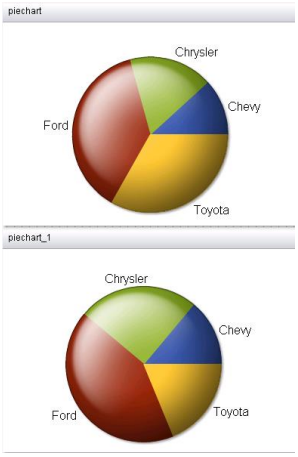
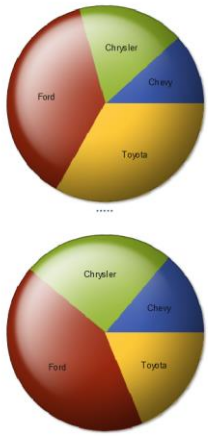
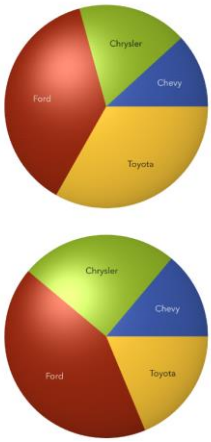
	SAS BI Dashboard (original)	SAS Visual Analytics (browser)	SAS Mobile BI (iPad)
PieChart			
KPI			
Interaction			
Range			
Layout			

Table 1. Result Comparison

KNOWN LIMITATIONS AND FUTURE PLANS

So far, there are still some issues in the conversion:

- SAS BI Dashboard supports complex data sources other than Table, such as Information Map, Stored Process, and SQL Query. But SAS Visual Analytics adopted a different data engine. Thus,

we are unable to support Information Map, Stored Process, or SQL Query data sources directly at this moment.

- A few indicators in SAS BI Dashboard support special properties like label, tick scaling, hide axis ticks, and so on. But SAS Visual Analytics does not support these special properties currently.
- SAS BI Dashboard supports about 28 KPIs. But SAS Visual Analytics does not support all of them. So we had to cast them to the five KPIs that are already supported in SAS Visual Analytics. For example, we casted Simple Tachometer in SAS BI Dashboard to Dial Gauges in SAS Visual Analytics.
- This conversion tool was tested in the SAS Visual Analytics 7.3 environment. It has not been tested in SAS Visual Analytics 8.1, which has not been released yet. Additional work might be needed to support upcoming SAS Visual Analytics releases.

We understand some limitations are significant to users. They are complicated, however, and we will try to address them in the future. Meanwhile, it is probable that you can find some workarounds, especially for data source limitations.

The authors are continuing to develop the conversion tool to cover more types of objects and improve the user experience:

- We are investigating how to integrate the tool into SAS Management Console or SAS Visual Analytics or both. The planned integration will result in a more efficient and smoother conversion. After the integration, users will not have to press Ctrl+Alt+B and manually paste the XML file. Our final goal is to allow users to import .spk files directly into SAS Visual Analytics.
- At present, a small number of SAS BI Dashboard indicators (like Bar Chart with Bullet, Scatter Histogram, and Spark Table) do not have direct corresponding types in SAS Visual Analytics. We are creating corresponding templates using SAS® Visual Analytics Custom Graph Builder. We are hopeful that almost all types of objects can be converted in the future.
- SAS BI Dashboard supports the Indicator Alert (sending email). Currently, it has not been converted to SAS Visual Analytics. We plan to implement it in the future.

CONCLUSION

SAS is working hard to help customers adopt new technologies and platforms as well as to protect your investments in SAS® 9. Easy and reliable migration is one of the key success factors to both you and SAS. With this in mind, we developed this useful tool to convert dashboard objects from classic SAS BI Dashboard to modern SAS Visual Analytics.

In this paper, we introduced the difference in dashboard objects in both products. Then we briefly described how we implemented the conversion tool and how it works. Based on this conversion tool, we detailed our best practices to migrate dashboards from SAS BI Dashboard to SAS Visual Analytics. Finally, we analyzed the converted results using a graph comparison between SAS BI Dashboard and SAS Visual Analytics (browser and mobile). Dashboard object conversion from SAS BI Dashboard to SAS Visual Analytics is very complicated. With our conversion tool and the best practices described in this paper, you are well equipped to start a smooth and efficient migration from SAS BI Dashboard to SAS Visual Analytics.

When this paper was written, the tool was still in beta mode and the migrating process still had some issues. We continue to develop the tool and optimize the process to improve the user experience.

ACKNOWLEDGMENTS

Sincere thanks are given to Himesh Patel for proposing the idea, providing continuing support during research and development, and reviewing this paper.

RECOMMENDED READING

- *SAS® BI Dashboard 4.4: User's Guide, Second Edition*
- *SAS® Visual Analytics 7.3: User's Guide*
- *SAS® 9.4 Intelligence Platform: System Administration Guide, Fourth Edition*

CONTACT INFORMATION

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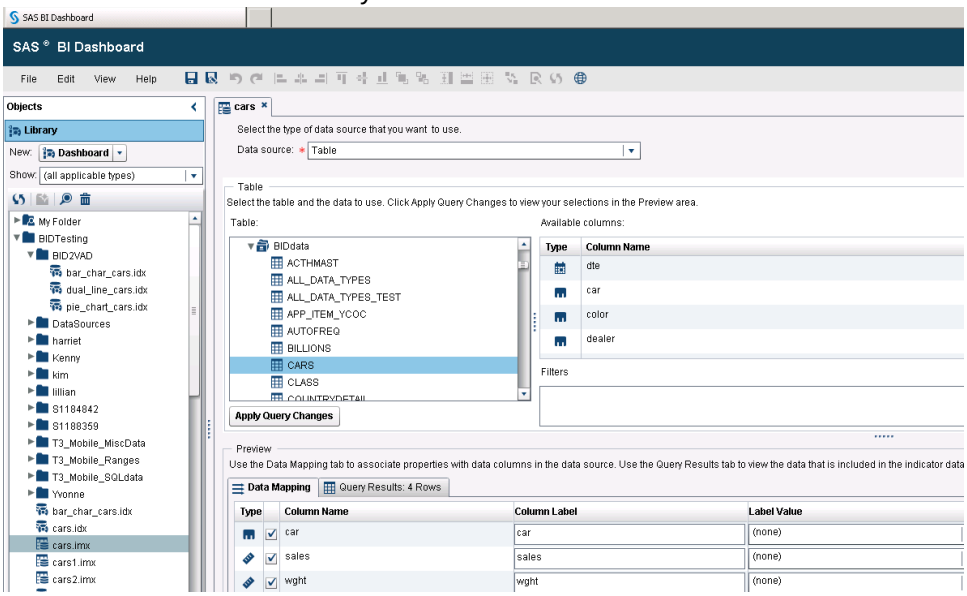
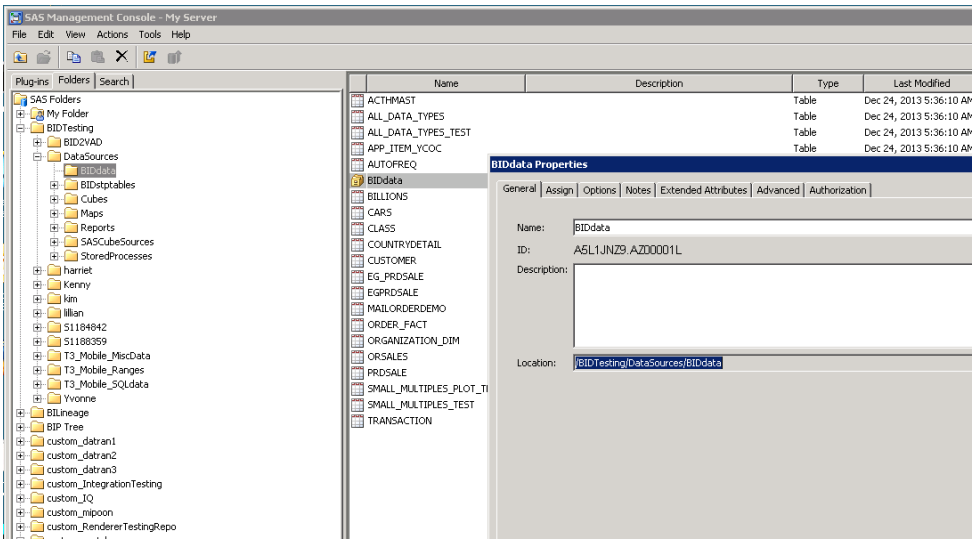
APPENDIX - IMPORTING SAS DATA SETS FROM SAS BI DASHBOARD TO SAS VISUAL ANALYTICS

1. In SAS BI Dashboard, find the data library that registers the table of the SAS BI Dashboard object. Log on to SAS BI Dashboard, and create new Indicator Data such as **cars.imx**. Select the **CARS** table in the BIDdata library. Then click **Save**.



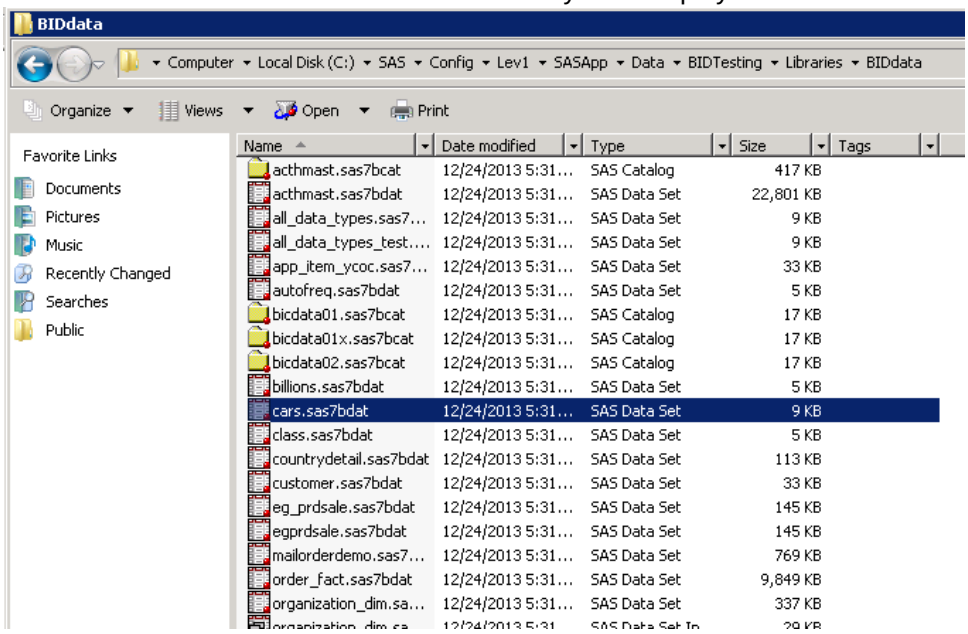
Display 1. Save the Indicate Data File

2. In SAS Management Console, find the library path. Open SAS Management Console and connect to the SAS BI Dashboard server. Find the BIDdata library and open the properties dialog box. Then you can record its location. In this example, it is **`/BIDTesting/DataSources/BIDdata`**.



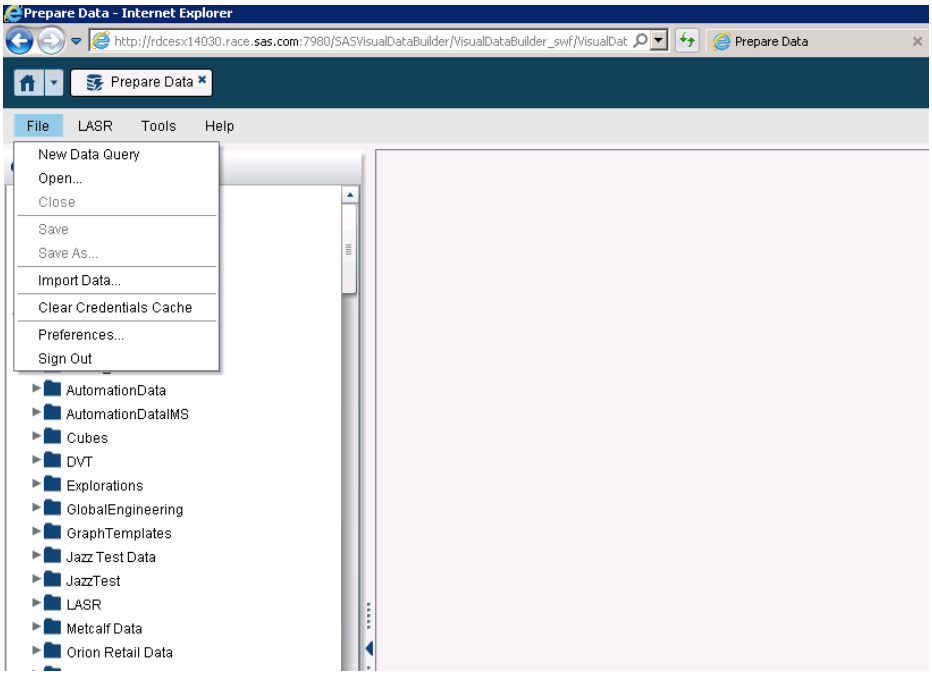
Display 2. Find the Library Path

3. Log on to the SAS BI Dashboard server to copy the data set file into the operating system. Find the data set file (**cars.sas7bdat**) from the path (in this example, it is **`C:\SAS\Config\Lev1\SASApp\Data\BIDTesting\Libraries\BIDdata`**). Copy the data set file to the server on which SAS Visual Analytics is deployed.



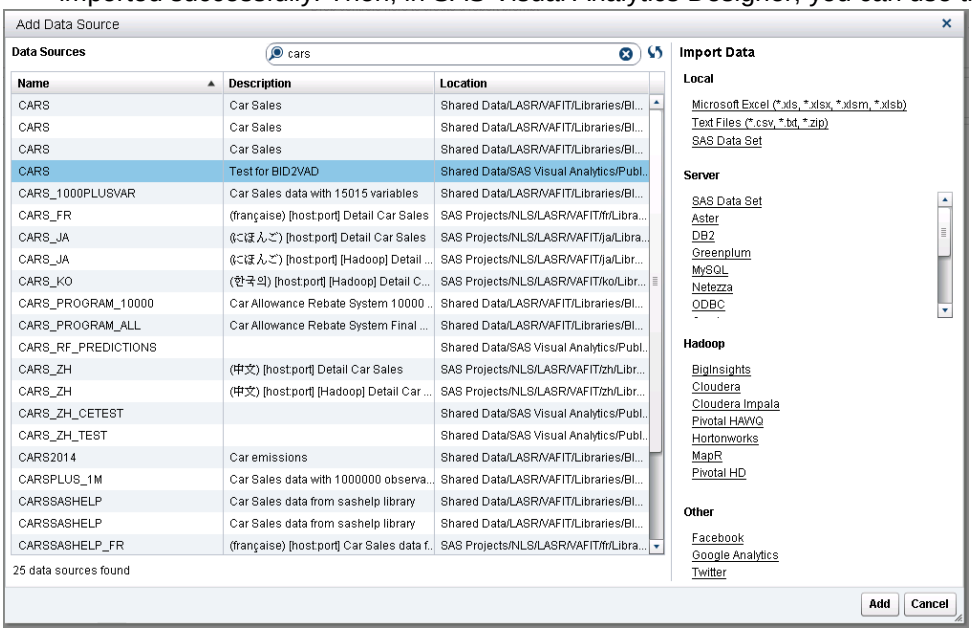
Display 3. Copy the Data Set File

4. Log on to SAS Visual Analytics Designer. Select **File menu** and then **Import Data…**.



Display 4. Log on to SAS Visual Analytics Designer

5. Click **SAS Data Set** and select the **cars.sas7bdat** file to import it. Make sure that the file was imported successfully. Then, in SAS Visual Analytics Designer, you can use the data set.



Display 5. Note that the File was Imported Successfully