

Ebony and Ivory: SAS® Enterprise BI Software and SAS® Visual Analytics Living in Perfect Harmony

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ABSTRACT

“Ebony and Ivory” was a number one song by Paul McCartney and Stevie Wonder about making music together, proper integration, unity, and harmony on a deeper level. With SAS® Visual Analytics, current SAS® Enterprise BI software customers can rest assured that their years of existing work and content can coexist until they can fully transition over to SAS Visual Analytics. This presentation covers 10 inter-operability integration points between SAS Enterprise BI software and SAS Visual Analytics.

INTRODUCTION

Just as there is a purpose to the unity behind “Ebony and Ivory”, there is a purpose behind integrating SAS Enterprise BI software and SAS Visual Analytics. The song “Ebony and Ivory” promotes the idea that underneath appearances, people are the same. Likewise, beneath SAS software for performing data reporting and visualization, the SAS metadata is the same. This unity starts with a shared SAS® Metadata Repository that facilitates true single sign-on (SSO) and integration among the following SAS technology components:

- SAS® Management Console
- SAS Visual Analytics linking to SAS Enterprise BI software content
- SAS Visual Analytics searching SAS Enterprise BI software and/or its own metadata simultaneously
- SAS® Visual Data Builder processing SAS® Information Maps and passing the data to SAS® Visual Analytics Explorer
- SAS® Visual Analytics Designer and SAS® Visual Analytics Viewer linking to SAS Enterprise BI software content
- SAS® Enterprise Guide integrating with SAS Visual Analytics, similar to how it integrated with SAS Enterprise BI software
- SAS® Add-In for Microsoft Office integrating with SAS Visual Analytics, similar to how it integrated with SAS Enterprise BI software
- SAS® Mobile BI application integrating with SAS Visual Analytics or SAS® Web Report Studio at the same time
- SAS® Theme Designer for Flex customizing elements of SAS Visual Analytics or SAS Enterprise BI software at the same time
- SAS® Environment Manager

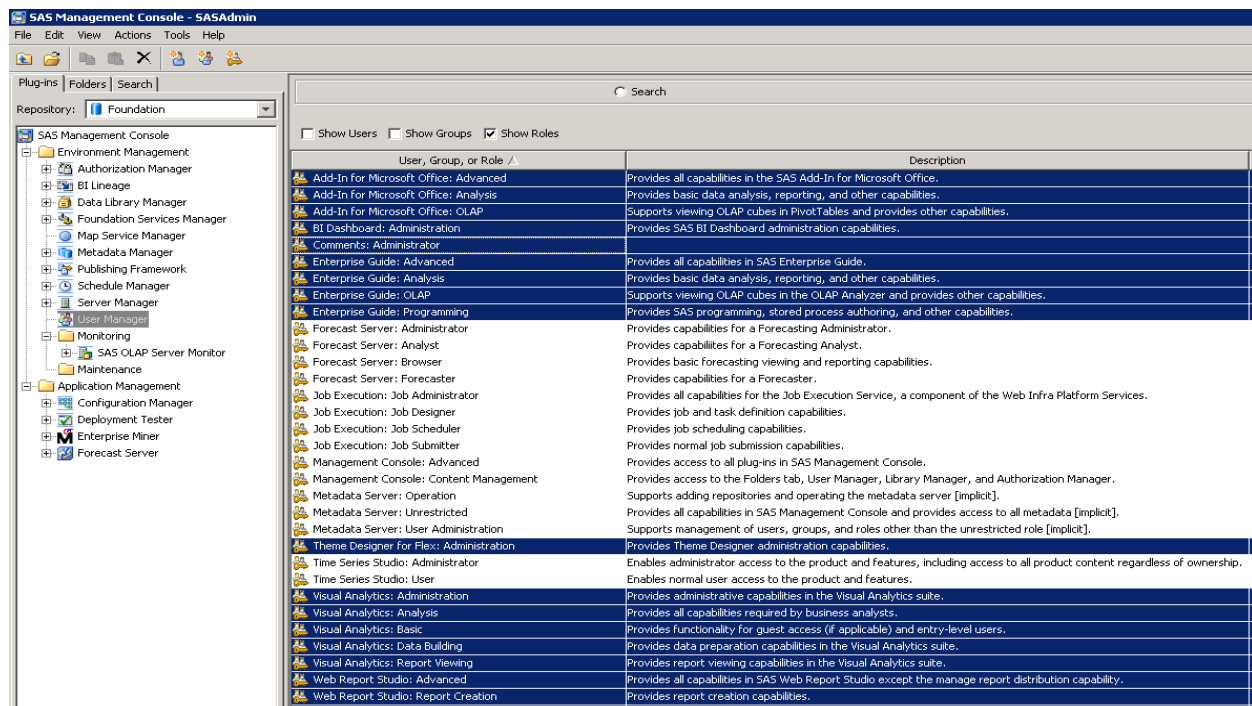
SAS MANAGEMENT CONSOLE

The same administrator’s interface that is used to administer a SAS Enterprise BI software environment can be used to administer many elements of a SAS Visual Analytics environment as well. A user can perform tasks including:

- Administer SAS Visual Analytics explorations and reports.
- Set permissions for in-memory (also known as SAS® LASR™) tables.
- Register SAS® LASR™ Analytic Servers that will process SAS Visual Analytics explorations, reports, and data tables.

In addition, with a shared SAS Metadata Repository, this interface provides a centralized, non-duplicated configuration of overall SAS usage control, regardless of the SAS technology component being used by the end user. In the context of SAS Enterprise BI software and SAS Visual Analytics specifically, users can perform joint tasks including:

- Register libraries and tables in metadata so that *any* table can become the source of a load process.
- Define users, groups, and roles for *total* login control, and define folders for publish/subscribe purposes in a *truly collaborative* manner.
- Import and export metadata and content for *system-wide* promotion/replication or backup/restore utility.

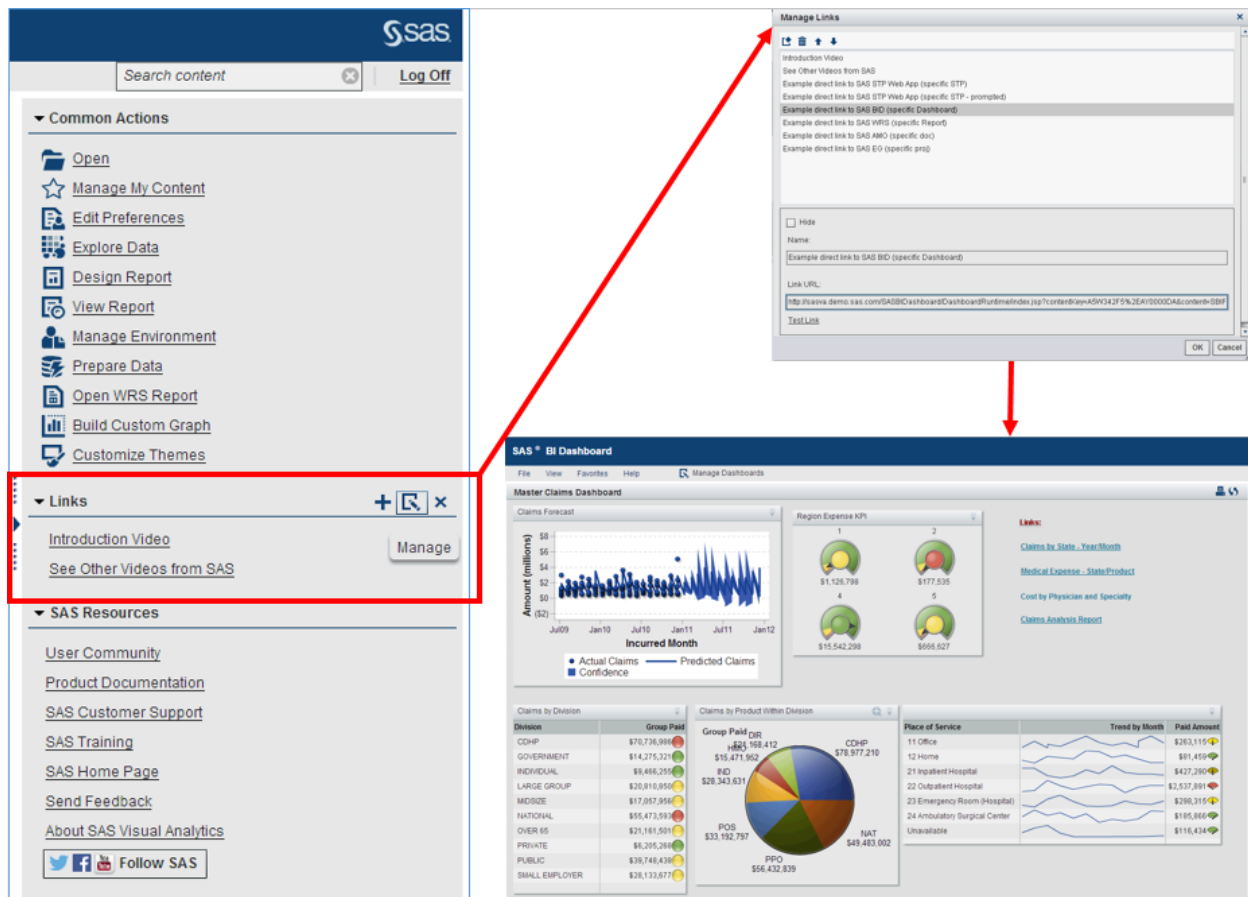


Display 1: SAS Management Console Sample Screen Depicting a Centralized SAS Enterprise BI software to SAS Visual Analytics Configuration

SAS VISUAL ANALYTICS HOME PAGE

The SAS Visual Analytics Home Page (~ HUB) is a central starting location for users of SAS Visual Analytics and enables users to search, view, bookmark, and comment on reports, subject to metadata authorization. It also enables users to launch other SAS components or components other than SAS. This launch capability uses http:// (or https://) linking, including parameter passing. In the context of SAS Enterprise BI software to SAS Visual Analytics shared metadata integration, users can link the following items:

- SAS® Web Report Studio reports.
- SAS® BI Dashboard content.
- SAS® Stored Processes (through the SAS Stored Processes web application).
- SAS® Enterprise Guide or SAS® Add-In for Microsoft Office projects (if they are stored and accessible within a SAS web server or browser context). However, parameter passing is not supported.



Display 2: SAS Visual Analytics Home Page Sample Screen Depicting Link to SAS BI Dashboard Content

SAS VISUAL ANALYTICS SEARCH CONTENT

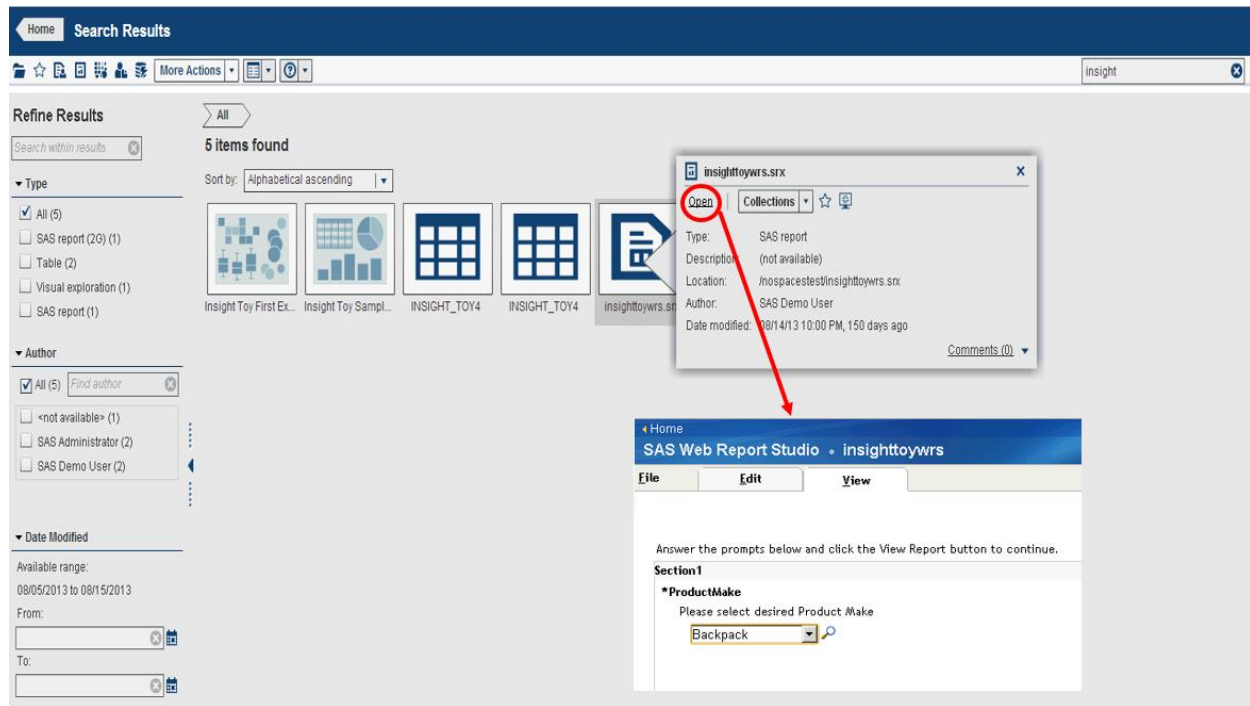
The Search facility within the SAS Visual Analytics Home Page allows for the search and retrieval of reports, explorations, tables, and queries that have been defined and authorized on the SAS® Metadata Server, and have been indexed with the SAS search index service, which by default is updated once per hour. The following fields in metadata are searched:

- Comment Title
- Comment Description
- Created Description
- Keywords
- Last Modified

In the context of SAS Enterprise BI software to SAS Visual Analytics shared metadata integration, you can search the following items:

- SAS Stored Processes, which can be launched via the SAS Visual Analytics Viewer. If the stored process contains prompts, users will be prompted to fill in the necessary values
- SAS Enterprise BI software metadata-defined tables (in which case SAS Visual Analytics Explorer or SAS Visual Analytics Reporter can be launched if the corresponding data is currently loaded into memory)
- SAS Web Report Studio reports (in which case SAS Web Report Studio can be launched to view them)

Note: When a user opens a SAS Stored Process, table, or SAS Web Report Studio report either by way of search results or navigating the SAS metadata folders and selecting, the content is also added to the SAS Visual Analytics Recently Viewed or History list. This integrates SAS Enterprise BI software with the SAS Visual Analytics Personalization capability (My Content area), which controls the availability of individualized features such as recent items, favorites, collections, alerts, and user preferences. The 'Other Content' area within SAS Visual Analytics displays lists of explorations, reports, stored processes, queries, or tables that a system administrator has added for particular users (including applicable SAS Enterprise BI software types listed). If a system administrator has not created any lists, then the 'Other Content' area will not be displayed. A user defined as an Administration role will also see a Manage link feature that enables the manage lists capability.



Display 3: SAS Visual Analytics Home Page Search That Shows How to Find and Launch a SAS Web Report Studio Report

SAS VISUAL DATA BUILDER

The SAS® Visual Data Builder enables data administrators to perform basic data preparation prior to analyzing or reporting on it, without leaving the SAS Visual Analytics interfaces. Users can create data queries to perform joins, add calculated columns, and subset or sort data. Several productivity features accelerate the creation of columns based on common aggregation functions. This data builder has import features that enable users to access data directly from the following data sources (as of SAS Visual Analytics 6.3):

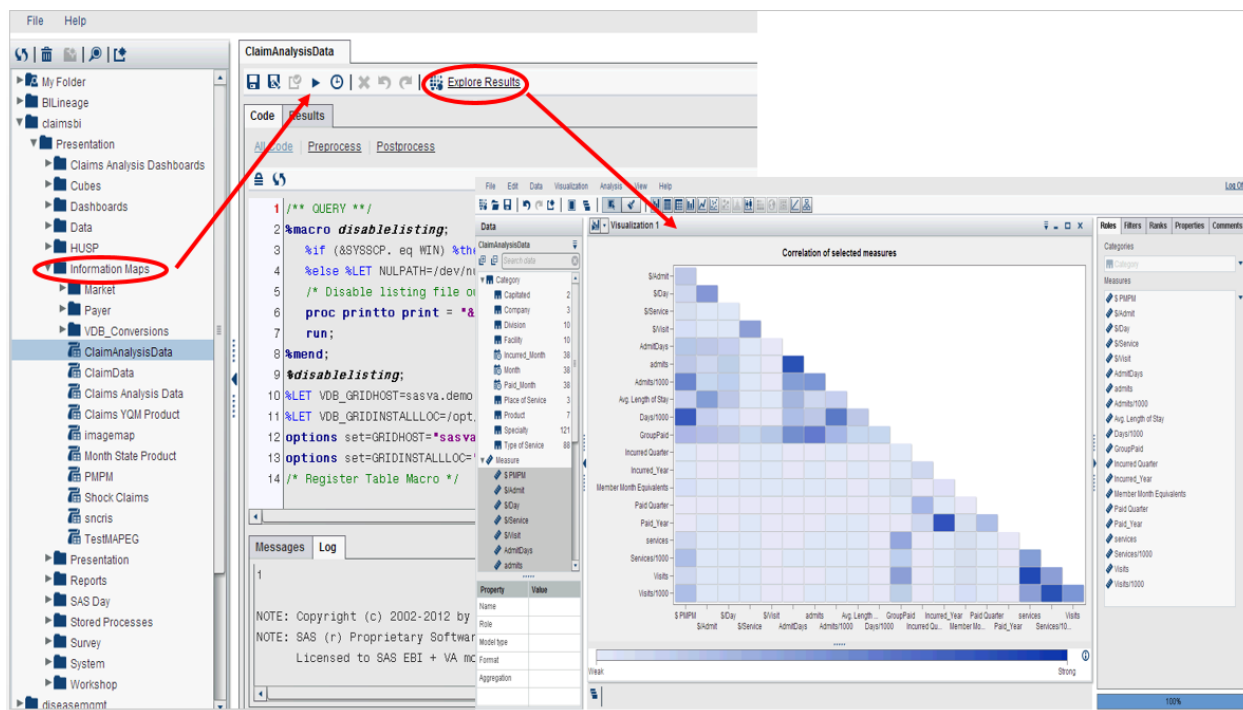
- Microsoft® Excel® spreadsheets
- delimited text files
- SAS data sets
- Oracle® database tables
- Twitter® stream
- source tables from other third-party vendor databases courtesy of the corresponding SAS/ACCESS® Interface product

With a shared SAS Metadata Repository between SAS Enterprise BI software and SAS Visual Analytics, this interface also enables you to import SAS Information Maps (created with either SAS® Information Map Studio or the

INFOMAPS procedure). SAS Visual Data Builder cannot create, edit, or save an information map. However, the data builder can import the business logic from a relational information map and represent it as a SQL equivalent query, and then automatically load it into SAS Visual Analytics Explorer for data discovery purposes.

As of SAS Visual Analytics 6.3, the data builder has the following limitations and restrictions when working with information maps:

- The data builder can use information maps that are based on relational tables. Information maps that are based on OLAP cubes cannot be used.
- The information map cannot use more than 50 physical tables. A table that is used more than once in a self-join counts as one physical table.
- The information map cannot use more than 5,000 physical columns. A column that is used in more than one data item counts as one physical column.
- Prompts are not supported. Even if a prompt has a default value, the default value is not included.
- Data items that are based on business data are not supported. For example, the equation $\text{Dataitem1} = \text{Year} + 2$ (where Year is a data item) is not included in the data query.
- Data items that are based on physical columns are not supported. For example, the equation $\text{Dataitem2} = \text{FirstName} || \text{LastName}$ (where FirstName and LastName are columns) is not included in the data query.
- The output table is automatically named with the same name as the map. The name field is limited to 32 characters.



Display 4: SAS Visual Data Builder Sample That Shows How to Import an Information Map and Send Its Corresponding Data to SAS Visual Analytics Explorer for Discovery Purposes

SAS VISUAL ANALYTICS DESIGNER AND SAS VISUAL ANALYTICS VIEWER

The SAS® Visual Analytics Designer (the designer) enables users to easily create reports or dashboards that can be saved and viewed on either a mobile device or via a web browser, preferably after a data discovery process has taken place through SAS® Visual Analytics Explorer. One of the many features of this interface is reporting linking. Report links enable single-step access to a report or web page that is related to a report currently in view. For

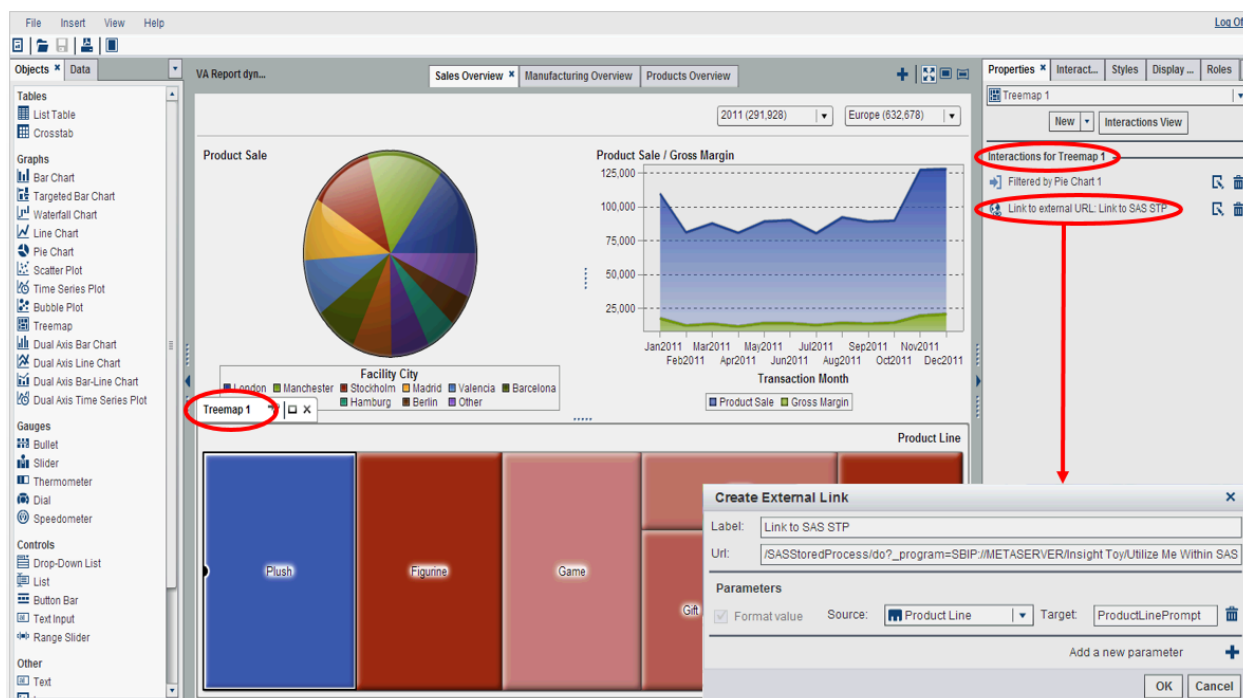
example, consider a bar chart that has sales information for each geographical region of an organization. If the Northeast region bar is clicked, then a report link associated with the graph can display a different report that provides information about employees in each region. Using the designer, you can add a link from a report object to another report, to a specific section in the current report, or to an external URL. Also, you can link to external URLs from text or image objects. The http:// part of the link is provided. The link can be relative to the current web application server to facilitate SSO. This external URL can point to SAS Visual Analytics, other SAS content, or content other than SAS.

This external URL capability enables SAS Visual Analytics reports to integrate with and drill down into SAS Enterprise BI software content (including parameter passing, especially dynamic parameter passing), as follows:

- SAS BI Dashboard content (with parameter passing support).
- SAS Stored Processes (with parameter passing support, rendered within the SAS Visual Analytics Viewer).
- SAS Web Report Studio reports (In a future release of SAS Visual Analytics, support for parameter passing with SAS Web Report Studio is planned.).
- SAS Enterprise Guide or SAS Add-In for Microsoft Office projects (if they are stored and accessible within a SAS web server or browser context). However, parameter passing is not supported.

In addition, the designer can interact with SAS Stored Processes outside the context of linking and external URLs. A user can add one or more stored processes directly to a report canvas. The prompts for a stored process can be edited using the **Properties** tab in the designer. When the value for a prompt in the designer is set, that prompt value becomes the default value when viewing. There are limitations (as of SAS Visual Analytics 6.3) to where stored processes can be used in the designer within this context:

- A stored process cannot be used in precision layout mode.
- A stored process cannot be the source or target of an interaction in a report.
- A stored process cannot be added to a container object.
- Users who view stored processes using the SAS Mobile BI app cannot be prompted. Instead, the stored process runs using the prompt values that were added when the report was created.
- The stored process output in a report is rendered as HTML regardless of the requested output type.
- Styles are not available for stored processes in this type of view.



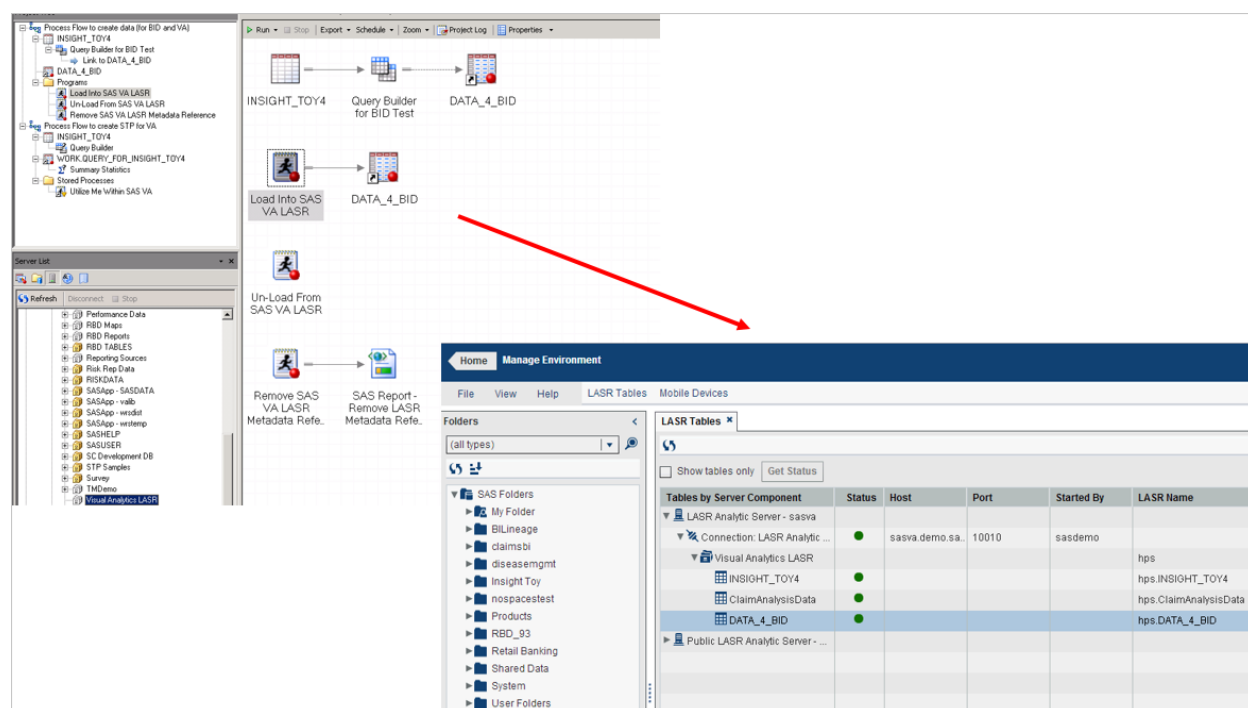
Display 5: SAS Visual Analytics Designer Sample That Shows How to Set Up a Parameter Passing to a SAS Stored Process

SAS ENTERPRISE GUIDE

The same “power users” interface that has been used for years preparing or accessing data, reports, or stored processes for the purposes of SAS Enterprise BI software, can be used with SAS Visual Analytics. In the context of SAS Enterprise BI software to SAS Visual Analytics shared metadata integration, SAS Enterprise Guide can perform the following tasks:

- Open and refresh reports that were created using SAS Visual Analytics Designer or SAS Visual Analytics Explorer (in the first maintenance release for SAS Enterprise Guide 6.1).
- Create a SAS Visual Analytics report format (in the first maintenance release for SAS Enterprise Guide 6.1).
- Programmatically load data into memory of the SAS Visual Analytics servers so that the data, including necessary metadata registrations, is instantly available to SAS Visual Analytics users.
- Programmatically unload data from memory of the SAS Visual Analytics servers so that the data, including necessary metadata registrations deletions, is no longer available to SAS Visual Analytics users.
- Create stored processes for SAS Visual Analytics users to consume, using the exact same process to build and deploy them as for SAS Enterprise BI software!

Note: Because SAS Enterprise Guide submits its work to the SAS® Workspace Server, its performance will be based on the submitted SAS session disk input output operation just as traditional Base SAS® has always performed (unless using SAS® Grid Manager). Unlike when working with the data within SAS Visual Analytics (which is RAM and Hadoop based), it is best practice to subset extremely large data while performing your SAS Visual Analytics development work within SAS Enterprise Guide.

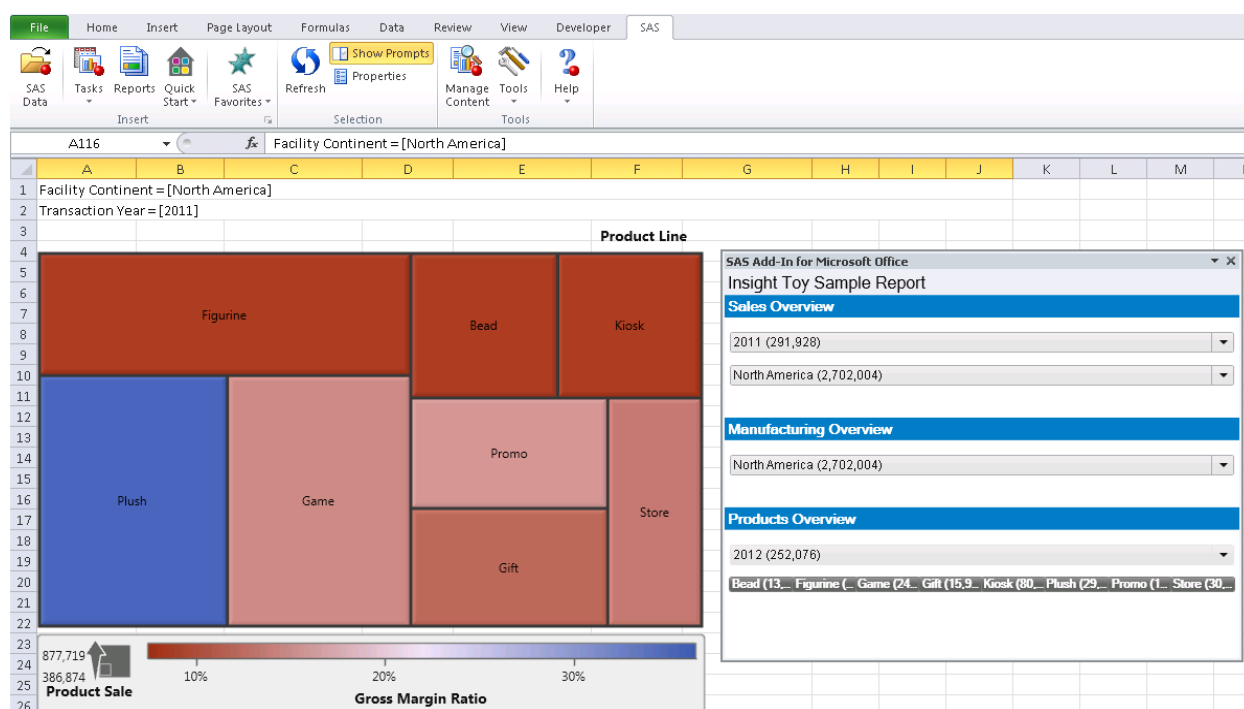


Display 6: SAS Enterprise Guide Sample That Shows How to Load Data into SAS Visual Analytics

SAS ADD-IN FOR MICROSOFT OFFICE

The SAS Add-In for Microsoft Office extended Microsoft® Office by enabling the power of SAS Enterprise BI software directly from within Microsoft Excel®, Word®, PowerPoint®, and Outlook®. SAS Add-In for Microsoft Office 6.1 provides integration with SAS Visual Analytics as well (with the first maintenance release for the SAS Add-in for Microsoft Office 6.1 supporting both SAS Visual Analytics 6.3 as well as 6.2). Because of this integration, the SAS Add-In for Microsoft Office can now be used to open and refresh reports that were created using SAS Visual Analytics Designer and SAS Visual Analytics Explorer. Favorites that were created in SAS Visual Analytics can now be accessed and managed. In Microsoft Outlook, the SAS Add-In for Microsoft Office also provides a view similar to the Hub (Home Page) in SAS Visual Analytics. This view enables access and commenting on favorite and recently opened SAS Visual Analytics reports.

In addition, the SAS® Web Parts for Microsoft SharePoint enabled access and provisioning to customized, dynamic SAS Enterprise BI software content directly onto SharePoint® sites. In SAS Web Parts for Microsoft SharePoint 6.1, SAS Visual Analytics is supported. The SAS Central Web Part lists any SAS Visual Analytics reports that were recently opened and any favorites that were created. It also enables the user to open additional reports in a new web browser. Metadata search and retrieval capability (for dashboards, stored processes, SAS Visual Analytics reports, or In-Memory available tables) is also provided. In the first maintenance release for SAS Web Parts for Microsoft SharePoint 6.1, you can view comments for SAS Visual Analytics reports via the SAS Content Viewer Web Part. On a desktop computer, you can open the report within the SAS Visual Analytics Viewer. On a tablet, you can view the report within the SAS Mobile BI Application.



Display 7: SAS Add-In for Microsoft Office Sample That Shows How to Open a Parameterized SAS Visual Analytics Report

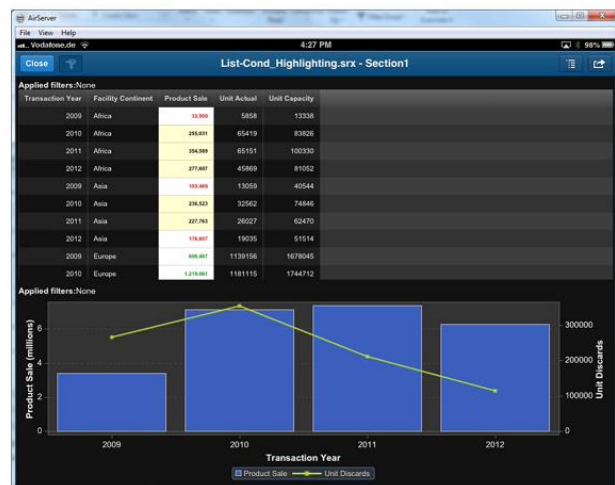
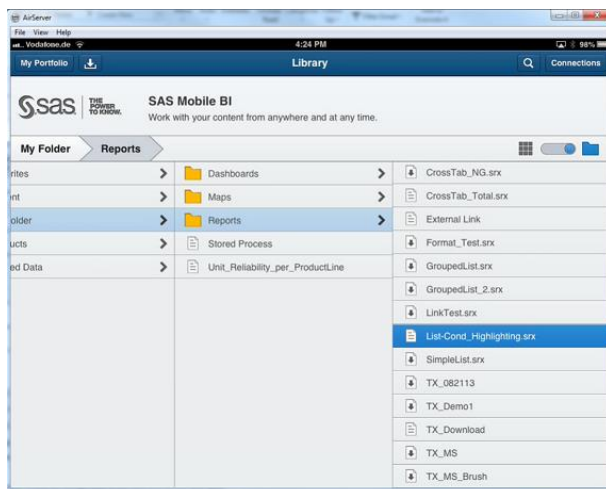
SAS MOBILE BI APPLICATION

SAS® Mobile BI enables users to view SAS Visual Analytics reports on Apple® iPad® or Android™ tablets. This free app can be download from the Apple iTunes® store or Google Play™ respectively. SAS Mobile BI 6.3 client support includes Apple iOS v7.0 (and above) on the iPad 2 (though not preferred due to iOS v7.x performance on it), iPad 3, 4 or Mini™. SAS Mobile BI 6.3 client support also includes Android 4.1, 4.2, 4.3 (Jellybean) on Samsung™ Galaxy Tab™ 2 10.1, Samsung Galaxy Note™ 10.1, Samsung Galaxy Note 8, Google Nexus™ 7 (2012 and 2013 editions), or Google Nexus 10.1. Beginning with SAS 9.4, users can view some SAS Web Report Studio relational reports via

this same exact SAS Mobile BI application on the iPad or Android tablet. A license that includes SAS Enterprise BI software 4.4 or later is required.

Not all reports that are created in SAS Web Report Studio can be viewed on mobile devices. As of the first maintenance release for SAS 9.4, the following types of reports can be viewed on mobile devices:

- relational reports that provide all SAS Web Report Studio graph elements with the exception of maps
- relational reports that provide basic table visual elements
- relational reports that provide tile layout
- relational reports that provide mobile graph styling
- relational reports that provide basic text support
- relational reports that provide surfacing and display stored processes on mobile devices
- relational reports that provide stored processes with default prompt values
- relational reports that provide images
- relational reports that provide group-by options
- relational reports that provide displaying of applied filters
- relational reports that provide conditional highlighting in a table
- relational reports that provide basic relational cross tab (ROLAP)
- relational reports that provide row and column totals in relational cross tab



Display 8: SAS Mobile BI App on the iPad Sample Depicting a SAS Web Report Studio Report

SAS THEME DESIGNER FOR FLEX

The SAS® Theme Designer for Flex enables users to easily customize the appearance of SAS web applications that are displayed with the Adobe® Flash® Player. This application is accessible directly from the SAS Visual Analytics

Home Page. The SAS Theme Designer for Flex, a Flex web application, can be used to create and deploy simple, visually appealing, customized themes. A theme defines the overall look and feel of an application. It is designed using colors and graphics that are applied to common user interface components and layout containers. A well-designed theme can create a strong visual identity across a product or set of products. SAS recognizes that users might not want to view their SAS applications in the default corporate theme. Instead, they might want to apply their own branding and customization to help the SAS applications fit in with the rest of their software environment. SAS also recognizes that users often use more than one SAS application in their daily work. A consistent look and feel ensures that the user's transition from one application to the next is as seamless as possible.

The work performed within the SAS Theme Designer for Flex has no effect on web applications that are not Flex enabled (for example, SAS Web Report Studio). However, elements of SAS® BI Dashboard, the SAS® Information Delivery Portal, as well as the SAS Stored Process Web Application do have some applicability with Flex. When using the SAS Theme Designer for Flex, it is important to understand the following points:

- Not all aspects of an application's appearance are customizable. The SAS Theme Designer for Flex enables a rich, carefully selected subset of design elements to be modified. The intent is to offer maximum visual impact with minimal effort and minimal risk of unintended results.
- This application is not optimized for large numbers of themes or deeply nested hierarchies. It is intended for occasional, highly targeted use.
- This application does not offer manual editing of a theme or direct interaction with configuration files. SAS does not support direct interaction with source files. All work should be performed from within the SAS Theme Designer for Flex.
- This application does not offer a step-by-step undo function.
- This application does not offer history or versioning of files.
- A user cannot alter, delete, or undeploy any of the predefined themes provided by SAS.
- A user cannot hide a deployed theme from anyone. All deployed themes are available to all end users in all eligible applications.
- A user cannot preload a custom color palette into the SAS Theme Designer for Flex.



Display 9: SAS Theme Designer for Flex Sample Screen

SAS ENVIRONMENT MANAGER

In SAS 9.4 and later, SAS automatically provides a SAS® Web Application Server that enables enterprise-class features for running all SAS web applications (including SAS Enterprise BI software and SAS Visual Analytics). The server is based on VMware® vFabric™ tcServer®. By packaging the server and software that can automate server configuration tasks, SAS simplifies the demands for managing a SAS® Web Application Server. The server, based on this commercially available third-party software product, is deployed and configured specifically to provide an environment for all the SAS web application middle-tier components. The configuration tools packaged with the software ease the administration of the server in a SAS environment and are designed to interact with the SAS Metadata Server and other SAS software products to maintain reliability and reduce administration in the SAS deployment. That deployment now includes SAS® Environment Manager as well.

SAS Environment Manager combines VMware® vFabric™ Hyperic® application monitoring framework with a collection of SAS designed technologies providing a unique, SAS Software integrated and out-of-the-box monitoring solution. SAS Environment Manager is a web-based administration solution for a SAS Metadata based environment. The application can administer, monitor, and manage SAS resources, including administering the SAS Web Application Server and monitoring SAS® Foundation servers. The application collects and charts data on metrics for monitored resources, providing a comprehensive view of resource health and operation. It also provides functions such as auto-discovery of resources, monitoring of log events, and reporting of alerts. The application provides SAS administrators with a dashboard that presents aggregated data from monitored resources, enabling them to gauge the effectiveness of their SAS Enterprise BI software environment. Over the lifecycle of SAS future releases, functions will be added to extend SAS Environment Manager capabilities as a centralized administration application for all SAS products (for example, SAS Visual Analytics capabilities). Hyperic agents can be installed and configured on all nodes of a SAS Visual Analytics Distributed Environment for use of monitoring the entire solution within SAS Environment Manager, above and beyond what SAS Environment Manager already can do with monitoring and managing the SAS Enterprise BI software components.

The screenshot displays the SAS Environment Manager web interface. At the top, there's a header with the SAS Environment Manager logo, a 'Recent Alerts' section indicating no alerts in the last 2 hours, and user navigation links (Welcome, Home, Sign Out, Help). Below the header is a navigation bar with tabs: Dashboard, Resources, Analyze, Administration, and Manage. A dropdown menu for 'Select a Dashboard' is set to 'sasadm@saspw'. The main content area is divided into several sections:

- Availability Summary Platforms:** A table showing resource types and their availability.

Resource Type	Availability
Linux	1 (Green checkmark)
SAS Application Server Tier	1 (Green checkmark)

Updated: 2:41 PM
- Availability Summary OS Network and NFS:** A table showing resource types and their availability.

Resource Type	Availability
FileServer Mount	3 (Green checkmark)
NetworkServer Interface	3 (Green checkmark)
RPC	5 (Green checkmark)

Updated: 2:41 PM
- Availability Summary SAS Server Processes:** A table showing resource types and their availability.

Resource Type	Availability
Apache Tomcat 6.0	1 (Green checkmark)
SAS Connect Spawner 9.4	1 (Green checkmark)
SAS Metadata Server 9.4	1 (Green checkmark)
SAS OLAP Server 9.4	1 (Green checkmark)
SAS Server Context	2 (Green checkmark)
SpringSource tc Runtime 7.0	1 (Green checkmark)
vFabric Web Server 5.2	1 (Green checkmark)

Updated: 2:41 PM
- Metric Viewer SASWork:** A table showing metrics for SAS Home Directory 9.4 SAS Directory.

Metric	Value
Use Percent	23.0%

Updated: 2:41 PM
- Metric Viewer Web Applications:** A table showing metrics for various web applications.

Application	Metric	Value
SAS Web Report Studio SAS BI Dashboard SAS Logon SAS Stored Process Web Application	Response Time	14ms
		12ms
		2ms
		2ms

Updated: 2:41 PM
- Metric Viewer:** A table showing metrics for SpringSource tc Runtime 7.0.

Metric	Value
Heap Memory Free	548.6 MB

Updated: 2:41 PM
- Metric Viewer:** A table showing metrics for PostgreSQL 9.x.

Metric	Value
Connections	68.0

Updated: 2:41 PM

Display 10: SAS Environment Manager Sample Screen

WHAT'S NEW IN SAS VISUAL ANALYTICS 6.4

SAS Visual Analytics 6.4 was pre-production when this paper was authored; therefore, details are subject to change. Setting up an external link to a SAS Stored Process no longer requires knowing all the parameter names nor knowing the exact URL string to the exact stored process. The user now has the ability to click a button to navigate the SAS

Metadata folders to find the specific stored process. If the selected stored process takes parameters, they will be automatically populated in the parameters area as the target parameter name:

Display 11: Planned New Capability for SAS Visual Analytics 6.4

CONCLUSION

Although SAS will invest in SAS Visual Analytics as our platform for Enterprise BI software innovation going forward, SAS will continue to support legacy Enterprise BI software through ongoing technical support, hotfixes, and development of mission-critical customer requirements. Not all SAS Enterprise BI software features have ported over to SAS Visual Analytics. By supporting a shared common Metadata repository, SAS Visual Analytics can augment SAS Enterprise BI software by facilitating data discovery, extending big data and big analytics capabilities, adding ad hoc reporting, and making business analytics accessible to a host of new users, interfaces, and devices.

REFERENCES

SAS® Visual Analytics 6.3: User's Guide. Available at <http://support.sas.com/documentation/>.

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RECOMMENDED READING

BI Notes Blog. Available at <http://bi-notes.com/>. [Informs SAS Enterprise BI software users how to better use their tools, including SAS Visual Analytics.]

The University of Texas System. (2013). "New website and iPad app make UT data even more accessible." Available at <http://www.utsystem.edu/news/2013/03/15/new-website-and-ipad-app-make-ut-data-even-more-accessible>. [The UT System Productivity Dashboard uses SAS Enterprise BI software along with SAS Visual Analytics.]

Vitron, Christine. 2014. "Considerations for Adding SAS® Visual Analytics to an Existing SAS® Business Intelligence Deployment" Proceedings of the SAS Global Forum 2014 Conference. Cary, NC: SAS Institute Inc.

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