

Paper 011-2011

Deconstructing Barriers for Dashboard On Demand Data

Maureen Murray, University of Central Florida, Orlando, FL

ABSTRACT

As the acceptance and use of the data warehouse has grown so has our users' scope in how to use this now easily accessible data. Recently, a college administrator requested that his technical staff design and develop a dashboard which required enterprise data from both the Student Administration system and the University Financial system. The current phase of development of our data warehouse provides data from the Student Administration system. A university-wide Financials Data Mart, housed on a SQL server, is provided by the university Financial Administration office for reporting and data exploration.

Eventually, the dashboard developers decided to employ the SAS® Intelligence Platform as their development and delivery tool and requested our assistance during their development effort. This paper details the solutions we built using different components of the SAS® Intelligence Platform to support the data acquisition and overcome technical and policy barriers. We currently have in place an information map which runs a stored process that creates an on-demand WORK table when the dashboard (a SAS® Web Report Studio report) is viewed.

WHO WE ARE

MISSION

The mission of Enterprise Decision Support (EDS) is to provide data integration services and actionable information solutions through the delivery of business intelligence applications and other knowledge management tools to support executive and operational decision-making and planning.

PURPOSE

The departments of Enterprise Decision Support and Institutional Research (IR) comprise the Institutional Knowledge Management (IKM) Unit. EDS partners with and supports IR to provide data for state, federal and all other official university reporting including ad-hoc requests for information. Through our Information Portal, Operational Data store, and dynamic web-based applications, the EDS development team delivers information and reports in various forms tailored to user need and technical aptitude. EDS is responsible for system support, administration, and security of the university data warehouse, which houses, but is not limited to, official state report data and functional reporting data marts. The ability of EDS to provide actionable information solutions is enhanced by the ability to integrate data from across the enterprise, utilizing Business Intelligence (BI) analytical tools, and through empowering users by training and education on how to use and understand the solutions provided.

BACKGROUND

Enterprise Decision Support has, as one of its primary objectives, the task of maintaining and promoting the university data warehouse. This enterprise-wide data system facilitates the creation, access, and dissemination of institutional knowledge pertinent to the university. The data warehouse contains over fifteen years of student reporting data, including official state reporting data, past and current term enrollment and student credit hour data tables, OLAP cubes and degree to date data. This warehouse of information serves as the foundation for the development of a wide variety of reporting applications using SAS® Business Intelligence software.

INTRODUCTION

As planning and evaluation aids, dashboard data visualizations have become popular BI tools for college administrators and their staff. Since our office is responsible for the development and maintenance of the official university data warehouse, receiving a request to aid in the development of a college level dashboard is not unexpected. Initially, the focus of our participation centered on developing a plan to provide the desired student administration academic data. Also, during the college developers' product evaluation stage, we conducted a demo of the tools available within the SAS® Enterprise Intelligence Platform. This demo included the SAS® BI Dashboard, SAS® Web Report Studio and the execution of SAS® stored processes within our customized SAS® Information

Portal. After evaluating several dashboard development products the college decided to employ the SAS® toolset for their dashboard process.

During a trial period the developers focused their effort in using the SAS® BI Dashboard tool employing stored processes as dashboard indicators to create the data visualizations. Up to this point the EDS team provided the student administration data from the university data warehouse via SAS® tables which were refreshed periodically by SAS® programs or SAS® Enterprise Guide Queries. Then everything changed with the developers' decision to use SAS® Web Report Studio (WRS) to build and deliver the dashboard indicators.

New Data Delivery Requirements

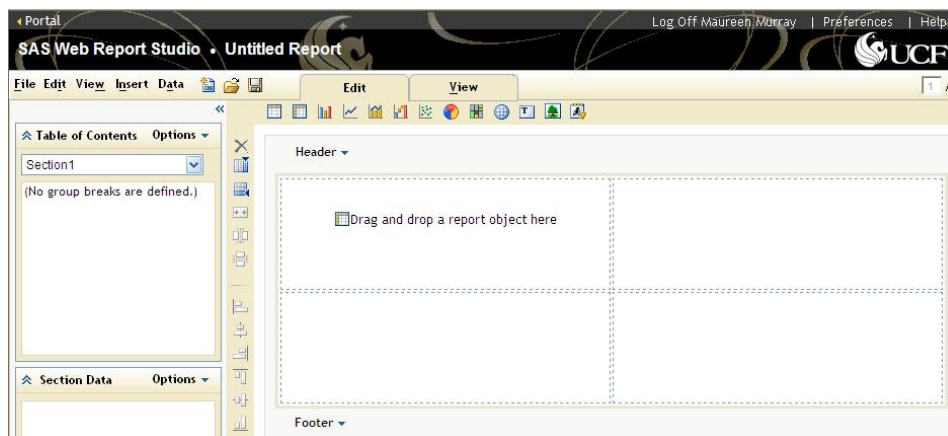
The selection of SAS® Web Report Studio as the college dashboard development and delivery mechanism changed our support requirements for this project. SAS® Web Report Studio strictly uses SAS® Information Maps as input to its report building function. An Information Map is a logical view of the data required for a report section(s). This logical view can be the layout of one physical table or the result of joining two or more physical tables including the required table(s) join conditions.

Instead of providing SAS® tables, we now had to provide Information Maps appropriate for the WRS report requirements. The development of the information maps for the data that resided in our data warehouse was very straight forward. It entailed working with the dashboard developers to understand their functional data requirements which aided us in the assignment of functional business data names to the fields, assign data formats and create filters.

The financial data required for the dashboard resided in the Financial Administration (FA) Data Mart, external to the data warehouse housed on a SQL® server. Creating the information map for this data access proved to be challenging technically and functionally.

Web Report Studio and Information Maps – A Brief Description

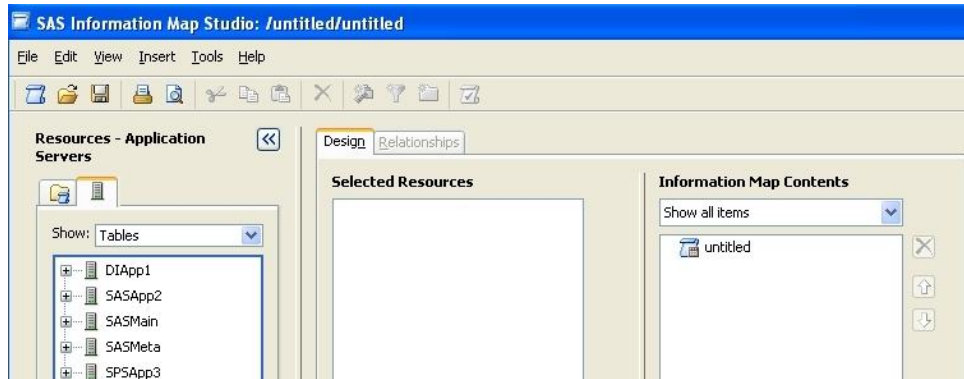
SAS® Web Report Studio allows the creation and viewing of data in varied report modes such as lists, crosstabs, charts, graphs and plots. Aggregate processing of the input data, data grouping and breaking, conditional highlighting combine with on-demand totals and subtotals; all of which aid the transformation of data into information when developing a report (see Display 1). The insertion of text, images, and geographical maps are also available to enhance the information presentation. WRS also allows the execution, upon viewing the report, of a SAS® stored process with the results displayed within a report section. All of these capabilities result in a powerful reporting mechanism.



Display 1. SAS® Web Report Studio report design or edit platform

This reporting tool, with a GUI interface, has been designed for users of different technical skill levels and is especially aimed at the functional business user. For that reason the data interface for WRS is not the more traditional data table or file but a SAS® Information Map. An information map is developed using SAS® Information Map Studio (see Display 2). The creation of an information map generally involves the joint efforts of both technical and functional staff. The functional requirements for the report or information analysis are combined with the

technical physical data table(s) definition(s) to produce a business friendly view of the data which will be transformed into information using SAS® Web Report Studio.

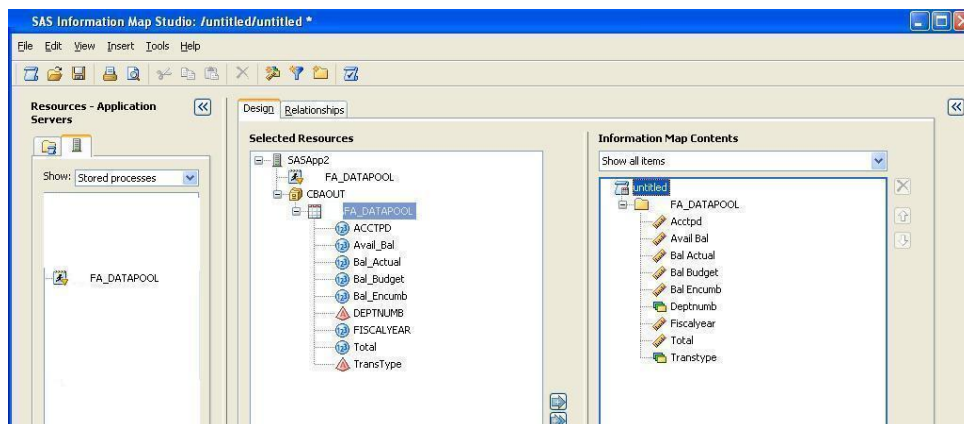


Display 2. SAS® Information Map Studio platform

When designing an information map, user friendly properties which enhance its functional usability such as

- the assignment of business names to data fields
- the definition of new data fields
- the assignment of data formats and value translations
- the joining of physical data tables

all combine to bridge the technical and functional requirements into a business view of the data. This business view (see Display 3) is then used to map the physical data into information via WRS.



Display 3. FA Data Information Map

Dashboard Data Delivery Development

Financial Data External to Data Warehouse and Information Maps

Our initial design for providing the Financial Administration Data Mart data detailed the development of a SAS® program which would be scheduled to run each morning on our SAS® BI Server creating a subset FA data table containing the data required for the dashboard reporting. An information map of the FA data table would be created for the dashboard developers to use in the WRS development. During our initial discussions with the custodians of the FA Data Mart that design was rejected. The Financial Administration staff expressed concern that the resulting data table would become out of sync with the data mart data leading to confusion or the data being viewed as unreliable. In order to address their data reliability concerns, it became clear that the data for the table would have to

be created in a WORK (temporary) library on an on-demand basis. For a Web Report Studio report this meant that the FA data table was only created when a user opened the report for viewing or refreshing the report's data and was deleted when the report session ended.

After researching SAS® technical documentation for a methodology to satisfy the design requirement for on-demand data when using WRS, we decided to associate a SAS® stored process with the information map. In principle this technique should work well. When a WRS report is opened the information map for the report is activated and the associated stored process is executed. However, now we were unsure where the WORK (temporary) data table should be created to ensure it was available to the Web Report studio processing.

On the SAS® Support website a colleague found the following: **Sample 33954: Associating an existing SAS® stored process with an information map in SAS® Information Map studio 3.1** and **Usage Note 19087: How to create and then use a SAS stored process in SAS® Information Map Studio**. Both documents provided excellent step by step instructions and guidance in creating a WORK table accessible to WRS within a stored process.

The basic steps to implement this approach are:

- Define a SAS library in SAS® Management Console (picking a name of your choice) that will be used as the WORK library. We chose 'CBAOUT'.
- Include the following required SAS code statements in the beginning of the stored process.

```
%let workpath=%sysfunc(pathname(work));
libname CBAOUT "&workpath";
```

- Create the data table in the library defined above.

The FA Data Pool Information Map and Associated Stored Process

Following the SAS instructions, a SAS Library named CBAOUT was defined in SAS® Management Console, the required SAS statements were included in the stored process code and the data table was created in that library as seen the in code below.

```
/* Create Data Pool Table - Union of          */
/* Work.XXACTUALS_SUMMARY, XXBudget_SUMMARY, */
/*   XX_AVAIL_BAL tables                     */
Proc SQL;
Create TABLE CBAOUT.XXFA_DATAPOOL AS
Select * from Work.XXACTUALS_SUMMARY
UNION
Select * from Work.XXBudget_SUMMARY
UNION
Select * from work.XX_AVAIL_BAL
;

QUIT;
```

The development of the stored process which created the final table involved its own challenges. The FA Data Mart's initial design consisted of a separate database for each fiscal year of the Actuals, Budget and Encumbrance tables. This architecture required us to use six ODBC Engine connection LIBNAME statements and create a multistep PROC SQL process which selected, aggregated and transformed the data into the designed table format. After our initial development, Financial Administration developed a new data mart architecture which allowed us to optimize this stored process. It now only requires two ODBC Engine connection LIBNAME statements (which has improved response time) as seen in the following code:

```

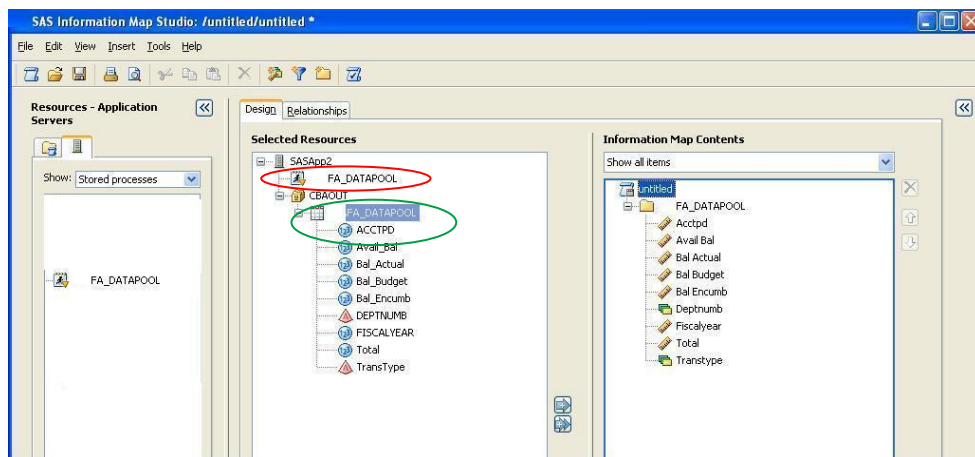
/* Create Data Table for All Required Dashboard FA Data */
libname FADM ODBC dsn=FADMALL uid=xxxxxx pwd='.....';
libname FAFROJ ODBC dsn=FADMPRJNW uid=xxxxxx pwd='.....';

/* Setup use of WORK library for WRS */
%let workpath=%sysfunc(pathname(work));
libname CBAOUT "&workpath";

/* Start Retrieve Data for ACTUALS */
Proc SQL;
Create Table Work.Actuals_ACCTPERIODS as
select DISTINCT FiscalYear, AcctPD, DeptNumb,
Case
  when TransType = 'ACTUALS' then 'Actual'
end as TransType,
Sum(ChekAmount) as Total
from FADM.Actuals
where substr(DeptNumb,1,2) = '13'
  And TransType = 'ACTUALS'
  AND AcctType ='Expenditures'
  AND FiscalYear in (2008, 2009, 2010, 2011)
group by FiscalYear, AcctPD, DeptNumb
;
QUIT;

```

The stored process creates the table FA_DATAPOOL in the WORK library called CBAOUT. An information map for the FA_DATAPOOL table (highlighted below by green oval in Display 4) was created and the stored process (highlighted below by red oval) was associated to the Information Map by inserting it into the information map definition. Caution: A stored process can only be inserted after a table has been inserted into a information map.



Display 4. FA Data Information Map

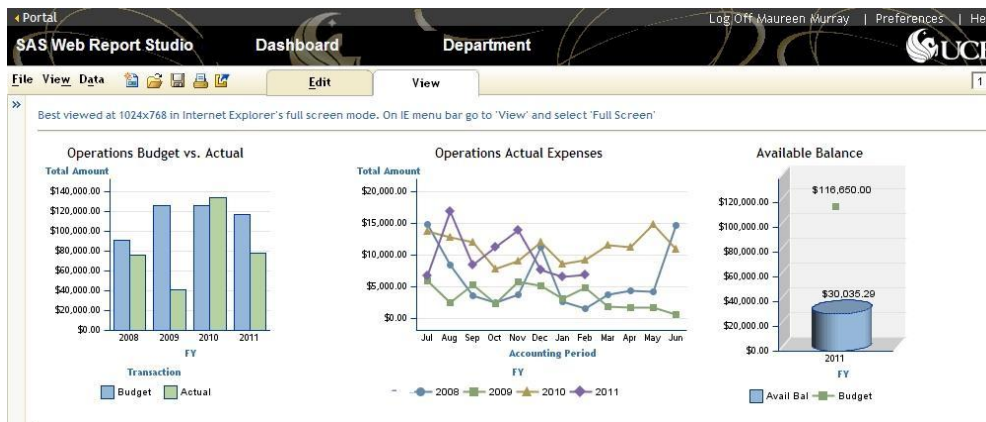
The Dashboard Indicators

The college developers were then able to proceed with their dashboard indicator development using SAS® Web Report Studio.

The final WRS consists of two report tabs, Academic Measures and Financial Measures which present the dashboard indicators (see Displays 5 and 6).

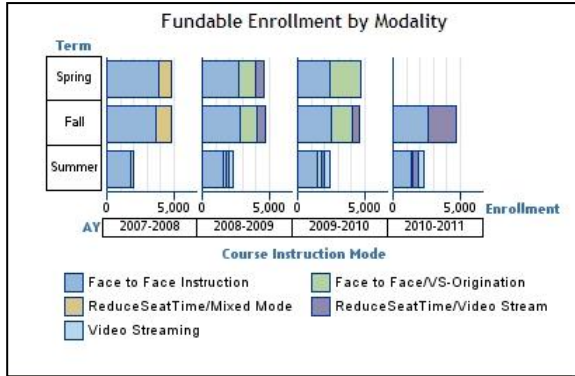


Display 5. Dashboard -- Academic Measures for a Department



Display 6. Dashboard -- Financial Measures for a Department

The information visualizations developed by the college technical team, which are used as the dashboard indicators have been received positively by their users. Although these indicators are very Education industry orientated they are an excellent example of the varied graphic presentations that can be developed using WRS.



Enrollment by Class Modality (type of instruction delivery) for 3 different term types for 4 Academic Years are compared

Figure 1. Close up of an Academic Measure Indicator



Available Balance is compared to the Budget Amount for the current Fiscal Year

Figure 2. Close up - Financial Measure Indicator

Conclusion

Throughout the development of the college dashboard we encountered both technical challenges and policy barriers. The requirement to use the FA Data Mart and the policy that this data must be created on-demand to minimize the data latency concerns but be available to WRS forced us to develop a technical approach unique to any we had used previously. Each of these challenges and barriers were overcome by teamwork and exploring the capabilities of the SAS® Business Intelligence software.

We currently have in our production environment an information map which runs a stored process that creates a WORK table when the dashboard (a SAS® Web Report Studio report) is viewed.

ACKNOWLEDGMENTS

The author and project developers are always grateful for the enlightening resources found at the support.sas.com website. The author would like to acknowledge all the individuals involved in this development effort especially the college's technical team.

CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

Name: Maureen Murray
Enterprise: University of Central Florida, Enterprise Decision Support
Address: 12424 Research Parkway, Suite 215
City, State ZIP: Orlando, Florida 32826
Work Phone: 407 823-4164
Fax: 407 823-4769
E-mail: Maureen.Murray@ucf.edu
Web: <http://www.iroffice.ucf.edu>

SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. ® indicates USA registration.

Other brand and product names are trademarks of their respective companies.