PUTTING EXECUTIVE SCORECARDS ON THE WEB WITH SAS® SOFTWARE

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Abstract

Many quality and performance measures are available on U S WEST's Intranet using the SAS System. The Vice Presidents and Executive Directors have asked for their own "Scorecards" on the Web which show only their measures on one page. The scorecards were required to have the results and targets of each measure on a daily, weekly, monthly, quarterly, and year-to-date basis. This paper talks about putting the information together from different data sets onto each scorecard with the same columns. The columns with the time-based results, were computed using SAS date functions. The values were also converted to character formats in order to have percents (%), dollars ($), and numbers displayed in a column. HTML, htmSQL™, and SAS programs are set up to use the SAS/IntrNet™ Application Dispatcher to produce the desired scorecard with the capability to drill down to a state level. Each row of the scorecard is linked with the web page of the measure. These pages have further drill down features that eventually show detail data. Both the summarized and detail pages have the capability to download the data to an Excel spreadsheet which gives both executives and engineers the information necessary to make better business decisions.

Introduction

The SAS system has provided an end to end solution for decision support at U S WEST which contributed to significant performance improvements. See Romero, Bob and Hamilton, Dale "SAS Powers Web Measurement Solution at U S WEST", Proceedings of the Twenty Third Annual SAS Users Group International Conference,23,1450-1454. The vice presidents each wanted their own scorecard on the web which has only the indicators that measure their organization on one web page. The functionality and flexibility of base SAS software along with SAS/IntrNet enabled this requirement to be met on time. An additional feature was added to the scorecard by linking selected rows, or measures, to their individual web tools on U S WEST's Intranet. The drill down features of the summarized data set then allow the user to get to the detail data and do root cause analysis on each individual item. The following sections describe how the scorecards were made.

Data Preparation

As reported in the earlier reference, data is extracted from ORACLE® tables using SAS/ACCESS® and the UNIX "cron" facility on an hourly or daily basis. Complex business rules are applied to the data using the data step and then summarized at different geographical and time-based levels. These data sets are then displayed by the SAS Application Dispatcher when requested by a web browser. In order to meet the request of making a scorecard, additional processing was done on the detail data sets. Two very important steps are done in the data preparation: 1) Many different "flag" variables are created to make the queries by the Application Dispatcher program as quick and simple as possible, and 2) numeric variables are converted to character so that a single column can contain percentages, dollar figures, "N/A" , etc. An example of preparing one measure follows:

Example:

```
* The data step is used to modify the data and create the time-based columns.;
data score; set libref.detail

  * A flag is set based on a met or missed commitment.
  if estdate > donedate then met = 1; else met = 0;

  * A flag is also set for each observation to calculate total no. of tickets;
  ttickets = 1;

  *The month and qtr values for each observation are determined.;
  month = month(estdate);
  qtr = qtr(estdate);

  *The day of the week is determined for yesterday.;
  workday = weekday(today()-1);

  *Flags are set for values within the last week and each workday Monday thru Friday.;
  if estdate> today() - 6 then do;
     weekmet = met;
     weektot = 1;
     if weekday(estdate) <= workday then do;
        select (weekday(estdate));
           when (2) do;
              monmet = met;
              montot = 1;
```

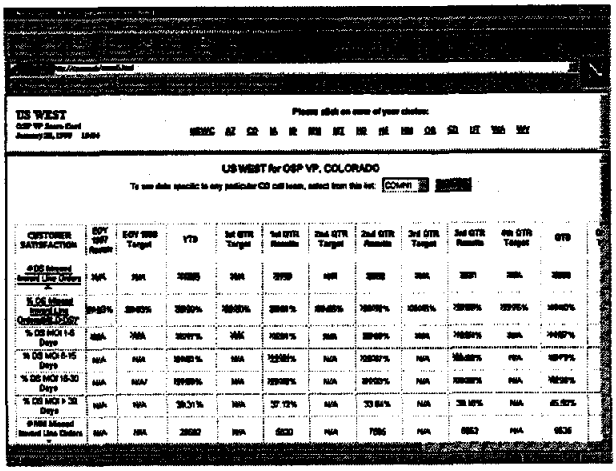
```
            end;
            .
            .
            .
            when (6) do;
               frimet = met;
               fritot = 1;
            end;
            otherwise;
         end;
      end;
   end;

   *Flags are set for values of each month.;
   select (month);
      when (1) do;
         janmet = met;
         jantot = 1;
      end;
      when (2) do;
         febmet = met;
         febtot = 1;
      end;
      .
      .
      .
      when (12) do;
         decmet = met;
         dectot = 1;
      end;
      otherwise;
   end;

   *Flags are set for values of each qtr.;
   select(qtr);
      when (1) do;
         qtr1met = met;
         qtr1tot = 1;
      end;
      .
      .
      .
      when (4) do;
         qtr4met = met;
         qtr4tot = 1;
      end;
      otherwise;
   end;
run;

*Last years values are flagged.;
data lastyear;
   set libref.lastyear;
   where year(estdate) = year(today)-1;
   if estdate > donedate then met = 1; else met = 0;
   ttickets = 1;
run;

* Data set is summarized for each state and USWEST.;
proc summary data=score;
   class state;
   var monmet montot tuemet tuetot - frimet fritot weekmet weektot janmet jantot febmet
       febtot - marmet martot aprmet aprtot maymet maytot junmet novmet novtot decmet
       dectot qtr1met qtr1tot qtr2met qtr2tot qtr3met qtr3tot qtr4met qtr4tot met ttickets;
   output out=sumsc sum=;
run;

* Data set is summarized for each state and USWEST for last year.;
proc summary data=lastyear;
   class state;
   var met ttickets;
   output out=sumlast sum=metlast ticklast;
run;

* Data is prepared for scorecard.;
data sc; set sumsc;
format title1 $40
       mon_r mon_t tue_r tue_t - fri_r fri_t weekly_r weekly_t jan_r jan_t feb_r
       feb_t - nov_r nov_t dec_r dec_t qtr1_r qtr1_t qtr2_r qtr2_t qtr3_r qtr3_t
       qtr4_r qtr4_t ytd_r ytd_t $10.;
```

```
label title1='Measure Title';
if state = ' ' then do;
   sorter = 1;
   state = 'USWC';
end;
else sorter = 2;

* Column with measure name is assigned.;
title1 = "% TICKETS MET";

* Percentages are converted to character in order to be appended to other measure data sets that may
contain different formats for the same variable name;
array var_r{*} mon_r tue_r -- fri_r weekly_r jan_r feb_r mar_r -- nov_r
               dec_r qtr1_r qtr2_r qtr3_r qtr4_r ytd_r;
array varmet{*} monmet tuemet -- frimet weekmet janmet febmet marmet -- novmet
               decmet qtr1met qtr2met qtr3met qtr4met ytdmet;
array vartot{*} montot tuetot -- fritot weektot jantot febtot martot -- novtot
               dectot qtr1tot qtr2tot qtr3tot qtr4tot ytdtot;
do i=1 to dim(var_r);
 mon_r = put(monmet/montot,percent10.2);
end;

*Targets for this measure are set to 95%.;
array vars95{*} mon_t tue_t wed_t thu_t fri_t weekly_t jan_t feb_t mar_t apr_t may_t
                jun_t jul_t aug_t sep_t oct_t dec_t qtr1_t qtr2_t qtr3_t qtr4_t ytd_t;
do i=1 to dim(vars95);
  vars95{i} = put(0.95,percent10.2);
end;

*unnecessary columns are dropped.;
drop monmet montot tuemet tuetot -- qtr4met qtr4tot met ttickets _freq_ _type_;
run;

* Last year's data set is also prepared.;
data lastsc;
  set sumlast;
  format last_r last_t $10.;
  if state = ' ' then do;
   sorter = 1;
   state = 'USWC';
  end;
  else sorter = 2;
  last_r = put(metlast/ticklast,percent10.2);
  last_t = put(0.95,percent10.2);
  drop metlast ticklast _freq_ _type_;
run;

proc sort data = sc;  by sorter state;  run;
proc sort data = lastsc;  by sorter state;  run;

data libref.sc;
  merge sc lastsc;
  by sorter state;
  drop sorter;
run;

/*  The data is now ready to be appended with all of the other measure data sets in a short data step in
which flags are set for the different scorecards. */
```

Web Display

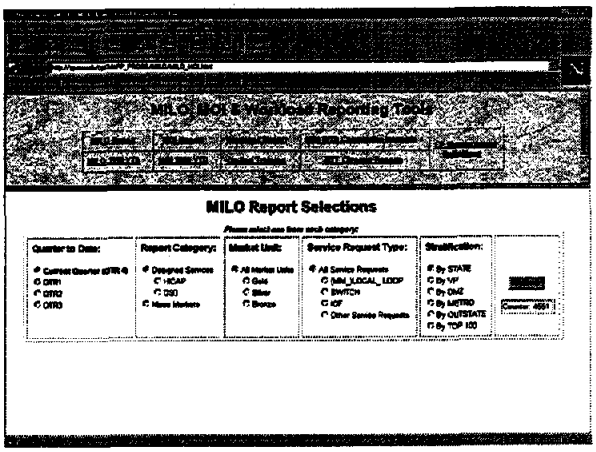
The above processing is automated to create the final data sets that are accessed by Application Dispatcher programs. The flexibility of the macro processing in an Application Dispatcher program allows the creation of multiple scorecards with one program. A total of 189 different scorecards (at the different state and area levels for each V.P.) can be dynamically generated using the one data set mentioned above and one Dispatcher Application program. Because of the methodology used, it was easy to add 750 more dynamically generated HTML pages to show 12-month views of the scorecards and related trend charts by simply writing two additional Application Dispatcher programs. Using these dynamic programs, those 939 HTML pages do not need to be created and stored every night; instead they are instantly generated when requested by the user through an HTML form.

A short Application Dispatcher program creates the specific scorecard based on the Vice President selected. Users can also select a particular state, and in some cases a particular cell team. The Application Dispatcher program first creates a subset of the data requested using the flags set in the data preparation. The resulting data is then placed into an HTML table using data step reporting techniques. The resulting scorecard appears as follows:

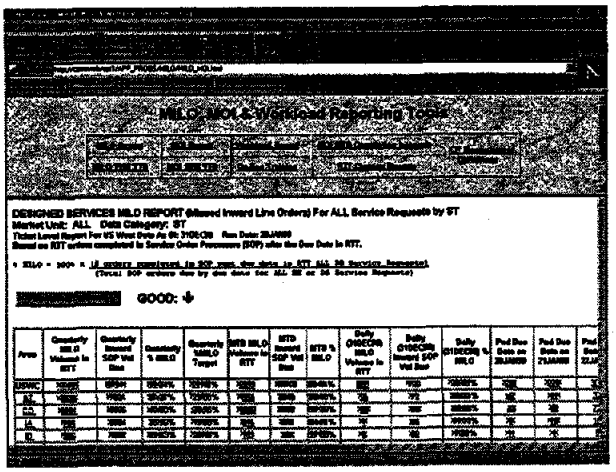


Each measurement came from a different data set produced by the process analyst in charge of that measurement. These measurements may be expressed as percentages, dollar figures, or any other format. Because of the intensive data preparation, all the Application Dispatcher program had to do was query one large summary data set containing primarily character data for the specific V.P., state, and/or cell team.

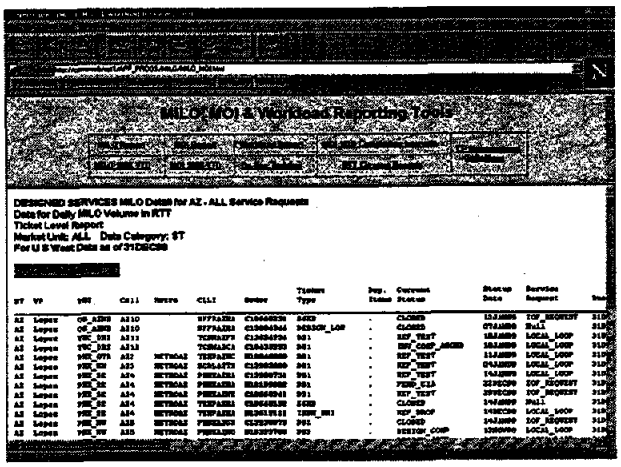
At the management's discretion, links can also be set up in the measurement name column to connect to a particular measure's web tool. For instance, the "MILO" measurement has its own web tool, which can be accessed by clicking on the related measure in the first column. The resulting tool appears:



Using this tool, executives can obtain more detailed information about the particular measure, including pending orders that can be dealt with proactively. The data can be "sliced and diced" any way imaginable to get to the exact data desired. Since well over 1000 different permutations of the report are possible, application dispatcher programs are also used for this tool:

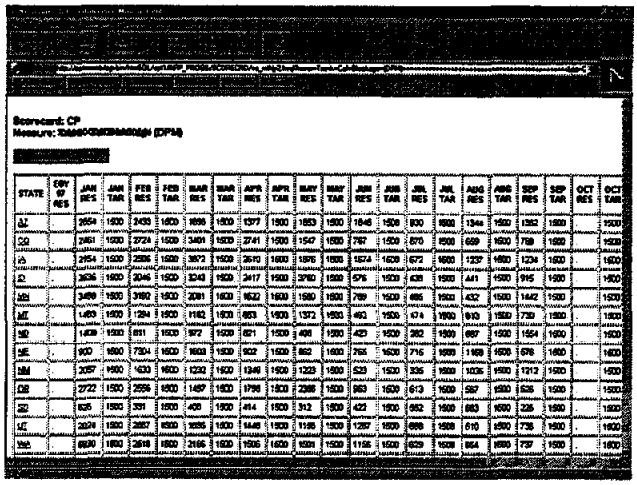


From here, action can be easily taken to improve any result, because the detailed orders (the source data) are available through any numeric link on the page (notice the ability to download to Excel):

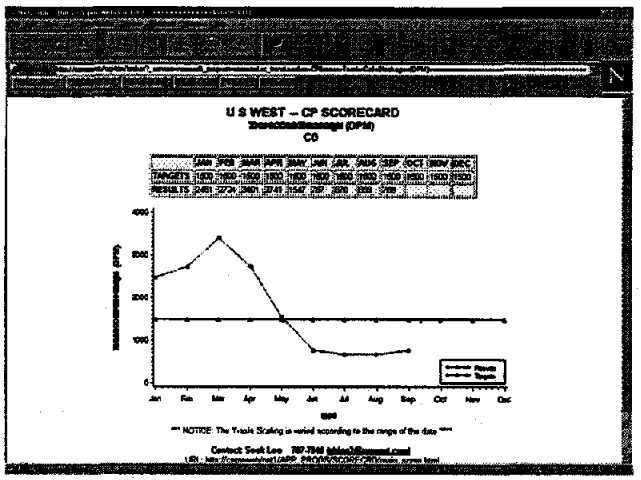


This ability to link from the scorecards all the way through the detail data gives everyone from management down through the engineering/technician level the ability to act upon the measurement results proactively and see the direct impact on the company. All of the reports created down through the detail level are created dynamically using the SAS Application Dispatcher or htmSQL, saving on storage space and eliminating unnecessary processing of seldom-used reports at all levels.

Also available as part of the Executive Scorecard web tool are 12-month views by state for each measure, with the ability to download the file to Excel. This download feature is available for a majority of the pages in our measurement web tools:



Through the state column, executives can link to a 12-month trend chart created with SAS/GRAPH® to get a visual of how the measure is improving (in the following case, lower is better):



CONCLUSION

The stringent requirements of the vice presidents' scorecards were easily met due to the flexibility of base SAS software and SAS/IntrNet tools. The methodology of using the SAS Application Dispatcher or htmSQL to create dynamic web pages also greatly reduced the storage capacity and unnecessary processing. Thus, very valuable information was produced on the web for both executives and engineers in a very efficient and expeditious manner, and without having to train them on how to use the tool.

ACKNOWLEDGEMENTS

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