A STRATEGIC PLANNING CONTROL SYSTEM

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ABSTRACT

Strategic planning, whether at a corporate or departmental level, requires a reliable control system in order to ensure the accuracy, efficiency, and quality of its operations. At Texas Instruments, this need arose during the review cycle, and the advantages of its development and structure of the system, its use during the review cycle, and the advantages of its operations.

INTRODUCTION

In the mid-1960's, Texas Instruments implemented its OST system, consisting of corporate and business objectives, strategies, and tactics, to couple the company's strategies and operating requirements in accomplishing both its near-term and long-term goals. At the department and division levels, however, where next year's fundable projects are first presented as "packages", no standard form or procedure for creating and ranking the packages was in use. Each year saw the evolution of a new methodology and, consequently, a host of inefficiencies: employee re-training, data collection problems, incomplete or multiple data files, reporting inconsistencies, and redundant manual efforts. A centralized control system was needed to easily create and collect individual packages, as well as to update and generate top-level summary reports and color graphics.

Designed for non-programmers, the Strategic Planning Control System runs under VM/SP CMS and draws upon a hierarchy of EXECs, panels, macros, and SAS and SAS/GRAPH programs to provide five main capabilities to its users:

1. Creation, updating, and printing of individual packages
2. Automatic updating of the data base
3. Production of top-level summary reports
4. Production of color graphics
5. Access to all filled reports

SPCS also allows users to send packages to one another, keeps a log of all packages updated to the data base, a single execution, and provides the development and structure of the system, its use during the review cycle, and the advantages of its operations.

STRUCTURE OF THE SYSTEM

SPCS is a hierarchical system. When SPCS is called, the master EXEC brings up a "master panel" asking the user to select any, all, of the five main procedures outlined earlier. The master EXEC processes each request in turn, calling for each the corresponding main EXEC that oversees all operations for that procedure. Each main EXEC displays a panel asking the user to further define his request and then calls, on the basis of that information, other panels, macros, SAS programs, and EXECs to process the request through to completion. When the last requested procedure has been completed, SPCS has finished a normal "run".

Among the five procedures, only the first requires significant manual input and that is only if the user is creating a totally new package proposal. The other procedures follow up on the process of...
WORKING WITH INDIVIDUAL PACKAGES

The PACKAGE procedure is the tool by which the package originators create the proposals for their projects to be funded. A proposal is the first step in strategic planning: it describes the need for a particular project, its requirements and benefits to its organization, and supplies all the administrative and financial data that will be needed later for creating top-level summary reports. For all the proposals generated during the planning cycle, a standard form is necessary to effectively compare the merits of vastly different projects.

The package form supplied by SPES is a 56-record, 132-character file reproduced from the mimeographed, typed-written forms used in previous years. As an electronic form, it not only relieves several secretaries from re-typing several dozen forms each week, but also permits the package originators to directly control the changes to their package proposals. To help the user fill out a form much longer and wider than his screen permits, the form is displayed on his screen section by section, as it will appear when it is printed. Help documentation is available at the stroke of a key to explain each section's requirements, as well as to review the capabilities available to the user: browse, edit, rename, erase, print letter quality, or send the form to either its data file or to another user, list all package forms on the user's minidisk, or work simultaneously with any number of forms during a single run of this procedure.

A package may be updated any number of times during the planning cycle as requirements change and projects are re-defined. The number of times a package is sent to the data base is justified by the number of changes it undergoes; the UPDATE procedure records the changes fairly easily.

UPDATING THE DATABASE

The system's data base resides on the user ID of the SPES controller, who supervises the smooth running of the system and generally handles the updates to the data base and the production of reports and graphics for management.

The UPDATE procedure is run whenever package forms are sent to the SPES controller. The controller is asked to name the package to be updated and to give its status as an addition, deletion, or correction to the data file. Each package's data is first scrutinized for any obvious error, such as a missing field, and then written to a temporary file for the controller to save after the procedure is done. An example is given in Figure 1. Once all package data is recorded in the temporary file, each record is updated against the data base. If a mistake has been made, such that a record marked as an addition already exists in the data base, the problem can be corrected at this time. Once all updates are recorded, the data base is justified by the number of changes it undergoes; the UPDATE procedure records the changes fairly easily.

CREATING TOP-LEVEL SUMMARY REPORTS

In the later stages of strategic planning, management requires a standard top-level report summarizing each department or division's fundable projects. The report needs to contain not only most of the administrative and financial data entered by the original package initiators, but also information on package rankings and projected total spending levels. These cumulative totals for computer usage, man-months, and labor expenses are necessary to determine cut-off points in each department or division's funding summary. Finally, because management analyzes each funding summary with regard to type of strategy, funding source, and product line, the information needs to be sorted quickly and easily to show the top-level picture in a variety of ways.

SAS is invaluable for this purpose. Because management has requested only one basic report, this procedure uses only one SAS program, which functions as a prototype for all created reports. From this prototype, shown in Figure 2, any field read in from the data file or created in the program may become the variable by which the report is sorted.

When the user calls the REPORT procedure, a panel is displayed that offers a choice of nine fields by which to sort the summary report. The user may sort by either one or two variables; up to forty-five combinations are available. If the user wants two sorts, he types a '1' beside his choice for a primary sort and a '2' beside his choice for a secondary sort. The program automatically scans for any error in entry.

Once the user's choices are displayed for him and verified, a copy is made of the prototype and an XEDIT macro substitutes the user's sorts for the dummy variables listed after the BY and PAGESBY statements. This section of code is given in Figure 3. After the SAS program is executed, another panel is brought up to offer the user a choice of options on the newly-created report: browse, print letter quality, send to another user, file on disk, or return to the first panel and create another report. If the report is not filed, it is erased, and if no more reports are to be created, the master EXEC determines whether or not the GRAPHICS or LIBRARY procedures should be run.

GRAPHING TOP-LEVEL DATA

The GRAPHICS procedure works in much the same way as the REPORTS procedure, albeit slightly more complicated. See the GRAPHICS panel in Figure 4. Instead of one SAS prototype, there are three, and...
the user faces a larger selection: vertical or horizontal bar charts, either simple (one X-axis variable) or complex (two X-axis variables, one as a subgroup to the other), or pie charts. The prototype for the complex SAS/GRAPH program is shown in Figure 5.

As with the REPORTS procedure, a copy is made of the chosen prototype and the user's choices are substituted for the dummy variables. Additional XEDIT macros supply secondary titles describing the sort done and some of the less well-understood codes within a given sort. A sample graph is shown in Figure 6. Please note that these graphical funding summaries are normally plotted in color; some adjustment had to be made in the PATTERN statements for the example to be produced effectively in black and white. Graphs are sent directly to an HP 7220 eight-pen plotter, since no color terminal (IBM 3279) is available.

ACCESSING FILED REPORT LISTINGS

Any of the report listings saved on disk in the REPORTS procedure may be brought up for review at any time through the LIBRARY procedure. Two panels are used in this procedure. The first asks the user which report he wants and makes available a list of all reports filed on disk, and the second provides options for that listing: browse, print, rename, erase, send to another user, or look at another listing.

When no more reports are to be examined, control is returned to the master EXEC and SPCS is concluded.

CONCLUSION

The Strategic Planning Control System has been effective in reducing the amount of overhead, frustration, and general inefficiencies plaguing the methodologies of past years. The combination of SAS, VM, and assorted CMS products has enabled the construction of a user-friendly, interactive system that has automated most of the day-to-day work of strategic planning, relieving secretaries of many hours of typing and managers of many weeks of manually sorting, ranking, and structuring reports during the strategic planning cycle.

Some of the key advantages to the system lie in the ease of package creation, collection, printing, and filing, and in the direct recording of package information from the individual's machine to the system's data base. New tools, such as color graphics, contribute to presentations by showing more clearly the distribution of projects in an organization. By aiding management to chart business development, SPCS realizes its potential to help control the day-to-day operations of strategic planning.

ACKNOWLEDGEMENTS

The author wishes to thank Bob Martin of Texas Instruments for his help in harnessing an unwieldy file to an ordinary IBM 3278 screen.

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FILENAME

Each package form, as a CMS file, has a filename, a filetype, and a filemode: All package forms share an unique filetype and filemode so as not to differate it from the other package forms. As in this example, the filenames are usually short descriptions of the full package name.

Notes for the reader:

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Called by the REPORT procedure of SPCS, this prototype for creating top-level summary reports is copied and modified to substitute the user's choice of sort(s) for the dummy sorts provided in the BY and PAGEBY statements. The permanent SAS dataset, ODP.DAT, was created earlier from SPCS’s updated data file.

```
OPTIONS CENTER PS=54 LS=132;
CMS FILEDEF ODP DISK Dummy DUMMY *
DATA STATS; SET ODP.DAT;
PROC SORT DATA = STATS; BY DUMMIES;
DATA PRINTALL; SET STATS; BY DUMMIES;
* Calculate the total expenses for each package;
TOTAL = LABOR + COMPUT + OTHER;
* Initialize the cum totals for each category within the top sort;
IF FIRST.DUMMY1 THEN DO;
CUMTOT = 0;
CUMINTMM = 0;
CUMTOTMM = 0;
END;
CUMTOT + TOTAL;
CUMINTMM + INTMM;
CUMTOTMM + INTMM + EXTMM;
* Print package data in report format;
PROC PRINT DATA = PRINTALL; PAGEBY TOPDUMMY; BY TOPDUMMY;
TITLE EQUIPMENT GROUP INFORMATION SYSTEMS;
TITLE2 DISTRIBUTED COMPUTER SERVICES;
TITLE4 1983 FUNDING SUMMARY;
TITLE5 $000;
TITLE7 SORTED BY SORTNAME;
RUN;
```

Figure 2: PROTOTYPE FOR CREATING TOP-LEVEL SUMMARY REPORTS

For this example, the user wants to create a top-level summary report
* with two sorts: product line within strategy,
* A$SORT1 = strategy and A$SORT2 = product line
* A$COUNT2 = 1 indicates that two sorts have been chosen
* Save the prototype...work with a copy

COPY ODP SAS D ODPSORT SAS D
A$STACK MESSAGE OFF
A$STACK TOP
A$STACK C/DUMMIES
A$STACK C/PAGEBY TOPDUMMY
A$STACK C/TOPDUMMY
A$STACK C/SORTNAME
A$STACK FILE
EXEC SASEX ODPSORT
```

Figure 3: CODE TO INCORPORATE THE USER’S SORTS INTO THE prototype

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ODP/OST GRAPHICS

Enter any character beside your selections.

Type of Plot: (choose one)
- Simple Vertical Bar Plot
- Complex Vertical Bar Plot
- Simple Horizontal Bar Plot
- Complex Horizontal Bar Plot
- Pie Chart

X-Axis: For a simple bar plot or pie chart, choose one.
For a complex bar plot, choose two: type '1' beside your choice for the primary group and '2' beside your choice for the subgroup.

- Type
- Strategy
- Product Line
- Cost Center
- Pool

Y-Axis: (choose one)
- $X
- Total MM
- Internal MM
- External MM

Output: (choose one)
- Foil
- Paper

PF1 = HELP
Enter = EXECUTE
PF3 = QUIT

Figure 4: GRAPHICS PANEL

This SAS program is the prototype for producing bar graphs with the SUBGROUP option. Called by the GRAPHICS procedure of SPCS, the user's choice of X and Y-axis variables, plus the variable to be subgrouped, are substituted for the XAXIS, YAXIS, and XAXIS2 variables, respectively. The code that makes these changes also exchanges BARTYPE for either HBAR or VBAR, XNAME and YNAME for the full descriptions of the X and Y-axis variables, and SECSORT for the description of the variable to be subgrouped. The macro also assigns descriptive sub-titles and footnotes, as needed.

Figure 5 shows the graph that is produced. For the sake of this example, the substitution made will be listed as a comment under the statement where it occurs. Note that this SAS/GRAPH program plots product line as the X-axis main GROUP, type as its SUBGROUP, and total man-months as the Y-axis;

OPTIONS DIV1 = HP7220T MODE = 1200 VSIZE = 7.5 HSIZE = 10 INTRMNL COLORS = (BLACK,RED,BLUE,GREEN,ORANGE,VIOLET,BROWN,GO\n) PLOTMNTS = 8 SPEEO = 10;
CMS FILEDEF OOP DISK DUMMY DUMMY *;
DATA STATS; SET ODP.DATA;

* Replace the dummy X-axis variables with the user's choices;
PROC SORT DATA = STATS; BY XAXIS XAXIS2;
DATA PRINT; SET STATS; BY XAXIS XAXIS2;

* Initialize the sum values to zero for every subgroup;
IF FIRST. XAXIS2 THEN DO;
* first. typ ;
TOTALK = 0;
TOTMM = 0;
INTMM = 0;
EXTMM = 0;
END;
TOTALK + LABOR + COMPUT + OTHER;
INTMM + INT + EXT;
EXTMM + INT;
INTMM = INT;
EXTMM = EXT;
IF LAST. XAXIS2;
* last. typ ;
SECSORT XAXIS2 YNAME = YAXIS; OUTPUT;
* plottype = typ ; totalmm = totmm;
* Output is sent to the plotter with PROC GREPLAY in another SAS pgm;
PROC GCHART GOUT = PLOT.COMPLEX;
 BARTYPE XAXIS / SUMVAR = YNAME TYPE = SUM DISCRETE
 SUBGROUP = SECSORT;
* vbar proc / sumvar = totalmm type = sum discrete
 SUBGROUP = SECSORT;
TITLE f 193 = BLACK f COMPLEX 1983 ODP/OST PACKAGES;
 PATERN1 = BLUE V=XX;
 PATTERN2 = GREEN V=XX;
 PATTERN3 = BROWN V=XX;
 PATTERN4 = RED V=XX;
 PATTERN5 = VIOLET V=XX;
 PATTERN6 = ORANGE V=XX;

Figure 5: PROTOTYPE FOR CREATING COLOR PLOTS
1983 ODP/OST PACKAGES
PRODUCT LINE GRAPHED AGAINST TOTAL MAN MONTHS
SUB GROUPED BY PACKAGE TYPE

Figure 6: SAMPLE "COMPLEX" GRAPH