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# Spreadsheet Analysis in Human Service Administration<sup>1</sup>

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## Introduction

In recent years, interest among human service administrators in the subject of computers and electronic data processing has risen dramatically. Each of the human service professions has shown considerable interest in electronic computing, together with strong reservations about the diverse implications of the computer revolution (Kelley & Weston, 1985; Sullivan, 1980).

After scattered early fascination (and horror) with computer therapist programs like "Eliza" the pseudo-Rogerian therapist, interest quickly settled on the use of computers in diverse administrative applications, principally involving the capture, tabulation and summary of program data. "Eliza" is a fairly primitive sentence-analyzing program that selects subjects, objects and verbs in more or less patterned sequences and "feeds them back" to the user as questions: E.g., The statement "I *feel so depressed and angry* " is likely to elicit the question, "Why do you *feel so depressed and angry*?" Not a trick exactly, but also not a serious pretender to "artificial intelligence!" (Weizenbaum, 1976)

The use of mainframe or minicomputer-based Management Information Systems (MIS) in hospitals, clinics, community mental health centers and state hospitals was already widespread by 1980. For example, many human service professionals interested in computers have joined the Computer Users in Social Services (CUSS) Network. Haworth Press has begun publication of a specialty journal entitled *Computers in Human Services* and professional meetings and conferences now typically include one or more sessions devoted to computer topics.

Recently, the free-standing desktop computer also known as the personal computer or "PC" has entered the human service administration scene, along with a host of new classes of applications software: word processing, database management, decision-support systems, expert systems, and desktop publishing, to name a few (Crimande & Sawyer, 1983; Kucic, Sorensen & Hornberg, 1983; Lorents, 1981; Mutschler & Cnaan, 1985; Newkham &

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Bawcon, 1981; Schoech, 1982; Slavin, 1981; Velasquez & Lynch, 1981; Zuboff, 1983).

One of the most useful genres of personal computer software for human service administrators is the "electronic spreadsheet." Despite its status as *the* single most important reason for the commercial success of the personal computer (or PC), spreadsheets have received scant attention in human service administration. An extended search of the major electronic bibliographies and information services turned up no references to spreadsheets in the human service literature.

Spreadsheets of the paper and pencil variety were a stable component in all types of financial management long before the advent of personal computers (Lohmann, 1980, 172-176). The development of spreadsheet software, however, is considered by many experts to be one of the prime factors (along with word processing) in converting the personal computer into a useful tool for management professionals.

The electronic spreadsheet phenomenon began in 1978, with the pioneering VisiCalc program, developed by Robert Frankston and Dan Bricklin for the Apple II, which came on the market in 1977. Spreadsheets quickly became the best-selling pieces of PC software among business executives long accustomed to the analysis of financial statements. Software success breeds imitation, and VisiCalc was quickly followed by Super-Calc, Calc-star, and other "first-generation" spreadsheets. Within only a few years, a number of "second-generation" spreadsheet programs such as Multiplan offered a host of additional features, such as variable width columns, and "iteration" (allowing joint computation of formulas which incorporate one another's terms). More recently, what might be termed "third generation" spreadsheets, such as Symphony (for MS-DOS machines), Jazz and Excel (for Apple's Macintosh series), Enable and other "integrated packages" allow integration of spreadsheets with word processing, graphics, and other applications.

## Spreadsheet Concepts

The elements of an electronic spreadsheet are simple and straightforward. First of all, there is the concept of the "window." This is created by a piece of software capable of creating, on a computer screen, a simple (but often quite large) matrix of cells. (See Figure 1) Spreadsheet programs allow "scrolling" the window up, down, right, and left so that many cells (more than will actually fit on the screen at one time) are easily accessible to the user.

Available software varies tremendously on the size and complexity of matrices, from the matrices for small home computers which may have fewer than 100x100 cells, to massive programs capable of producing matrices of

half a million cells! (well beyond the memory-storage capabilities of most existing personal computers as well as their users)!

There are some important differences among spreadsheet programs. First of all, programs may utilize several possible "input" approaches to place values in the cells of the matrix, including special input boxes, cursor placement on the desired cell, "mice" and touch-sensitive screens. Also, column and row locations may be designated by a letter and number system, as with Super-Calc and Lotus 1-2-3 where "A18" designates row 18 of the first column; by the RC (or Row-Column) system of Multiplan where the same location is R18C1, or by some other notation system. (Notation throughout this article is in the Multiplan convention: "R" precedes the row number and "C" precedes the column number.

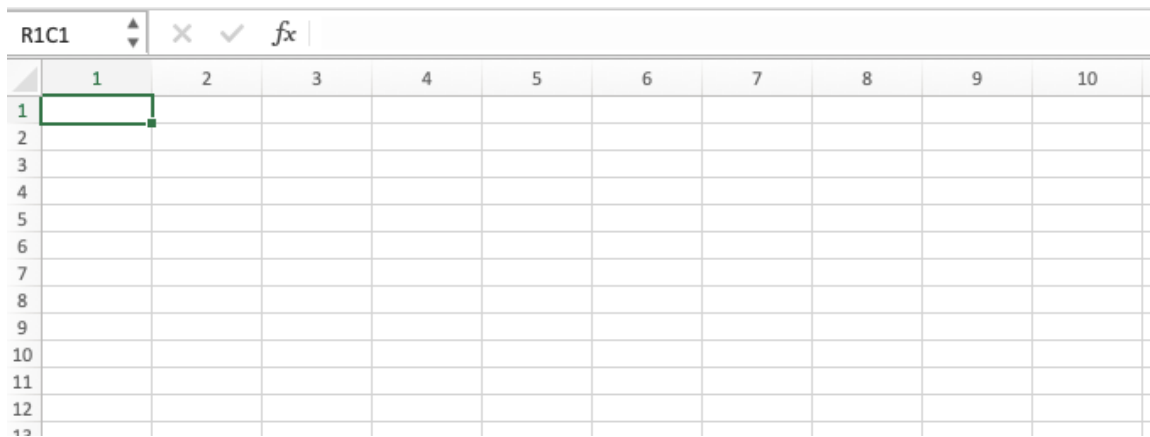
Another major set of differences between spreadsheet programs are the variety and types of functions supported. Existing programs vary from simple programs which support only basic arithmetic, to sophisticated programs which support logical, trigonometric and statistical functions, and such specialized features as "lookup tables", "linking" of two or more separate spreadsheet files, and "importing" of data from other applications.

Despite differences in notation, the sophistication and cost of the software involved or the advanced features in a package, however, basic spreadsheet concepts are similar enough to enable general discussion of possible applications to common human service administration problems. Although the cost of spreadsheets varies widely, the human service user should expect to spend from \$99-\$495 for a PC-based spreadsheet program. Several companies also produce spreadsheet software for mainframe and mini-computers. et concepts are similar enough to enable general discussion of possible applications to common human service administration problems.

## Basic Spreadsheet Theory

Cell values in an electronic spreadsheet may be one of three types: constants, numbers and equations. *Constants* remain unchanged throughout an application. "String values", (or labels), consisting of combinations of letters and numbers whose primary function is to convey information to the viewer on the screen, are the most common examples of such constants. The items in Column 1 and Row 1 of Figure 2 are all examples of constants. The greatest initial difficulty in recognizing constants is usually in cases where a seeming numerical value (E.g., the year 1981) is used as a label. At the same time, numerical labels can have unique advantages in some spreadsheets, as in the case of the Multiplan equation (=1981 +COLUMN()-4) which produces a series of successive year column headings (1981, 1982, 1983, 1984) beginning in the column where it is placed.

Figure 1. Spreadsheet Window (Showing 120 Cells: 10 X 12)



|    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|----|---|---|---|---|---|---|---|---|---|----|
| 1  |   |   |   |   |   |   |   |   |   |    |
| 2  |   |   |   |   |   |   |   |   |   |    |
| 3  |   |   |   |   |   |   |   |   |   |    |
| 4  |   |   |   |   |   |   |   |   |   |    |
| 5  |   |   |   |   |   |   |   |   |   |    |
| 6  |   |   |   |   |   |   |   |   |   |    |
| 7  |   |   |   |   |   |   |   |   |   |    |
| 8  |   |   |   |   |   |   |   |   |   |    |
| 9  |   |   |   |   |   |   |   |   |   |    |
| 10 |   |   |   |   |   |   |   |   |   |    |
| 11 |   |   |   |   |   |   |   |   |   |    |
| 12 |   |   |   |   |   |   |   |   |   |    |

The second type of cell-values in a spreadsheet are *numbers*, such as those shown in column 2 of Figure 2. Numbers in a spreadsheet program can typically be manipulated arithmetically or algebraically, and in some cases with the aid of built in trigonometric, statistical, logical or other functions. Such manipulations are done with the third type of possible cell-value, *equations*. Column 2, Row 7 (R7C2) of Figure 2 shows what appears to be a number, but as shown in Figure 3, it is actually a formula. Spreadsheet programs do not "report back" equations to the screen. Instead, the equation is automatically solved and the solution is shown in the cell where the equation has been placed.

Figure 2. Example 2 X 5 Table

The screenshot shows a spreadsheet with a formula bar at the top displaying 'R2C2' and the value '8327'. The spreadsheet grid has columns 1 through 10 and rows 1 through 20. A table is defined in the first two columns, with the following data:

| Name         | Income      |
|--------------|-------------|
| John         | \$8,327.00  |
| Mary         | \$7,928.00  |
| Bill         | \$5,820.00  |
| Jane         | \$4,775.00  |
| Total Family | \$26,850.00 |

Figure 3. Example Table Showing Formula

The screenshot shows a spreadsheet with a formula bar at the top. The spreadsheet grid has columns 1 through 5 and rows 1 through 20. A table is defined in the first two columns, with the following data:

| Name         | Income              |
|--------------|---------------------|
| John         | 8327                |
| Mary         | 7928                |
| Bill         | 5820                |
| Jane         | 4775                |
| Total Family | =SUM(R[-5]C:R[-2]C) |

Although there are many advanced user features, the ability to combine the elements of strings, variables, and formulae in desired combinations (or tables) is what gives the spreadsheet its analytical power. Each time a number or an equation is changed, the equations are recalculated and the spreadsheet is updated. Spreadsheets thus combine many of the advantages

of paper and pencil, statistical packages, and report generators into a single program.

## Applications to Human Service Administration

Anyone who has ever done program budgets or prepared a report in which repeated recalculation of long columns of figures was involved will immediately appreciate the usefulness of spreadsheet software. Instead of the individual having to recompute each time a single digit changes, one merely "plugs in" numbers as new cell values, and the program recomputes all of the totals, using the formulas and the other data already in place.

Figure 4. Budget With Standard Increments

|    | 17 | 18 | 19 | 20                         | 21   | 22               | 23 | 24               | 25 | 26 |
|----|----|----|----|----------------------------|------|------------------|----|------------------|----|----|
| 24 |    |    |    |                            |      |                  |    |                  |    |    |
| 25 |    |    |    |                            |      |                  |    |                  |    |    |
| 26 |    |    |    |                            |      |                  |    |                  |    |    |
| 27 |    |    |    |                            |      |                  |    |                  |    |    |
| 28 |    |    |    | Percentage Increment       | 0.05 |                  |    |                  |    |    |
| 29 |    |    |    | Fringe Benefits Percentage | 0.17 |                  |    |                  |    |    |
| 30 |    |    |    |                            |      |                  |    |                  |    |    |
| 31 |    |    |    | <b>Line Item</b>           |      | <b>Last Year</b> |    | <b>This Year</b> |    |    |
| 32 |    |    |    | Professional Salaries      |      | \$71,841.00      |    | \$75,433.05      |    |    |
| 33 |    |    |    | Clerical Salaries          |      | \$8,299.00       |    | \$8,713.95       |    |    |
| 34 |    |    |    | Fringe Benefits            |      | \$13,623.80      |    | \$14,304.99      |    |    |
| 35 |    |    |    | Office Rental              |      | \$4,108.00       |    | \$4,313.40       |    |    |
| 36 |    |    |    | Staff Travel               |      | \$2,742.00       |    | \$2,879.10       |    |    |
| 37 |    |    |    | Telephone                  |      | \$977.00         |    | \$1,025.85       |    |    |
| 38 |    |    |    | Office Equipment           |      | \$1,203.00       |    | \$1,263.15       |    |    |
| 39 |    |    |    | Office Supplies            |      | \$1,806.00       |    | \$1,896.30       |    |    |
| 40 |    |    |    |                            |      |                  |    |                  |    |    |
| 41 |    |    |    | <b>Total Project Costs</b> |      | \$104,599.80     |    | \$109,829.79     |    |    |
| 42 |    |    |    |                            |      |                  |    |                  |    |    |
| 43 |    |    |    |                            |      |                  |    |                  |    |    |

In terms of applications to human service problems, electronic spreadsheets may be said to involve two general dimensions. The first is "what if" analysis, or before-the-fact applications in planning and program development. The second is report-generation, or after the fact synthesis and summary of data. This may involve financial data, worker activity summaries, client information, or other data. If done by hand, either may involve significant amounts of tedious calculation and recalculation, much of which can be eliminated or radically minimized with proper spreadsheet usage. In fact, most users find that once a spreadsheet is designed, set up, and tested, very little change is necessary thereafter. To illustrate some possible human service applications, let us look more closely at a couple of sample applications.

Figure 4 (above) shows a simple budget with Fringe Benefits computed as a percentage of total personnel costs ( $R32C22 + R33C22$ ) and Next Year

projections based on a fixed percentage (computed from R28C21). Figure 5 shows what appears to be a completely different budget from the same table with different figures in the Percentage Increment and Fringe Benefit cells.

**Figure 5. Same Budget With Different Increments**

|    |    |    |    |                            |      |                  |    |                  |    |    |
|----|----|----|----|----------------------------|------|------------------|----|------------------|----|----|
|    | 17 | 18 | 19 | 20                         | 21   | 22               | 23 | 24               | 25 | 26 |
| 24 |    |    |    |                            |      |                  |    |                  |    |    |
| 25 |    |    |    |                            |      |                  |    |                  |    |    |
| 26 |    |    |    |                            |      |                  |    |                  |    |    |
| 27 |    |    |    |                            |      |                  |    |                  |    |    |
| 28 |    |    |    | Percentage Increment       | 0.08 |                  |    |                  |    |    |
| 29 |    |    |    | Fringe Benefits Percentage | 0.21 |                  |    |                  |    |    |
| 30 |    |    |    |                            |      |                  |    |                  |    |    |
| 31 |    |    |    | <b>Line Item</b>           |      | <b>Last Year</b> |    | <b>This Year</b> |    |    |
| 32 |    |    |    | Professional Salaries      |      | \$71,841.00      |    | \$77,588.28      |    |    |
| 33 |    |    |    | Clerical Salaries          |      | \$8,299.00       |    | \$8,962.92       |    |    |
| 34 |    |    |    | Fringe Benefits            |      | \$16,829.40      |    | \$18,175.75      |    |    |
| 35 |    |    |    | Office Rental              |      | \$4,108.00       |    | \$4,436.64       |    |    |
| 36 |    |    |    | Staff Travel               |      | \$2,742.00       |    | \$2,961.36       |    |    |
| 37 |    |    |    | Telephone                  |      | \$977.00         |    | \$1,055.16       |    |    |
| 38 |    |    |    | Office Equipment           |      | \$1,203.00       |    | \$1,299.24       |    |    |
| 39 |    |    |    | Office Supplies            |      | \$1,806.00       |    | \$1,950.48       |    |    |
| 40 |    |    |    |                            |      |                  |    |                  |    |    |
| 41 |    |    |    | <b>Total Project Costs</b> |      | \$107,805.40     |    | \$116,429.83     |    |    |
| 42 |    |    |    |                            |      |                  |    |                  |    |    |
| 43 |    |    |    |                            |      |                  |    |                  |    |    |
| 44 |    |    |    |                            |      |                  |    |                  |    |    |

A print-ready version of the budget in Figure 5 suitable for distribution is shown in Figure 6. It was created simply by turning off the gridlines

## "What If" Analysis

In addition to easing and speeding arithmetic, spreadsheets have given rise to a practice called "What If" Analysis, in which the analyst systematically replaces certain key values in a matrix with alternative values to determine the effects on yet other cell values. "What If" Analysis refers to an elementary form of simulation activity in which a two-dimensional "model" in the form of an MxN matrix is constructed with the spreadsheet, and various values are modified to correspond with changes in real world conditions. The term "What-If Analysis" has become a universal label for the type of sequential simulation of alternatives and options made possible by the speed and ease of spreadsheet programs. Because electronic spreadsheet calculation is virtually instantaneous, a very large number of plausible hypotheses can be tested quite readily. Thus, we can examine "What would happen if we doubled the number of clients," and "What if we expanded our services into another community." In sophisticated versions of What If Analysis, regression equations using known quantities and probabilities can be included in the spreadsheet.



Such capabilities are, of course, not new to computers. Mainframe software packages such as SAS, SPSS, and the IMSL (International Mathematical and Statistical Library) have allowed such computation possibilities for more than a decade. In addition, much of the interest in computer simulations is grounded in the technology of automating sets of differential or simultaneous linear equations. However, such procedures usually involved advanced mathematical abilities and above average programming knowledge and skill.

**Figure 6. Budget as Printed (Gridlines Turned Off)**

| <b>Project Budget Example</b> |                     |                     |
|-------------------------------|---------------------|---------------------|
| Percentage Increment          | 0.08                |                     |
| Fringe Benefits Percentage    | 0.21                |                     |
| <br>                          |                     |                     |
| Line Item                     | Last Year           | This Year           |
| Professional Salaries         | \$71,841.00         | \$77,588.28         |
| Clerical Salaries             | \$8,299.00          | \$8,962.92          |
| Fringe Benefits               | \$16,829.40         | \$18,175.75         |
| Office Rental                 | \$4,108.00          | \$4,436.64          |
| Staff Travel                  | \$2,742.00          | \$2,961.36          |
| Telephone                     | \$977.00            | \$1,055.16          |
| Office Equipment              | \$1,203.00          | \$1,299.24          |
| Office Supplies               | \$1,806.00          | \$1,950.48          |
| <br>                          |                     |                     |
| <b>Total Project Costs</b>    | <b>\$107,805.40</b> | <b>\$116,429.83</b> |

The real genius of the PC-based electronic spreadsheet is that just about anyone can learn the basic operations in a very short period of time. Thus, electronic spreadsheet programs dramatically increase the potential for use in social agency settings without access to mainframe computing installations, and also simplify many analytical tasks to the point where the average human service professional could master Macintosh Multiplan in a single afternoon.

## Budget Formulation

Probably the single biggest reason for the initial success of the PC in business and professional settings has been the use of spreadsheets for financial analysis. Tax returns, financial statements, etc. are just part of the many financial applications of spreadsheet technology. For example, the author has developed a system of "linked" spreadsheets which automatically synthesize and compute the IRS-1040 and associated supportive schedules. Another set of linked tables easily computes gross and net salaries, summarizes fringe benefits, provides running information on W-2's and IRS Form 990 and related personnel information.

In the human service agency, the kinds of tedious calculations of calculating and recalculating budgets can be dramatically reduced through its use. For example, the standard budget form in Figures 4 and 5 shows a "What If" analysis involving first a 5% budget increment and then an 8% increment. This entire change took approximately 5 seconds to insert the number in R28C21. Further, either document can be printed directly without the matrix boxes and row-column references.

Thus, one of the real advantages of electronic spreadsheets is that "standing" forms which involve repeated calculations can be set up and saved for future use. In addition to being a time-saver, this also offers the analyst continuing opportunities to refine the model involved over time.

## Salary Schedule

One interesting application of spreadsheets is in the construction of reference tables, such as a Salary Schedule. The basic table shown in Figure 7, for example, consists entirely of formulas, and generates rates per hour and annual salaries for a range of "grades" and "levels" (See Figure 8 for the partial list of the formulas involved.) The entire table is generated by four user-determined variables (shown in the upper left: "Base", or the minimum payment at Grade 1, Level 1; the amount per hour of the level increment; the percentage of the grade increment; and the number of hours worked.) By varying the number of hours, one can produce daily, weekly, monthly, quarterly or annual estimates. The cents-per-hour increment for levels and the percentage increments for grades are for illustration purposes only. A user would probably use cents or percentages for either or both. What the user creates is only the table of equations. What the viewer sees is only the results of those calculations.

**Figure 7. Sample Human service Agency Salary Schedule**

Salary Schedule Calculator

| VARIABLES |             |                  |             | LEVELS   |             |             |             |
|-----------|-------------|------------------|-------------|--|-------------|-------------|-------------|
| Hours:    | 2080        | Level Increment: | \$0.95      | This table will automatically calculate a salary schedule for 7 levels and 6 grades based on the 4 variables at the left. To change the calculations, type different numbers into any (or all) of the 4 boxes. |             |             |             |
| Base:     | \$13.75     | Grade Increment: | 10.00%      |  |             |             |             |
|           |             |                  |             |  |             |             |             |
| GRADE     | 1           | 2                | 3           | 4  | 5           | 6           | 7           |
| I         | \$13.75     | \$14.70          | \$15.65     | \$16.60  | \$17.55     | \$18.50     | \$19.45     |
|           | \$28,600.00 | \$30,576.00      | \$32,552.00 | \$34,528.00  | \$36,504.00 | \$38,480.00 | \$40,456.00 |
| II        | \$15.13     | \$16.08          | \$17.03     | \$17.98  | \$18.93     | \$19.88     | \$20.83     |
|           | \$31,460.00 | \$33,436.00      | \$35,412.00 | \$37,388.00  | \$39,364.00 | \$41,340.00 | \$43,316.00 |
| III       | \$16.64     | \$17.59          | \$18.54     | \$19.49  | \$20.44     | \$21.39     | \$22.34     |
|           | \$34,606.00 | \$36,582.00      | \$38,558.00 | \$40,534.00  | \$42,510.00 | \$44,486.00 | \$46,462.00 |
| IV        | \$18.30     | \$19.25          | \$20.20     | \$21.15  | \$22.10     | \$23.05     | \$24.00     |
|           | \$38,066.60 | \$40,042.60      | \$42,018.60 | \$43,994.60  | \$45,970.60 | \$47,946.60 | \$49,922.60 |
| V         | \$20.13     | \$21.08          | \$22.03     | \$22.98  | \$23.93     | \$24.88     | \$25.83     |
|           | \$41,873.26 | \$43,849.26      | \$45,825.26 | \$47,801.26  | \$49,777.26 | \$51,753.26 | \$53,729.26 |
| VI        | \$22.14     | \$23.09          | \$24.04     | \$24.99  | \$25.94     | \$26.89     | \$27.84     |
|           | \$46,060.59 | \$48,036.59      | \$50,012.59 | \$51,988.59  | \$53,964.59 | \$55,940.59 | \$57,916.59 |

Figure 8 (below) shows the formulas for Grades 1-5 and all levels. Simply by typing different values into the cells labeled Variables, all of the values in Figure 7 will be automatically recomputed, and extension of the table to include additional Grades or Levels is straightforward. Likewise, computing level and grade increments as either dollar values or percentages is simply a matter of adjusting the formulae.

Figure 8. Formulae for Part of Figure 7

| VARIABLES |                             |                     |                     | LEVELS  |                     |   |   |
|-----------|-----------------------------|---------------------|---------------------|---|---------------------|---|---|
| Hours:    | 2080                        | Level Increment:    | 0.95                | This table will automatically calculate any schedule for 7 levels and 6 grades based on the 4 variables at the left. To change the calculations, type different numbers into any (or all) of the 4 boxes. |                     |   |   |
| Base:     | \$13.75                     | Grade Increment:    | 0.1                 |   |                     |   |   |
|           |                             |                     |                     |   |                     |   |   |
| GRADE     | 1                           | 2                   | 3                   | 4   | 5                   | 6 | 7 |
| I         | =R[-3]C                     | =RC[-1]+R[-5]C      | =RC[-1]+R[-5]C[-1]  | =RC[-1]+R[-5]C[-2]  | =RC[-1]+R[-5]C[-3]  |   |   |
|           | =R[-4]C*R[-6]C              | =R[-1]C*R[-6]C[-1]  | =R[-1]C*R[-6]C[-2]  | =R[-1]C*R[-6]C[-3]  | =R[-1]C*R[-6]C[-4]  |   |   |
| II        | =R[-2]C+(R[-2]C*R[-5]C[1])  | =RC[-1]+R[-7]C      | =RC[-1]+R[-7]C[-1]  | =RC[-1]+R[-7]C[-2]  | =RC[-1]+R[-7]C[-3]  |   |   |
|           | =R[-1]C*R[-8]C              | =R[-1]C*R[-8]C[-1]  | =R[-1]C*R[-8]C[-2]  | =R[-1]C*R[-8]C[-3]  | =R[-1]C*R[-8]C[-4]  |   |   |
| III       | =R[-2]C+(R[-2]C*R[-7]C[1])  | =RC[-1]+R[-9]C      | =RC[-1]+R[-9]C[-1]  | =RC[-1]+R[-9]C[-2]  | =RC[-1]+R[-9]C[-3]  |   |   |
|           | =R[-1]C*R[-10]C             | =R[-1]C*R[-10]C[-1] | =R[-1]C*R[-10]C[-2] | =R[-1]C*R[-10]C[-3]   | =R[-1]C*R[-10]C[-4] |   |   |
| IV        | =R[-2]C+(R[-2]C*R[-9]C[1])  | =RC[-1]+R[-11]C     | =RC[-1]+R[-11]C[-1] | =RC[-1]+R[-11]C[-2]   | =RC[-1]+R[-11]C[-3] |   |   |
|           | =R[-1]C*R[-12]C             | =R[-1]C*R[-12]C[-1] | =R[-1]C*R[-12]C[-2] | =R[-1]C*R[-12]C[-3]   | =R[-1]C*R[-12]C[-4] |   |   |
| V         | =R[-2]C+(R[-2]C*R[-11]C[1]) | =RC[-1]+R[-13]C     | =RC[-1]+R[-13]C[-1] | =RC[-1]+R[-13]C[-2]   | =RC[-1]+R[-13]C[-3] |   |   |
|           | =R[-1]C*R[-14]C             | =R[-1]C*R[-14]C[-1] | =R[-1]C*R[-14]C[-2] | =R[-1]C*R[-14]C[-3]   | =R[-1]C*R[-14]C[-4] |   |   |
| VI        | =R[-2]C+(R[-2]C*R[-13]C[1]) | =RC[-1]+R[-15]C     | =RC[-1]+R[-15]C[-1] | =RC[-1]+R[-15]C[-2]   | =RC[-1]+R[-15]C[-3] |   |   |
|           | =R[-1]C*R[-16]C             | =R[-1]C*R[-16]C[-1] | =R[-1]C*R[-16]C[-2] | =R[-1]C*R[-16]C[-3]   | =R[-1]C*R[-16]C[-4] |   |   |

More Complex Simulations

One is by no means bound by simple, single-table "simulations" in most contemporary spreadsheet software (Luse, 1980). "Linking" tables together has already been mentioned above. As an example of this, I have created a 25-agency budget simulation containing over 1,200 equations, in which 10 funding sources in two communities fund anywhere from one to five

programs in each agency. The model, which is called "Lindblom County" because it operates on incremental change assumptions, incorporates simple regression equations which capture user estimates of the power, prestige, effectiveness and similar parameters of each program. Even a slight change in any program results in a complete re-computation of all other agency budgets (I.e., simulates a new fiscal year).

Similar kinds of spreadsheet simulations in the clinical arena are also not difficult to envision. For those who dislike or distrust quantification, it is entirely possible to construct a completely non-quantitative spreadsheet, using logical functions only (Kay, 1984).

## A Challenge for the Future

Spreadsheet analysis on the personal computer is still less than 10 years old. However, it has proven to be a mainstay of PC applications, and spreadsheet programs continue to be among the best sellers in PC software. With the proliferation of PC's in the administrative suites of state and general hospitals, Community Mental Health Centers, private practices, community agencies and group homes, the base for extensive utilization of spreadsheets by human service administrators is growing rapidly. While the cost of spreadsheet software is hardly incidental, the potential labor-saving advantages of spreadsheets in the laborious tasks of budget preparation and tracing alone justifies the outlay for most agencies.

We are already building an extensive knowledge and experience base in the application of spreadsheets to the problems of human service administration. However, as the paucity of literature on this subject shows, we have yet to settle upon ways of disseminating the best and most effective applications of spreadsheet technology from agency to agency and community to community. Such diffusion of "good ideas" and pre-tested "templates" could turn out to be one of the most impressive time- and labor-saving aspects of spreadsheet technology. The challenge to human service administrators, therefore, is twofold: First, we need to identify those problems which are most amenable to spreadsheet technology. Second, we need to discover effective ways to disseminate models, templates and other spreadsheet solutions to those problems.

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