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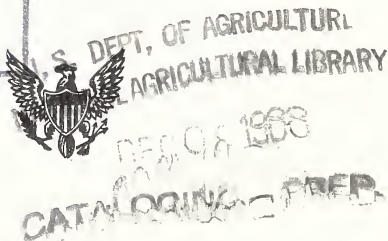of Agriculture—Held in Washington, D.C.,
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COST OF COMPUTER PROGRAM DEVELOPMENT—TIME AND MONEY

(By Muriel S. Brink, Extension Nutritionist and Associate Professor, Agricultural Extension Service, University of Minnesota)

The development of any educational resource requires an investment of time and money. Calculating the precise cost for developing a computer program is as difficult as calculating the precise cost of developing other educational resources. Today, I will delineate tasks which require time and budget considerations.

The decision to develop a computer program should be made after considering these factors:

1. Capabilities of the computer system versus other media;
2. Subject matter of the potential program;
3. Needs, interests, and abilities of intended clientele;
4. Projected use of the program; and
5. Availability of the computer system to the intended clientele.

TIME

The total time required to develop a computer program varies with topic, availability and adaptability of data bases, experience of the individuals, and number of unanticipated problems. Based upon my experience with computer program development, I have divided the tasks (responsibilities) between the subject matter specialist and the computer programer as follows:

Subject matter specialist:

1. Determines objectives;
2. Consults with programer throughout the development;
3. Justifies use of computer versus other media;
4. Determines output format;
5. Develops flow chart;
6. Assists with debugging of program;
7. Develops additional supporting materials—that is, instructions for preparing input sheet, input sheet dictionaries, if needed, and other supporting materials;
8. Does subject matter documentation which includes citing the sources of various data bases and a listing of assumptions which were made in the development of the program; and
9. Tests program with potential users.

Many of these tasks are the same as those required for the development of any type of educational or decisionmaking resource.

Computer programer:

1. Consults with the subject matter specialist throughout the developmental process;

2. Does the computer programing—this means coding the program in appropriate computer language and implementing the program;

3. Debugs the program; and

4. Does the documentation of the computer program—that is, provides a detailed explanation of the internal operation of the program. This gives another programer the necessary information to adapt or change the programs.

I have found it advantageous to have a computer programer on staff as part of the team. The programers employed by the Minnesota Agricultural Extension Service have an understanding of the mission of the organization, and, therefore, can assist in the development of programs which meet the objectives. Also, I've been able to develop programs without becoming an expert in the various computer languages and specifics of coding a computer program. It is also comforting to know that when problems arise, there are individuals available to assist with the troubleshooting. Knowing the computer programers are accessible increases interest in the development and use of computer programs.

MONEY

Salaries and/or wages and computer costs are the two major budget considerations. If the individuals are already employed by the organization, the salary or wage is not an additional cost but rather an allocation or redistribution of the individual's time. However, if services of a programer are needed, the hourly rate would depend upon the person's experience. The quoted hourly rate usually includes the programer's services, access to other consultants, and other supplies necessary for program development. The rate would not include computer time.

Computer costs include the cost of terminal and computer charges. Terminals can be leased or purchased. Before making a decision regarding the terminals, you may want to check to see if others within the organization have a terminal available and if you might work out some sharing arrangement. Computer charges vary among systems. Some computer systems offer several options to users. After reviewing the options, the user decides which option is best for the particular situation. For example, the University of Minnesota Computing Center provides these options:

1. *Connect time.*—The University user would pay a $10 per month fee plus $2 per hour connect time plus 20¢ per month for each 100,000 characters stored;

2. *One-half port.*—The University user would pay $100 per month which would include unlimited connect time, and storage of 300,000 characters. There would be an additional fee for storage beyond the 300,000 characters.

3. *Dedicated port.*—The University user can lease either a 10-character per second or a 30-character per second port. The monthly rate varies from $225 per month to $275 per month, depending upon the speed. Included in the monthly rate is unlimited connect time and storage for 600,000 characters. Again, there is an additional fee for storage of more than 600,000 characters.

An advantage of the fixed rate is that users can budget more accurately. The selection of an option may depend not only on your in-

tended use but also the extent to which others within the organization plan to use the computer system. The message I am trying to emphasize is find out who else is involved in computer application.

In summary, I would like to reemphasize that when developing a computer program, it is important to: (1) identify objectives, (2) know the functions the computer will perform, and (3) establish a good working relationship with the computer programer.

While I have not given specifics, I hope the identification of the cost factors in terms of time and money will help you estimate the cost of developing a computer program in your area. I am convinced that this approach is worth the investment.