Effectiveness considerations for end-user computing applications in multiple-location environments

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ABSTRACT

Critical distinctions can be made between broad classifications of end user computing applications known as enterprise-wide computing situations and the more focused requirements for dispersed or multiple-location environments. Attaining efficiency in administrative information management systems is the objective in both cases. This paper discusses the coordination, design, programming and training efforts associated with a management information system which spans geographically dispersed offices (multiple-locations) of an enterprise. The focus of the application development project was to eliminate the requirement for each of the offices to have specialized application packages and to help ensure uniformity in reporting.

INTRODUCTION

Enterprise computing, in the context of academic and administrative environments as seen by Fisher and Moore (1992) can be defined as a tightly linked system of computers and terminals in an organization which is designed to provide applications and information from both internal and external sources. In the broader context, the *organization* considered for *enterprise computing* discussions is at a single location. In the context of this paper, the organization is dispersed, i.e., it has distinct representations at *multiple-locations*. End-user computing concepts should be considered differently for the multiple-location scenario. This paper takes most generally accepted definitions of end-user computing and extends them to encompass functions and requirements which exist at each of the 30 offices of an organization. The system of computers or *network* in this case is considered to be a single *organization*. The central focus of the paper is to recognize that the effectiveness of resultant end user programs and applications for the *organization* in this environment is dependent upon the acceptance of some basic concepts of end-user computing. Other discussions explain that often it may be prudent to counter the basic tenets of end user computing or programming. The central idea presented in the paper is that *efficiency* is sometimes not based only on cost considerations. Of significance is the recognition given to the importance of and adherence to the actual procedures and actions for which the end user initially required the program and/or application. The obvious implication here is one of continuous quality improvement with respect to both the application and the function or activity which required it.

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The scenario used for this paper is the network of Single Parent/Displaced Homemakers (SP/DH) Coordinators, a network of thirty offices/sites which operates under the program name *New Connections in Georgia.* The *organizational* concept in this presentation is because the *network* in this case is made up of thirty offices which are administered from various Technical and Adult Education Institutes located across the state. Each of the thirty offices of the network provides the following three basic services for their respective clients:

1. Life Skills Workshops
2. Management Skills Training
3. Sessions/Workshops and Career Assessment Services to include advisement and placement counseling

Each office is minimally staffed with a coordinator who is effectively both the *administrator* and *staff* for the office. Generally, the coordinators are not particularly adept or proficient in computer-oriented activities. They, nonetheless, have distinct information management needs which can readily be met by using computers. Throughout this paper, these coordinators will be referred to as end users.

COORDINATION

An initial contact with the Chatahoochee Technical Institute, one of the thirty locations of the *New Connections in Georgia* program, generated the *organizational* focus of this presentation. The initial contact was for assistance and guidance in accomplishing tasks which were in line with *traditional* end-user computing concepts. Subsequent interactions with the initial site suggested that the same applications would be required at the remaining twenty-nine sites; however, program differences such as agencies and services available at the various sites as well as differences in client needs, suggested different applications for each of the respective sites.

Since the *New Connections in Georgia* program is federally funded, the *source and application of funds* requirement was obviously critical. In the context of the paper, this requirement may be interpreted as it relates to the traditional accounting requirement of showing where funds come from (source) and how they are expended (application). Beyond this basic need, however, was the more fundamental one of assessment, i.e., monitoring and reporting on the actual services provided compared to the actual needs of the clients served.

The *source and application* tasking was a rather straightforward function. The real challenge, with respect to the diversity of the respective offices which are located throughout the state of Georgia, was one of standardizing or benchmarking the assessment methods of the offices. The assessment tasking, in this context, becomes a means of attaining effectiveness and sustaining the quality of the overall program.

Recognition of the existence of commercially available software application packages which were designed to report on similar programs caused initial concern with respect to the precepts of traditional end user computing concepts. For example, some notable information systems texts such as Lucas (1990) define end user computing in terms of using . . . very high

level computer languages . . . so that users can extract data for information management (reporting) purposes. More timely and realistic views, such as the one presented by O'Leary (1993), address the use of prewritten programs, to include programs developed for readily available software application packages, as viable end user computing approaches. The latter approach is distinguished from very parochial and specific programs such as, in this case, a total information management package which was developed for a program in Florida which is similar to Georgia's *New Connections* program.

Beyond the cost prohibitive nature of specialized packages, consideration must be given to the fact that such packages are developed for reporting on specific features and requirements of the respective state(s). Converting the unique packages so they can be used to report on features of other programs, in this case Florida's program for the *New Connections in Georgia* program, was estimated to be both time and cost prohibitive. The concept of end-user programming thus took on real significance. Thus, the approach decided upon in this case was to begin with discussions of the requisite and relevant actions of determining the objectives of the monitoring, reporting and assessment functions previously performed by the sites in the network and the desired functions of an *idealized* system. An ancillary benefit expected from this approach would be to demonstrate how end-user computer actions could actually affect the functions on which the resultant application would report. The objectives were realized because the end user(s) were required to design report(s) which reflected action(s) they actually performed to serve respective client needs. Redundancies that showed up in reports were essentially caused by redundancies that occurred in the functional activities. Focused, streamlined and more useful reports were designed.

In effecting the coordination phase of this project, both academic (*procedural* or *nominal*) as well as utility or applications-oriented (*practical* or *pragmatic*) aspects of end-user computing concepts were considered. This particular approach provided useful perspectives for enhancing the understanding of the status of and prospects for end user computing in a typical network environment or *organization*.

DESIGN

With respect to cost considerations, the initial design and planning aspects for the project were oriented at precluding excessive software costs which would be caused by redundant software across the multiple locations for the *organization*. An example of this concept is that one plan might require copies of spreadsheet, database management and forms management software programs at *each* of the thirty network locations. The concept of *efficiency* comes to the fore when the *utility* of the forms management software is evaluated. A typical basic question might be, "Can the final report be formulated without using a specialized *forms management* tool?" In a similar vein, a distinction had to be made between *traditional* end-user programming and the use of *commercial* software application packages which might facilitate and/or enhance normal office operation and management. For example, it is highly unlikely that any business office having a microcomputer would not also have some word processing package available, simply for routine correspondence. The same office should also have some *basic* spreadsheet

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and/or database management software for the preparation of some periodic reports beyond the required *annual* report. A typical question in this case was, "Which of these *readily available* application packages would be most effective?"

The initial cursory examination of this scenario inferred that there might have been significant *cost avoidance* issues prevalent. In this case, a scheme was considered to develop *templates* such as either compiled spreadsheet or database management programs that could be distributed among the sites of the *organization*. The main concern at this point was that this scheme might adversely counter *traditional* concepts of end-user computing and would really approach the tenets of an application following *System Development Life Cycle* (SDLC) procedures as noted in works such as Davis (1985) and Laudon (1991). It was decided to avoid a full SDLC approach primarily because of the perceived short duration of the project as it would exist in its current format, i.e., with respect to the services provided and the needs of clients, as well as the desire to get the real end users involved more quickly.

In precluding consideration of system application development under SDLC concepts, focused discussions ensued to make distinctions between *programming professionals* and *knowledgeable programmers*. In this context, *programming professionals* were considered as individuals whose primary focus was to provide application programs to perform *identified* or *specified* tasks. The *knowledgeable programmers* here were actually the end users. They were *knowledgeable* to the extent they had *both* a knowledge of the application package to be used *and* the desired/required monitoring, reporting and assessment functions. Similarly, effort was explicitly expended to effectively minimize the *outside consulting* function to ensure that concepts more in line with end user computing would be adhered to. The focus and intent was to encourage more involvement in end user computing on the part of the personnel at the respective sites, rather than too much reliance on any *outside developer(s)*.

PROGRAMMING

The programming tasks were accomplished by first establishing an abstract perspective for the end users. The abstraction in this case was one of the relationship between the sites of the *organization* and the central agency to which the sites report. In this scenario they are referred to as the *sites* and the *central office*. In this context, all of the thirty offices were considered as constituting a *collective end user*. The utility of this approach was intended to reinforce the concept of standardization among the sites. Standardization in this context was viewed in the same vein as the basis for consistent or continuous quality. When viewed from the perspective of the *central office*, because of the *source and application of funds* reporting requirement, *each* office was considered as a *single* end user because of the unique aspect(s) of the respective offices. Examples of the unique aspects were shown in terms of local county, community and/or agency services which may be provided to clients. *Specialized* (local reporting) aspects were incorporated into the general report provided to the central office. Figures 1, 2, and 3 will help to explain the salient concepts of end-user computing concepts for this *organization*.

Figure 1 is a reproduction of the first page of a two-page data collection form used by one site to collect demographic and needs data on applicants for the Single Parent/Displaced Homemakers program at Chatahoochee Technical Institute. Figure 2 shows the first page of the nine-

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page summary information for a typical program. Figure 3 is a depiction of a data collection screen for a typical database management program for a general database application program. The particular application used in this scenairo was dBASE III Plus. Any of several other packages such as dBASE IV, Paradox, Alpha 4, etc., could have been used. The objective here was to get the end users to develop close-to-paperless techniques for collecting data.

Figure 1. First Page of SP/DH Application

"NEW CONNECTIONS IN GEORGIA"

Single Parent/Displaced Homemaker Program
PROGRAM APPLICATION

Today's Date: _____

Name: _____
         Last   First   MI

Social Security #: _____ Date of Birth _____

Address: _____

City: _____ State _____ Zip Code _____

Home Phone #: _____ Work Phone #: _____

1. County of Residence: ____ Cobb ____ Paulding ____Other (specify) _____

2. Marital Status (answer only Part A or Part B)
    Part A: Displaced Homemaker (no minor children)
    ___ Divorced   ___ Married, No Public Assistance
    ___ Married, Disabled Spouse   ___ Separated
    ___ Married, Unemployed/Dislocated Spouse   ___ Widowed
    Part B: Parent (with minor children)
    ___ Divorced, with minor children   ___ Single, never married, with minor children
    ___ Married, with minor children   ___Widowed, with minor children
    ___ Separated, with minor children   ___ Pregnant

3. Sex: ___ Male ___ Female

4. Age: ___ 16-25 ___26-35 ___36-45 ___ 46-55 ___ 56 and over

5. Race/Ethnic Group: ___ Asian or Pacific Islander ___ Black ___ Native American
                           ___ White ___ Other (specify) _____

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Figure 2. First Page of SP/DH Annual Report

GEORGIA DEPARTMENT OF TECHNICAL AND ADULT EDUCATION

ANNUAL REPORT FOR SINGLE PARENT/DISPLACED HOMEMAKER PROGRAM

July 1, 1992 - March 31, 1993
(Due May 1, 1993 and May 1, 1994)

School: _____

Congressional District: _____

Date: _____

	Single Parent	Displaced Homemaker	Single Pregnant Women	Total Number
Intake Interviews				
Referred to Others				
Enrolled in SP/DH Program				

Sex:				
Male				
Female				
Race:				
White				
Black				
Other				
Age:				
16-25				
26-35				
36-45				
46-55				
Over 55				

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Figure 3. dBASE-III Plus Data Entry Screen for Initial Inputs to New Connections in Georgia Program

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**    First Page of New Connections in Georgia Tally Sheet **

         Social Security Number of Participant:   XXX-XX-XXXX

   Referred to Other Agency? (Y/N) N    Enrolled in SP/DH Program? (Y/N) Y

    County of Residence of Participant:    Cobb (Y/N) Y    Paulding (Y/N) N

       If Other County . . . Enter county here -> XXXXXXXXX

                   Category for Participant:

                      Single Parent (Y/N) Y
                      Displaced Homemaker (Y/N) N
                      Single Pregnant Woman (Y/N) N

       Sex of Participant:    Female (Y/N) Y    Male (Y/N) N

    Race of Participant:    White (Y/N) Y Black (Y/N) N Other (Y/N)N

  If race is 'Other' . . . Asian (Y/N) N   Hispanic (Y/N) N   Native (Y/N) N

  Age of Participant:    16-25 N    26-35 Y    36-45 N    46-55 N    Over 55 N

   Press 'Ctrl/End' to SAVE screen . . . Press 'Esc' to EXIT without saving. )
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Functionally, with respect to attaining efficiency in the management of information, early use of microcomputer (software) tools provides significant benefits. Foremost among these are the elimination of extra tally sheets used to tabulate, classify and cross tabulate program participants and services required and provided. Built-in error checking routines add more credence to the data collected. As an aside, the actual entry of the data into a computer should not be done at the time the data are collected, i.e., at the time of an initial interview. Entering the data into a computer when an applicant is not present will help preclude giving the applicant an impression of being treated in an impersonal manner or of being treated as a statistic. The individual who enters the data also tends to feel more comfortable because her/his professional competency, which is usually not in the computer area, is not assessed along with her/his computer competency.

Two approaches were developed for the report forms similar to Figure 2. The first approach used preprinted forms (photocopies) and used dBASE-III program code to place calculated values in the respective spaces on the form. The second approach used macro features of a word processing program to develop stylistic report format sheets in which the various information spaces were filled in as the report was typed. The first approach was adopted primarily because of the desire to ensure that all forwarded reports would be in standardized formats. The objective of attaining overall efficiency was also a strong reason for not typing the reports.

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Other features of the project are noted by the graphs that appear in Figure 4. Macro routines for spreadsheets, in this case Lotus, were written to extract data from the database summary routines to produce the spreadsheet PIC files. The actual layout and printing of the files was made easier by importing them into the same application package (word processor) used to prepare the final report and associated transmittal letter.

Figure 4. Sample Graphs from Initial Data on Applicants

PARTICIPANT BREAKDOWN BY COUNTIES

Cherokee 0.6%
Fulton 4.3%

Douglas 4.3%

Paulding 8.0%

Cobb 82.8%
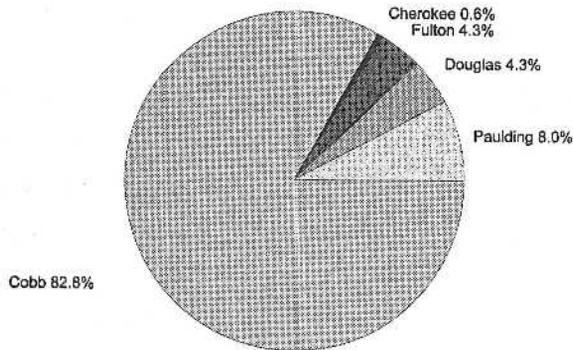
MARITAL STATUS OF SP/DH PARTICIPANTS
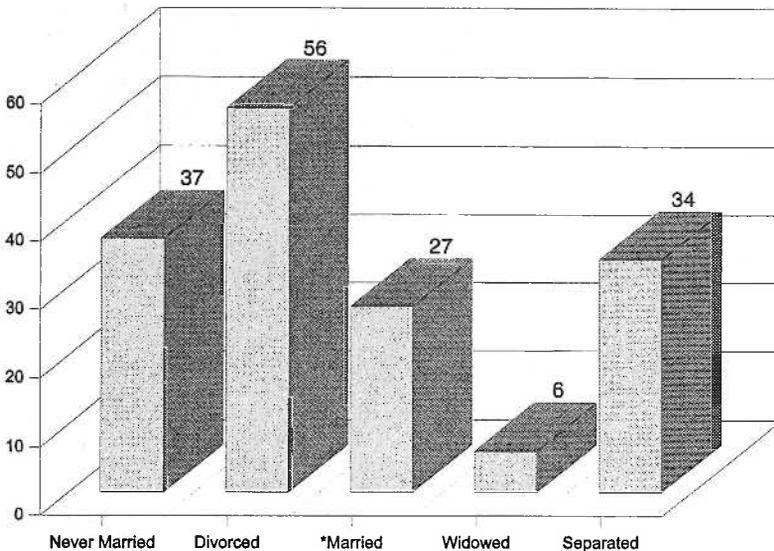
*Married With Diminished Income

TRAINING

The initial objective was to make the end users (site administrators) proficient in basic application packages. However, the sites did not all possess the required software. Rather than to introduce the new procedures using several different application packages, a template was prepared. A database compiler, Clipper, was used because the programming code for this particular language very closely matches the code that the end users would eventually use. During the training sessions, it was recognized that standardization would be at risk if a database management tool was actually used. It was decided to continue using the template program for the data collection and report generation tasks. The focus of the training was toward manipulating the selected spreadsheet and word processing application packages.

SUMMARY

The theme and purpose of the paper was to provide a scenario and examples which can be used in assessing the status of and prospects for end user computing as it relates to and enhances efficiency in administrative information systems. It is often not obvious that end user computing can indeed become *cost prohibitive* when an *organization* or multiple locations of common environments and/or functions are involved. Prudent planning with due consideration given to the required and desired functions to be performed can significantly preclude excessive costs. The concept of assessment of the resultant application with a view towards continuous quality improvement was emphasized. A general guideline of using the eventual assessment of both the end user application *and* the function(s) for which the application was created can enhance adherence to costing precepts and the resultant acceptance and use of the end user application.

Although actual cost data was not accumulated and presented for the scenario used for the paper, sufficient anecdotal information and actual examples of the resultant application were provided to aid in determining the utility and effectiveness of the similar approaches with respect to cost and quality considerations.

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