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THE INFORMATION CENTER  
THE ORGANIZATION'S NEWEST RESOURCE

by  
Daniel J. Topp

A Three Credit Thesis  
Presented to the Graduate Committee  
of Lehigh University  
in Candidacy for the Degree of  
Master of Science  
in  
Information Science

Lehigh University

June, 1985

This thesis is accepted and approved in partial fulfillment of the requirements for the degree of Master of Science.

April 25, 1985  
(date)

David J. Hillman  
Professor in Charge

David J. Hillman  
Division Head

Earl Thompson  
Department Chairman

I wish to thank my employer, American Telephone & Telegraph Technologies, Inc., whose tuition refund program enabled me to pursue this degree.

THE INFORMATION CENTER  
THE ORGANIZATION'S NEWEST RESOURCE

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## I. ABSTRACT

The Information Center is an idea formed from the needs of the users, not the wants of the data processors. When the processing time to develop new user-requested systems by the Data Processing department increased beyond useable limits, the users demanded the opportunity to do their own development. "End-User" programming became the term associated with this user development.

Hardware and software vendors realizing this new need, have begun to develop new products directed toward the end-users. In so doing, the "computer-eez" and jargon is being reduced and replaced with English-like commands (forming the basis for the 4th-generation languages). The complexity of the product is hidden from the users, allowing them to "program" in terms that they understand. This computer <-> user interface became known as "user-friendly".

The Information Center was formed as a central site where the non-professional computer user could go to be educated in the use of these new tools. End-user programming is changing the roles of both the Data Processing programmer and the end-users.

This paper will explore some of the aspects of the Information Center, including its establishment, development and maintenance.

## II. THE INFORMATION CENTER, WHAT IS IT?

The Information Center is a new organizational approach for extending the power of the computer to the non-professional user. It is built around user-friendly software that lets even the data processing novice develop their own applications. This allows them to find quick solutions to their everyday problems by giving them direct access to the computers. No longer will the computer be the "black box", shrouded in mystery and hidden away in some obscure data center, to be accessed only by a few selected systems support personnel. The power of the computer is coming to the necessary people directly, rather than indirectly routed through the data processing staff. Its mission is to enable the "end-user" (The person ultimately responsible for obtaining the necessary information. Note, this term is defined in detail later in this paper...see page 27) to develop and apply computer based solutions to his or her daily business problems. The Information Center and its staff work toward achieving this goal by providing the appropriate guidance, training, and assistance to these end-users.

The Information Center by its word content alone implies that it is a physical center, ie. an office, or room or building. In many situations it is, but more importantly though it is a concept in learning and self-sufficiency. It

is people helping people to do their jobs better, faster and, hopefully, cheaper. The users are united through the facilities of the Center itself, though physically they may be scattered throughout the building in which they work. The success of the Information Center is not a function of the fancy physical furniture that adorns it, but rather a function of the abilities of the staff that operate it.



### III. GOALS AND OBJECTIVES OF THE CENTER

The goal of the Information Center is to provide the user community with the necessary computer productivity aids and access to the appropriate company, departmental, and/or personal business data, while remaining responsive to the needs for education and assistance in application development and problem resolution. The intent is to increase the self-sufficiency of the end-user in the accessing and processing of his data, thus reducing the dependency on the programming resources of the application programming staff.

The following are some of the objectives that can be set to assist the Information Center in carrying out its mission (Note: Each Center will undoubtedly have their own unique objectives, but in general these are common among all of them).

1. To expand user self-sufficiency by:

- Providing services to the users that they would not normally be offered by the data processing department (specialized), but are necessary for them to do their job.
- Providing the users with the right tools and end-user products to access and process their data in their own terms. An important part to this is

the proper education to use these tools.

- Providing the technical and administrative support for those products and services. Consultation with the user in the selection of the appropriate products that are to be used to access his data is a most important first step. This can avoid possible reprocessing if the wrong approach is taken.

2. To increase end-user productivity by:

- Increasing user expertise. This is accomplished through repeated use of the services and products.
- Allowing online access to company data (with the proper authorization). Nothing is more frustrating than to be told that only application programming staff is authorized to access the data base directly. This directly hinders end-users in the performance of their job.

3. To function as a focal point for end-user services by:

- Developing and maintaining a high level of expertise in the use of the end-user products and services that are offered. If this is not maintained, then the integrity of the Center could be

lost or degraded.

- Evaluating new and existing products and providing the results of the evaluation to the user community.
- Increasing the awareness of the end-users of the benefits of the services provided by the Information Center. This is often done by means of a Newsletter. In some institutions where the Information Center is very large and elaborate, this letter may actually be a published document prepared by an art/drawing department and distributed nationwide (if this is the scope of the Center). In smaller Centers the "news" may be spread electronically through mail facilities to each end-user connected to the center (This could also be one of the services provided by the Information Center).

#### IV. WHY AN INFORMATION CENTER?

The cost of establishing an Information Center, as will be discussed later (see page 35), can be a significant burden on a company. Why, or when should an Information Center be established? Well, sometimes the direction comes from above in the organizational structure and is dictated upon a department to establish the Center...ASAP! This is the worst way to start out, but alas it happens in many companies. Normally, though there are tell-tale signs which begin to suggest that the normal data processing cycle is beginning to fail.

With the inception of the "Total Systems Development" approach for developing an end-user's project, a backlog of user requests begins to grow. The "TSD" approach is a ten phase cycle of development and testing which, though necessary, can consume weeks, months or years of man-years before the end-user even sees part of his requested output. Under this approach, it is easy to see how the backlog of user requests could grow very quickly. This tends to frustrate and sometimes irritate the end-users to point of alienation from the data processing staff.

"It used to take up to a year and a half to get a data processing solution to a specific problem," says Michael Thompson, the Information Center supervisor for the Anchorage Alaska Transportation Department. "Now we can get

answers within hours."<sup>1</sup>

Since normally the "TSD" approach is applied only to the larger computer projects, the "little guy" user who is requesting a only a small amount of output or time from the data processing staff is told that his request will be processed "when we find the time". Those large projects consume much of the available resources of a department. Many times the smaller requests just don't justify allocating the staff to process them. Again, frustration mounts.

A direct result of the above problem is the increased usage of outside data processing services (time share data inquiries, and retrievals). Unfortunately the attitude taken by the user is that ...if you won't do my request, I'll find someone who will... Your starting to loose control of your user community.

In the worst of situations, there is no backlog of applications. That is the users have just given up asking for anything. This is a major problem, but generally management "sees the light" before anything this drastic happens.

One thing very close to the heart of any manager is

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<sup>1</sup> IN staff writer, "Do-It-Yourself Computer Solution", Info-systems, May 1983, p. 70.

that of the cost of running his data processing department. With hardware and software costs stabilizing or dropping, they are finding that their staff costs are rising. Closer examination is being done to ensure that the programming staff is being allocated to the right projects. Maybe some of those small user requests are important enough to be allocated personnel.

Management must also realize that the tools of an Information Center can be equally beneficial to the programming staff (increase their productivity as well).

The above reasons are mainly from the perspective of the Data Processing department, but there are also equally important signs from the "other side" (end-users) that indicate that maybe an Information Center would be an attractive asset to the company.

The users need their information now not later. In many situations time is of the essence and waiting is unacceptable. For example, a section chief of a production line wants to change over to a new product line, and needs to know the next product available for setup. He needs to access the product availability files now and act promptly to gear up for change over. There's no time for long delays while the data processing department is contacted to process their request. The Center can provide the online access that is needed and the appropriate tools necessary to gain

the information, now.

Often times end-users are given their information on a regularly scheduled basis (daily, weekly, etc.) and is generally acceptable for most situations. Still, though there is the need for the unscheduled, on-demand processing of the data, stemming from "what if..." types of questions which demand an immediate response, so that the appropriate action can be taken, which in turn may cause a loop in the cycle.

Let's face it, the end-users know their data better than the data processing department, so why then don't they maintain it? The users need to access and manipulate their own data, for whatever their reasons. This situation must be monitored closely though, so as not to create multiple copies of the same information, one copy for each user group.

## V. BENEFITS OF THE INFORMATION CENTER

Both sides of the data processing fence benefit from the services provided by the Information Center. Each benefit factor is important in its own right.

The systems in the development backlog, mentioned earlier as being a problem, can be implemented at a faster rate due, in part to fewer interruptions by the users for their requests. This allows the large, high-priority and costly applications to be developed most expeditiously.

There will be an improved responsiveness to the user community. Requests can be developed faster with a personal tailoring to the needs of the user. Modifying new and existing user reports becomes much more flexible to meet their ever-changing requirements.

There is a better utilization of the highly skilled programmers and analysts. Their jobs can be better performed since they can be insulated from the sometimes nagging requests of the users, thus allowing them to concentrate their efforts in the areas in which they are skilled. Consequently this results in a cost savings to the data processing department.

On the other side of the coin, perhaps the end-users benefit the most from the Information Center. With the Center's services at their finger tips at all times, they



can be more responsive to their business needs. Since access to the company data is made easier for the users, unscheduled adhoc requests from management can be processed in a timely fashion. And, since the users are not consuming the expensive resources of the data processing staff, their costs for generating these reports is much lower. .

There is also a special factor that comes into play, and that is the deep sense of pride that is obtained when a user processes a request and presents it to his management (The "I did it all be myself attitude"). Pride in his/her work makes the employee happy, and a happy employee is a productive one. Increased productivity means increased profits to the company, which in turn etc., etc..

## VI. END-USER SERVICES AND FUNCTIONS

The success of the Information Center depends directly on how well it is managed and promoted. There are many responsibilities that must be undertaken and accomplished. The Information Center staff must wear many different hats, and be good at all of them. After all, the users are looking up to these people for guidance and assistance.

The services of the Information Center can be broken into three major classifications, which are in turn further defined. The categories are:

1. User Support
  - a. Consultation
  - b. Direct Assistance
  - c. Education
  
2. Internal Operations
  - a. Administration
  - b. Technical Support
  - c. Planning & Controlling
  - d. Product Evaluation
  - e. Promotion
  
3. Data Processing Interface
  - a. Systems Management

b. Data Access Coordination

c. Data Center Operations

The following is a brief discussion in a little more detail for each of the sub classifications.

1. USER-SUPPORT

a. CONSULTATION

This may well be one of the most important jobs for the Information Center staff. Remember your audience, this is all very new to these novice "programmers". Situations could arise in which the user may waste his time trying to force his request into the wrong application program<sup>2</sup> if the proper direction and assistance is not given by the Information Center staff.

Assuming also that he did manage to do this, the cost to process his request may be excessive. Therefore it is very important to sit down with the intended user on a one-to-one basis and discuss his problem in detail so that it can be properly evaluated by a staff administrator. In so doing the "best fit" application program can be selected

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<sup>2</sup> Application program here is used generically to represent any general solution to a user problem. The actual form of the "program" would be product dependent.

to produce the optimum results. The application selected though must be within the capabilities of the user. If it is not, and the time constraints on his request are not too restrictive, the appropriate education can be arranged so that the user can learn it. If not, then an alternate solution should be selected.

Consultation is important from user to user also. The sharing of skills, techniques, and "tricks of the trade" should be encouraged among users.

b. DIRECT ASSISTANCE

Once a package has been selected (using the user's request solely as the basis for the selection), the Information Center staff member should follow up on the user's progress (Note, this may not be practical in a Center with a very large populous) and provide direct support for the user should it be required. Also, assistance should be given to the user to resolve all end-user product problems. This assistance may simply be questions concerning the internal workings of the package that he is using. For instance, "How does it handle a situation like...?", or "What happens if I...?". It may also be problems in the syntax or structure of the commands he is using. Regardless of what it is, the appropriate assistance should be given.

A "Hot Line" is a must in an Information Center. The

user needs someone that he can contact for assistance. Even if there is not a dedicated person running the Information Center, there should still be a phone number that can be used for simple questions (a backup number should also be considered). In mature and fully staffed Information Centers an additional feature is that of a "Help Desk", a desk or office, staffed at all times during normal Center hours, where more substantial or complicated problems and their solutions can be discussed. In some Information Centers, especially smaller ones where staff personnel are limited, several part-time "helpers" can share the help desk. It really does not matter, so long as someone is present when needed.

You are trying to sell confidence to the users. They need to depend on someone being there when they need help. Frustration and apathy will build if assistance is not provided when it is promised. You will "turn off" your users, and interest and use of your Information Center will begin to decline.

One very important point to remember about this consultation service is that under no circumstances should any of the Information Center staff write the application program for the end-user. The user will gain no benefit by doing this and may very well put your own activities behind schedule. I can vouch for myself that this is difficult to do.

The problems that some of the users come up with are indeed very interesting and fascinating to figure out, especially for a "die hard" programmer. Restraint is needed. Provide what assistance is needed to get the user to see the solution himself without actually doing it for him.

If good user education is provided at the onset, there will be less problems of this nature occurring. There are, however users, no matter how much you try to teach them, will always try to get you to do it for them or to fix their problems. Don't do it! A little diplomacy and discretion is necessary in conveying this information to the user. Be tactful and direct, but don't be rude. They will understand.

If you find that the same users are coming back time and again for the same or similar questions or problems, suggest to them that they take a refresher course in the product to sharpen their skills.

#### c. EDUCATION

Making end-user tools available to the user community will not guarantee their use and acceptance. People need to know what is available to them and how to use it. Education in the form of classes, seminars, video tape, online tutorials, etc. must be provided to all those that have a need to know about a package. The best form of education is that of

personally conducted classes. This makes the user much more comfortable and at ease. It also allows direct interactions between the instructor and the student for questions and answers. The goal of the instructions is to provide enough knowledge to the user so as to be self-sufficient in performing his job.

Know your intended audience. Do not make the assumption that they all know what a computer is. If possible, categorize your users and arrange your classes accordingly. For some users it may be necessary to attend an "introductory" class or seminar on the basics of the computer and general information. This is necessary so as not to burden the entire class on material which the majority already know. The classes can be broken into "Basics", "Intermediate", "Advanced", and "Refresher". Besides the packages themselves which must be learned, instructions on the operation of the terminal itself may be necessary. If the intended users are not familiar at all with a terminal, or perhaps just is not familiar with the specific type of terminal that the package needs, then either direct instruction or a "terminal users guide" should be provided.

The user should not feel overwhelmed at the amount of material being presented. It should be concise and specific to their needs. The "Users Guide" of the product can always be used for additional or background information if neces-

sary.

Online self-help or tutorials should also be available. This is a convenience feature which provides quick answers to minor problems or perhaps just a reminder of how a command is formatted or used.

Feedback is most important to the Information Center in everything that it provides. There is no way to judge the effectiveness of the classes without the users' feedback and critiques. Through these critiques the classes can be fine tuned or corrected for future users.

## 2. INTERNAL OPERATIONS

### a. ADMINISTRATION

The administrative functions involved in an Information center may very well consume the bulk of your allocated time. Typical of administrative functions is considerable paper work and "red tape", but it is all necessary and must be performed on a regular basis.

The users must be kept informed of the status of the Information Center. Hardware and software can change frequently and if it affects the end-users, they need to be made aware of the changes. The newsletter, as mentioned earlier could be a means to accomplish this. A few other



things that could be placed in the newsletter are:

- Information Center staff names and phone numbers.
- New services available.
- Other users' applications. Perhaps they can be shared by other users with similar requests.
- Available education and schedule dates.
- Suggestions, both to and from the users.

The Information Center should issue the newsletter on a regular basis, or in most situations, as needed.

Know who your users are! User profiles are not only helpful but are a necessity if monitoring of usage is to be done. When a user comes to the Center with a request it should be logged with the user's name, department number, etc., the planned resources that he intends to use (and later those actually used), what applications are to be used and his justification for needing this request. With this information, combined with other users' profiles, the Information Center can monitor the effectiveness of its services. Frequency distribution charts of the Center's activity (based on time of day used) can be produced (see Figure 1 on page A1 of the Appendix of a typical distribution of a small Information Center). Available resources and applications charts can also be produced (See Figure 2 on page A2 of the Appendix for a sample resource chart).

The limits in the types of monitoring that can be done are nearly limitless. Some monitoring and tracking must be done though. At some time management is going to ask you, "How much use did the Information Center receive for last month?" You must be prepared to answer this and similar questions.

General administrative functions must also be performed, including registration of new users (assigning logon ids, passwords, security clearance, etc), issuing terminal logon procedures, general rules of conduct, etc. All are unavoidable and certainly not the most interesting of Information Center staff functions.

b. TECHNICAL SUPPORT

Remember that the user community that you are serving is generally not composed of computer people. The technical complexity of their working environment should be minimized. Insulate them from the technicalities of the Operating System, or basic command syntax. Routines or "front-ends" should be written around the application to make their access into the computer as painless as possible. Typical in IBM shops these "front-ends" would be written as Time Share Option (TSO) "CLISTS procedures, either as interactive conversations or full screen dialogues. Don't burden them with "native-mode" system commands (unless the users wants

to know them).

Standards should be established for the use of end-user products, but don't make them so restrictive as to infringe on their ability to do their job. Conversely the standards must not be so lax as to let a "free reign" on the users to do whatever they feel like doing. Select a medium point suitable and agreeable to both sides.

The Information Center staff must interface with the Systems Programming department to ensure that the end-user products are installed as requested, tested and tuned to run efficiently. Service levels should be reviewed and discussed with both the systems staff and the end-users. Measures should also be in place to monitor the response times agreed upon to ensure that they are being maintained. Backup and recovery procedures should be established should a computer failure require that the users' data or programs be restored. The end-users must have confidence in the Information Center staff that their data is safe.

c. PLANNING & CONTROLLING

Without knowing what is is the user needs in terms of hardware and software and how many they need, the Information Center will be a disaster. The staff should accurately evaluate the users' requests so that the resource requirements (CPU, terminals, control units, communication lines,

printers, etc.) can be estimated. An estimate of the number of users and their frequency of use of the Center will help establish the number of terminals, communication lines, modems, even furniture and floor space that will be needed. Interviews (or questionnaires) with intended users on the type and number of inquiries on the system will help to determine the CPU load that the Center will consume.

Once a plan is established it will be necessary to monitor the actual versus planned usages and report back to the using departments. If a department's usage is continuously rising, that department should be re-evaluated to see if it is using the resources improperly causing excessive use, or whether their requirements have changed.

The Information Center should be responsible for the ordering (or arranging for the ordering) of the hardware, and depending on the size of the Center and the complexity of the equipment, may also install it.

#### d. PRODCUT EVALUATION

This is a small part of the internal operations. New end-user products and/or services should be evaluated to determine if the potential benefits to the end-user justifies the additional cost. Sometimes a user may approach the Center's staff with literature about a new product that they have read about or seen. The product should be given

consideration, provided enough users would and could use it to their benefit (Of course, the money must also be available in the Center's budget too).

e. PROMOTION

This is very important. If nobody knows that your Information Center is available how can you expect anyone to use it? Be visible! Let the user community see what you have to offer them. Open the Center for demonstrations of the products and services that it offers. Arrange to give brief seminars to end-users and their management. It is very important to let management know about the Center. They may be the people funding your operation so it is important to impress upon them 'the Center's capabilities especially since it may save them money. The promoting or marketing of the Information Center to the users is an ongoing function, not just for the opening.

3. PROCESSING INTERFACE

a. SYSTEMS MANAGEMENT

The Information Center acts as the users' representative in dealings with other areas of the Data Processing departments insofar as those dealings relate to the users' demand processing activities.

The usage estimates obtained from the users as part of the Planning and Controlling stage, should be presented as input to the department's regular capacity planning.

b. DATA ACCESS COORDINATION

Who can access what data, and when, is a subject of much concern both to the end-users and to the Information Center. The end-users relate to the Center's staff the data that they need to access. It should be the staff's job to evaluate whether the user has a "need to know" that information. If he does, and it requires access to a database, then the Data Base Administrator (DBA) group should be notified of the request so that provisions can be made for that user to access the database. In some shops though, access to the online production databases by an adhoc user request is not permitted. In these cases perhaps a "strip" file can be created from the database for the user to access. Creating these "strip" files may be the responsibility of the DBA staff, the Information Center, systems programming or even the users themselves depending on company policy. Data files that are not globally accessible by all users should have the appropriate security controls on them to prevent unauthorized access.

c. OPERATIONS

The Data Processing Operations group provides the actually running of the systems and their necessary support, however the Information Center does act as the liason for the end-users. The staff coordinates the regularly scheduled backups of user data files, arranges for distribution of printed reports, resolves problems with service and scheduling of user requests, and monitors the quality of on-line service being delivered.

## VII. WHO ARE THE END-USERS?

The end-user can be anybody and at some time or another we'll all probably have the opportunity to be one. To ensure that the Information Center is directing its efforts to the end-users correctly, three points, common among all users must be remembered.

1. They are application specialists, not data processing specialists. They, like programmers speak in "jargon", but it is the "jargon" of the application, not of the computer world. Terminology relating directly about the computer should be minimized (eliminated if possible) and be used only if necessary. At all other times English or English-like terminology should be used. When it is not possible to eliminate the technical terms, the users should be taught them in their introductory courses. The documentation of the Information Center should include a glossary of terms and their meaning (It is even more helpful if this glossary can be maintained online as a tutorial, or available through "help" screens.).
2. They are part-time system users, not CRT clerk/operators. The typical end-user may only



use the system for a few hours or so each month therefore access into the system should not require complex procedures. More so than not, the user will probably forget how to enter the system from one session to the next. User-friendly interfaces and "help" procedures should minimize the users' frustrations.

3. They are problem solvers, not program builders. The techniques of computer programming generally insure the accuracy and auditability of the output. This doesn't hold true for the end-user who is more concerned with the quickest way to get his answer rather than the most efficient way. His methods will probably be unstructured and redundant. To prevent this (or at least reduce it) the users should be taught good programming habits as they pertain to the end-user. The "neatness" of their output may not be necessary, but precision and consistency is.

As more and more processing is being done in businesses, it is becoming apparent that the end-users can be categorized into two major groups: Local Users, and Remote Users. Each of these groups attracts its own type of users.

## LOCAL USERS

Among information users, the clerical group is now and probably will remain the largest local user type. Data entry, text and word processing, database inquiry and limited report production are the most common functions performed by this group. These users will generally require extensive mass storage and will probably process from the main computer although some applications may be downloaded to a micro/mini workstation for processing.

IBM estimates that by 1990, 50% of all professional workers will have direct access to the computer system. International Data Corporation puts the figure at 65% of the professional work force.<sup>3</sup> Typical applications of this group are spreadsheet and statistical analyses, graphics and modeling. Most of these applications are available on micro computer systems which is where the processing should be done. The data is kept on a mainframe somewhere (depending on the size) and is downloaded to the micro for processing and shipped back when processing is completed. This minimizes the load requirements of the host CPU so as not to degrade the performance of other users.

The executive user, is an odd type of user. More and

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<sup>3</sup> Leilani Allen, "Who Are End Users?", Computerworld, Volume XVIII, Number 47, November 19, 1984, pp. ID/19-ID/20.

more upper level management type people are increasing their hands-on use of the computer, yet fewer of them are using them as their most frequently accessed information source. Though most of the computer tools being developed for executives are being centered around the need to provide them with direct access to the production databases. This need is based on the misconception that, as managers they want to get their hands down into the "nitty gritty" of the detailed data analysis. Most executives, even if they did have the time to do this, are more interested in a much higher level view of the operations and as such do not want to bother with learning program or command syntax to get their results. They want it to be simple (almost thoughtless) and direct. They are also the ones most interested in data security. They want to be reassured that the data they see is theirs alone.

The last of the local user types is a fledgling as an end-user, but is growing rapidly. In the industrial area, the shop worker on the production line is seeing a significant need for information about his product line, his load, inventory as well as for testing, inspection, repair analysis and production control. The Information Center is aware of this potential new user and is adjusting its structure to accommodate them.

#### REMOTE USERS

Many of the functions performed by local users is duplicated with the remote users also. Large companies will often have satellite mini offices strategically located throughout the state or country. These offices can work independently, functioning through their local Information Center, however an additional function of the local Center is to provide connections and access to the data at the main office. The two Information Centers "talk" to each other though the users may not even know it.

Another form of remote user is the transient one. He is equipped with a portable terminal with a built in modem for communication and is never more than a phone call away to his Information Center for information. This is typical of sales personal or field engineers like the construction or oil industries.

Technologies are changing rapidly and it will obviously directly affect the way people work and how they do their job. The Information Center's job is to determine how these technological developments can best be harnessed to provide the end-user with the most productive way to perform his function.

### VIII. ORGANIZING AND STAFFING THE CENTER

The Information Center is rapidly becoming as much a part of an organization as any other group. It must be given an equitable position in the company's Data Processing structure if it is to be effective. Figure 3 on page A3 of the Appendix depicts the possible placement of the Information Center as it may appear during its start-up phase. Often times the implementation of an Information Center may be just a large project within some other existing data processing function. In some companies where the end-user population is small and potential growth is limited, this may be as far as the Center will progress up in the organization. It is perfectly capable of surviving and functioning well in this environment. This in no way has any determining factor over the success of the Center.

In most situations though as the Information Center matures and gathers additional users it will not be able to exist as a "project" under another department. It will likely move into a higher position as shown in Figure 4 on page A4 of the Appendix where it can be more closely watched and monitored by the Data Processing Manager.

Staffing an Information Center is another critical ingredient to its success. The number of people assigned to the Center should be directly proportional to the number of end-users anticipated being served. It's not easy to pick a

magic number for this ratio, it will vary. The ratio of Information Center staff to users should not be so small as to have staff people idle for extended periods of time, or so large as to have users who are not able to be serviced within a reasonable amount of time.

A general starting point (suggested by IBM) would be a manager who would be directly responsible for the overall performance of the center and the staff, as well as the interface to the next level of management. Though a Center can exist on a single support person, two to three is a good place to start. As the Information Center matures, more products and services may be added for the general benefit of the users. An appropriate staffing strategy is to have a product support person assigned to generic areas, such as planning, text processing, query or training, and if possible, cross-product training would be an added benefit. It will be the responsibility of the manager to determine if and when additional support staff will be needed.

The people who comprise an Information Center must be top performers who have excellent inter-personal and communications skills. The staff in an Information Center spend most of their time working to support end-users rather than developing data processing solutions in relative isolation, hence the need for a good inter-personal nature. They should feel comfortable in the data processing environment,

but they need not be "technical wizards".

Because of the hectic nature that the job can generate, they must be also be self-starters and good organizers who can juggle many tasks at once with equal dexterity. Some of the other personal qualities to look for in selecting a person for the Center's staff are:

- |                         |                           |
|-------------------------|---------------------------|
| 1. Patience             | 6. Product Knowledge      |
| 2. Diplomacy            | 7. Data Processing Skills |
| 3. Analytical Ability   | 8. Enthusiasm             |
| 4. Communication Skills | 9. Energetic              |
| 5. Business Practices   | 10. Creativity            |

If it sounds like I've just described the perfect employee, that's essentially true. The best people should be placed in the center. Unfortunately, as is the case with highly qualified people as just described, they are not only hard to find but are considerably harder to keep. Turnover of staff personnel could be a problem.

## IX. COST JUSTIFICATION AND CHARGE OUT

The Information Center is not an unlimited resource to the company. The expenses incurred in establishing the Center can be extensive especially if the number of potential users is initially small promising. It is a necessity then that the cost of running the Center must be recovered through some sort of charge out mechanism.

The Center is part of the Data Processing department, and like most companies is a non-revenue producing organization (since there is no product being produced or sold). In fact the Data Processing department is actually an expense to the company, 100% overhead which must be recovered through the cost of the company's product(s). The Center can not pay for its resources since it has no income. The users of the Information Center must "foot" the bill.

The method of charging the user should be both equitable and accurate. Monthly expenses of the Center should be exactly recovered by the charges to the users. The methods for "charging out" the Information Center are so many and varied that it could be the subject of another paper. Each company may have their own system, or they may own/lease a "canned" product already on the market. Though the technique of how the expenses are levied are many, virtually all Information Centers have much the same type of expenses to recover.



Three basic types of cost need to be recovered: Overhead, Fixed and Variable (although overhead is really a form of fixed cost). As is the case in most companies today the greatest expense is that of personnel. Personnel costs are generally included as an overhead expense and all the costs associated with the staff must be recovered. This is more than just the base salary. It is not unusual to figure the cost of an employee as (Monthly Salary + 60%). The additional 60% accounts for all the fringe benefits of the employees. So you have this cost for your Information Center manager, your product service staff (a variable number of these), and fractional parts of the Data Center Operations staff (They are the ones scheduling jobs and printing the output). The actual percentage of the operations staff would probably first be an estimate and later refined, as more empirical data is accumulated. With the cost of hardware and, to a lesser degree software delining, the personnel costs will easily be your largest expense.

The Information Center occupies space, and office space costs money. Another part of the overhead is the cost of the Center's existence. Even if never used, the Information Center must account for its floor space and related costs. Some of it is fixed, like the rent while the others are variable, like heat, electricity, air conditioning and supplies. The most equitable way of allocating these costs to the Information Center is by square footage. Likewise

the user community should share this cost on a proportional basis. One way would be to divide the total overhead floor space costs by the total number of users and charge this amount per user per month. Remember, as the number of users increases, the cost per user decreases (assuming no increase in the size of the center).

The other type of fixed costs which will probably be the next largest cost to the Center is that of the actual hardware and software used by the Center. Even though the cost of the equipment is decreasing, more and more equipment is being acquired, thus keeping the costs up.

Hardware and software may be purchased or leased, but in either case its cost must be recovered...through the users. If equipment is leased then it is the monthly cost, or if purchased, the depreciation cost that is to be charged out (plus maintenance, if applicable). Though computer equipment is usually depreciated for about seven years for accounting purposes, it is not uncommon to assume an infinite useful life for charge out purposes. Thus the equipment can be charged out for as long as it is in use. Purchased software is not generally depreciated, so an arbitrary length of time can be selected as the basis for calculating the monthly cost.

The variable costs, those associated with the using of the computer, are more difficult to capture. Each resource

used (for example, CPU seconds, disk and tape I/O, memory, print lines, etc.) will have an associated unit cost. Determining the number of units used of each type for a session is the difficult part. Luckily there are many usage accounting systems on the market that will record every aspect of a user's session and apply the unit cost to arrive at a session cost. These charges can then be direct billed to a user department based on his/her user ID. Since the overhead, hardware and software costs are pretty much fixed, this is an area where money can be saved by utilizing a little careful planning with the Information Center staff.

As I stated before, how the recovery is done is not all that important. There are, however points that should be remembered when establishing the charge out procedure. It should:

- Be easy for the users to understand.
- Be easy for the Information Center staff to administer.
- Be flexible enough to allow for evolution as necessary to meet promotional and control objectives.
- Be priced for recovery, not for profit.
- Be competitively priced relative to the outside time-sharing services.

Users should be made aware up front what the Information Center is costing the company, it does not have an

unlimited budget. "If the users are not made aware of the high cost of computing, they will do nothing to reduce it".<sup>4</sup> Offloading some of the "crunching" from the mainframe to the micros could be a means of reducing some of these variable resource costs.

Making the users responsible for their own Information Center costs will also enable the end-user environment to mature more rapidly. Once users become aware of how much duplication of effort exists when there is poor communication among themselves, they will move to create a more integrated and cooperative user environment for themselves.

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<sup>4</sup> Paul Gillin, "Consultant:Put More Budget Control in Users' Hands", Computerworld, Volume XVIII, Number 36, September 3, 1984, p. 13.

## X. THE INFORMATION CENTER...IS IT ALL GOOD?

End-user computing is becoming more than just a side-line activity in some companies, it's becoming a main-stream function. Managing it is the new role of the Information Services department (Information Center). The Information Center must expand end-user computing by creating a managed environment in which it will continue to be effective as it grows. The goal is to develop an environment that will allow end-user computing to flourish by removing the factors that potentially inhibit its effective implementation. The Information Center must identify where end-user computing is effective, where it is not, where problems lie and what to do about them.

There are three general functions that are readily adaptable to an Information Center environment: Report writing, Modeling, and Systems Development. Report writing is traditionally the bulk of the work done by a user in the Center. Most report writers are so simple that it is easier for the user to just learn it himself rather than have a programmer explain what is needed. It's this simplicity that is both a benefit and a detriment to the user.

Most systems which currently exist today were not designed with end-user report writing in mind, but rather for transaction processing efficiency. Therefore situations often arise where some of the data that the user needs is on

one file, and the rest of it is on a different one. Arrangements like this often cause complex and inefficient report requests to be generated by the users (if they are able to figure out to do it!).

At some point technical skills begin to overcome business knowledge when dealing with fragmented information which tends to make end-user computing much less effective. Even when systems are designed with a simple file structure for the users there are still problems. To circumvent the problem of unavailable data or inconvenient access to the data, users will embed data into their program. The application gets used and passed around to others who may or may not be aware of embedded data in the program when they attempt to make changes to it. Multiple versions of the same/similar program are stored under various users. This is equivalent to having multiple version of a Data Processing production program, which causes maintenance nightmares for programmers. When management starts seeing conflicting reports of the same data, you can be sure that there are probably several "versions" of that program around and being used.

The second area of end-user computing is modeling. Most of the modeling done is in the form of either spreadsheet or statistical analysis. These packages are also generally easy to learn and are quick to turn raw data into

meaningful information. Problems can emerge when users get more sophisticated and develop models that the spreadsheet packages were not designed to do (or at least not easily). This results in not only an inefficient use of the individual's time, but also a model that is so complicated and poorly structured that it would be virtually impossible for anyone but the originator to understand. This is not good especially if a user is reassigned to another department, or leaves the company, leaving the "spaghetti code" behind. Often times the model will have to be thrown away and redone by the next user to inherit it.

Another type of problem that can arise with modeling is that of input data. With all the sophisticated controls that are placed on production systems, virtually no controls are placed on these "modelers". One user may decide that the information of another is useful to him and access it without knowing the actual status or validity of that information. Or, problems can and will arise if more than one user can enter/update the same data file.

The last area is that of systems development. Users currently have only one choice, given the limited staff of the Information Center... to develop the systems themselves. The irony here is that these systems, developed by the users are often more beneficial than the systems being developed for them by the Data Processing department, but they are not

"traditional" systems.

Most Data Processing departments do not realize how many of these systems exists throughout the company and the benefits they offer. Nor do departments take into account the amount of information that is not stored in the computer that is an integral part of the decision-making process. "If these systems were identified, the development backlog would easily be 10 years".<sup>5</sup>

Users designing and implementing their own systems has its definite advantages for the users (after all it is what they want them to be), but there are also disadvantages as well. The functional organizational structure of the company can be disrupted. The unity of the structure is jeopardized. The information flow and its value to the using departments can no longer be guaranteed by the Data Processing department. With both the Data Processing people and the users having access to the data in the information data bases, there arises conflicts about how that data should be stored and who should be able to access, modify and control its distribution. As friction builds between them the organizational structure begins to breakdown.

One major problem that often arises is duplication of

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<sup>5</sup> Ronald A. Zink, "End-User Programming", Computerworld, Volume XVIII, Number 30, July 23, 1984, p. ID/10.



data; one that the users maintain and the actual one stored on the data base. This problem becomes worse when the user-defined systems involve data from other organizations as well as their own. Often this duplicity of data goes unnoticed, but it will surface as a problem (usually at the most inappropriate time). When management begins to receive reports with conflicting or inconsistent information you'll probably know why it's occurring. A company can not continue to operate under these conditions and expect to survive. The groups will need to meet and agree on some common grounds.

The factors that cause problems in end-user computing can be categorized into three major areas: lack of systems design concepts, improper use of available tools, and data management problems.

Systems design expertise is often lacking because they do not have enough training and experience. More training may not be the complete answer. After all it is not our goal to convert users into systems personnel. The goal is to merge the users' knowledge with the necessary tools and training to help them perform their jobs. Too much training and experiential learning can take time away from the users' functional tasks. They become too systems oriented, thereby losing the primary advantage of end-user computing.

Improper use of the available user tools is often

caused by confusion on the users' part due to the many and varied fourth-generation languages and modeling tools which all seem so similar. It's not they are difficult to learn, they are not. The problems result when one tool is used when another would have been more appropriate. For instance maybe a report-writing program is used when a spreadsheet should have been used. Though the correct results are obtained, the statements to generate the output may be so complex that only the author can decode it.

Lastly, poor management of the data is usually the cause for the inaccurate results being obtained. Again it's generally not the application package in error, but rather poor editing, duplication of data and/or embedded data in programs by the users is the culprit.

The task then is to remove these limiting factors without disrupting the information flow. "An environment must be created in which sound systems can be developed by individuals without DP background where the appropriate tools can be used and where the data is properly managed so that system activities performed by different users according to their own time frames remain coordinated."<sup>6</sup> The Information Center, with its Information Services group backing them up,

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<sup>6</sup> Ronald A. Zink, "End-User Programming", Computerworld, Volume XVIII, Number 30, July 23, 1984, p. ID/10.

is designed to do just that. It brings the knowledge of the Data Processing specialists together with the astute business-minded end-user to reach mutual goals for the benefit of the company. The Information Center needs to be brought into the mainstream of the Data Processing world.

## XI. THE CHANGING ROLES OF DATA PROCESSING

With the Information Center becoming more and more a standard element in an organization, the end-users, the beneficiaries of the Center, are beginning to make a dent in the protective shield of the Data Processing professional.

The facilities provided by the Center are contributing to a general rise in computer literacy among end-users. Companies are facing situations in which users are no longer content to wait to be serviced by the Data Processing department. Backlogs of user requests for new systems are growing so rapidly that they are turning into daydreams. The users are stepping in and taking control of their own needs by their own means. Will they still need the Data Processing professional? Yes, but in a different sort of way than is currently utilized.

Eventually the end-users will be generating most of their own systems. The Data Processing group will concentrate their efforts on developing the more complex, inter-related systems as well as provide the framework for the end-user environment itself. Though hardware and software technology is advancing rapidly, the power is still not near what it must be to totally support end-user development, but the industry is progressing in the right direction and at an accelerated pace. It is only a matter of time.

Computer literacy though does not mean proficiency or experience. Uncontrolled information manipulation provides incredible opportunities to misrepresent important corporate data. One Data Processing function that will take on a more prominent role is that of controller. The end-user environment should not be hampered by the control, but rather enforced by it. The Data Processing department will provide the support necessary to insure that the end-user solutions conform to good practices and corporate goals. One major contribution that the Data Processing professional can make is to bring his project management and control expertise to the typical user development efforts.

In many organizations of today a subtle dispersion of many of the traditional Data Processing functions is beginning to occur. One of these, the cost/benefit justification of their systems, is being placed in the users' hands. Also much of the design, development and testing efforts are being performed by the end-users.

The professional data processing organization tends to pursue system solutions without bias that serve and protect itself. With the responsibilities in the hands of a single user's area there is less protection for the balance of the company as a whole. To correct (and prevent) this situation, the Data Processing group must take a more active role in review and recommendations for new development. By

involving themselves early in the users' projects, the Data Processing staff can provide the correct direction that they should follow and offer suggested alternative solutions as well as an analyzation of the intended solution.

In the Data Processing organization of tomorrow the primary emphasis on the development personnel will be the attributes of consulting, communicating and coordinating. These attributes will be the interface point to the end-users, with their prime responsibility to protect the overall organization from information abuse and misuse. The typical programming analyst functions may very well go by the wayside, except for specialized and complex applications.

Much of what can be done with the new development tools depends upon the sophistication level of the user community. This factor must be well know by the Data Processing staff and will bear heavily on the organization's plans. Sophisticated and intelligent end-users allow for substantially lowered commitments to education and training as well as a considerable lowered requirement for constant assistance.

It is obvious that if a company does not have this level of end-users that they can not just go out and replace them all. This is not only impossible, but highly impractical. They do however have a couple of choices. One is to attempt to create foolproof systems interfaces or to raise

the level of sophistication of the end-users. Creating foolproof systems interface is unlikely to ever happen. No system is perfect.

So the role of data processing is slowly making a shift in the functions that it performs. For those companies who have already either addressed the need of an Information Center to support end-user programming, or those that have one currently installed, the transition will be easier than for those who have not. The Information Center is fast becoming a permanent fixture in an organization, it is not just a passing fad. The Information Center should be treated as any other company resource and be considered as a viable alternative solution to end-user system requests. I believe that this new concept of encouraging end-user programming through the facilities of an Information Center, will establish itself (if it hasn't already) as a valuable new resource for the organization.

## XII. CLOSING COMMENTS

As can be seen by examining the Bibliography (page A5), much of the material for this paper was obtained from current magazines, periodicals and computer newspapers. The few books on the subject of "Information Center" that I did find tended to be lagging in current concepts. The Information Center concept seems to be changing so rapidly that books can not stay current. The numerous computer-related literature that are available, are able to report the changes almost immediately, making the information more useable.

The fact that the information was more timely was very important to me for another reason. On October 1st, 1984 I was given the job assignment to define and establish an Information Center (known by our people as "User Support Center") to promote end-user programming and provide support for all the people in our organization. This paper was written concurrently with the development of the Center, and much of the information that I collected about the Information Center for this paper was used as a guide for developing my own User Support Center.

Not only did the research get me started in the right direction for developing the Center, but it guided me through all the development stages.



The following is the status of my User Support Center.

No. Users: 112 (30 Programmers, 82 End-users)

Note: Of the 82 End-users, 25 are heavy users, 57 are occasional users.)

Terminals: 112 Synchronous (one per person)

20 Asynchronous (dial access anywhere)

13 Personal Computers (multi-user, w/slaves)

3 Graphic Terminals (1 color, 2 black/white)

3 Pen Plotters (2 4-color, 1 8-color)

1 Graphic Printer (8 color)

Services: (See graph on page A2)

Organizationally, our User Support Center most closely resembles the chart on page A3. It is relatively small currently, and is a sub-project, jointly monitored by both Systems and Application Programming staffs. I am sure, though when the size of the Center increases it will become necessary to move it the function to the same level as the other Data Processing functions, and be supervised by separate management.

As a means of monitoring the usage of the User Support Center, I have written several programs to produce reports and graphs (see page A1 and A2) to do so. In so doing I can gauge how often the report and/or graphics packages are being used and who's using it/them. If I see that the usage

for a particular package has dropped off or has not developed, I will make it a point to encourage its use by demonstration of its capabilities to the end-users.

The usage information is not only for myself, but management is also very concerned about the Center. After all, it is (was) quite an expense to establish it and they want to make sure that it is being used as expected. As an aside, this paper was produced in my Center utilizing a word processing package for preparation and a laser printer for output.

In the short time that the User Support Center has been in full operation (about 2 months), I have received very good feedback from the users. Some of the feedback has been in the form of praise on its setup, suggestions for improvement, and unfortunately some dissatisfaction. It's impossible to please everybody (when you are constrained for resources), but I've been able to please the majority and accommodate the rest. There always seems to be room for improvement.

The Information Center (User Support Center) I have found to be one of the best new innovations to be introduced as a new resource for a company. For those who do not have one, it is only a matter of time when they will. It will be a necessity rather than a convenience.

# INFORMATION CENTER DISTRIBUTION OF ACTIVITY

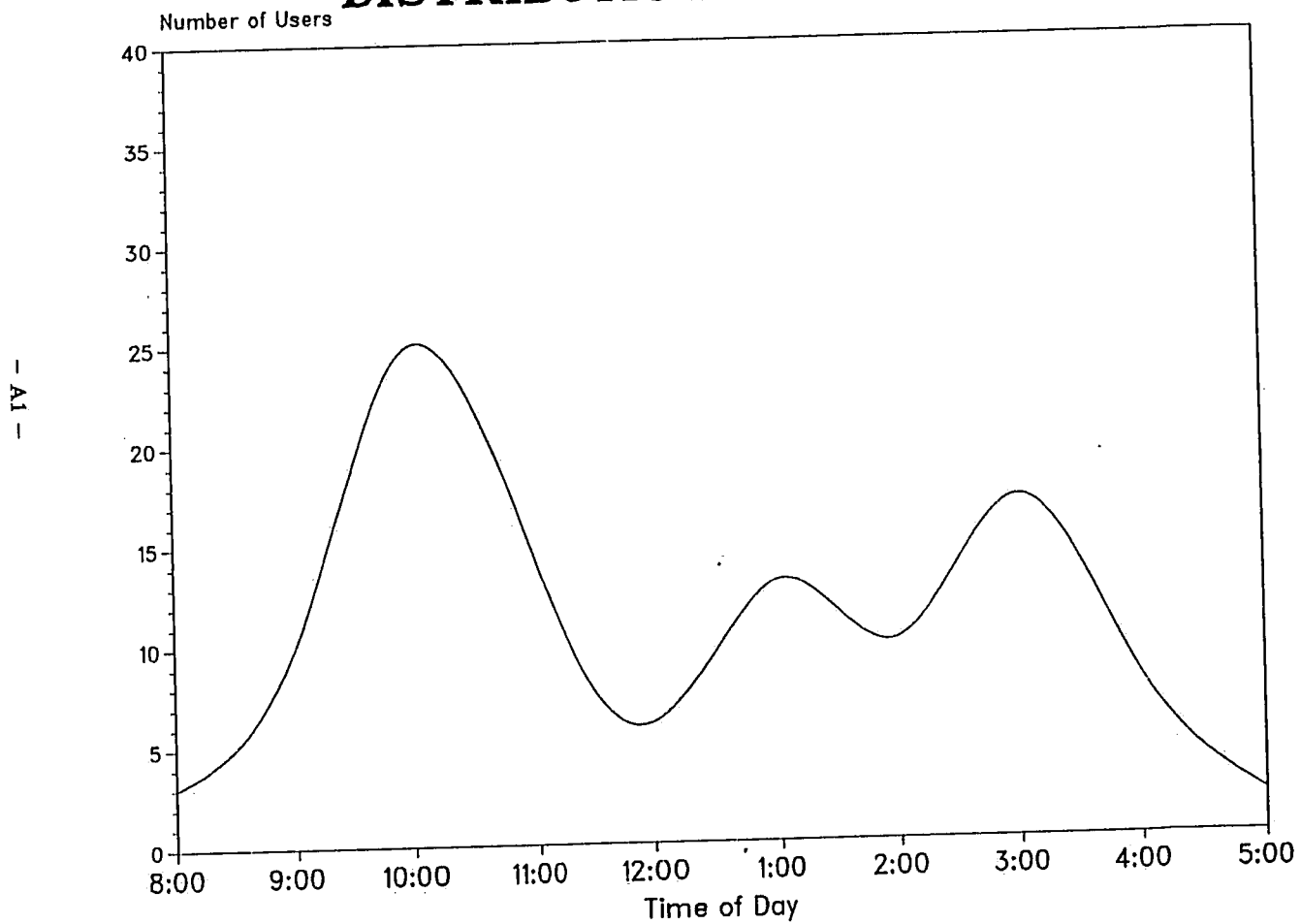


Figure 1

# INFORMATION CENTER DISTRIBUTION OF SERVICES OFFERED

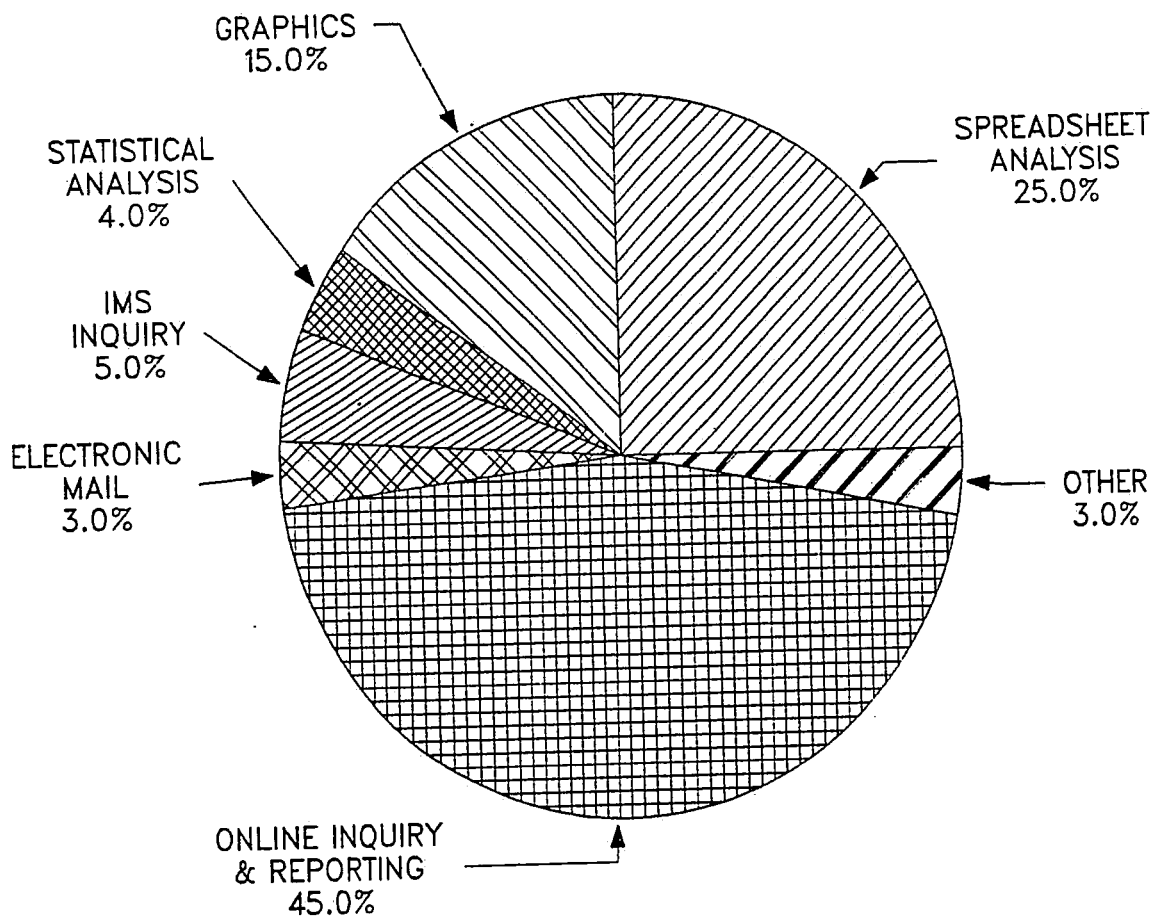


Figure 2

ORGANIZATIONAL PLACEMENT OF AN IMMATURE/PILOT INFORMATION CENTER

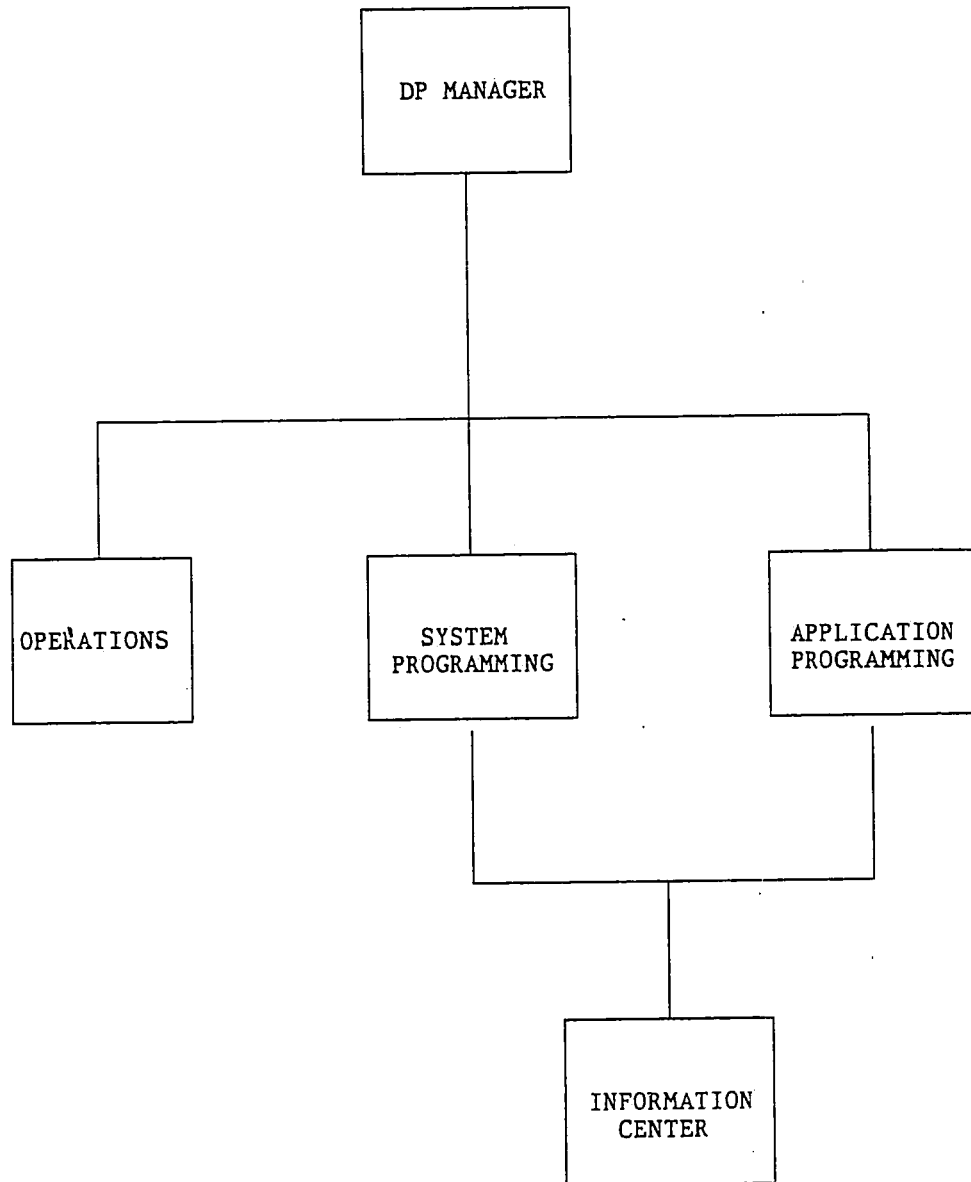


Figure 3

ORGANIZATIONAL PLACEMENT OF A MATURE INFORMATION CENTER

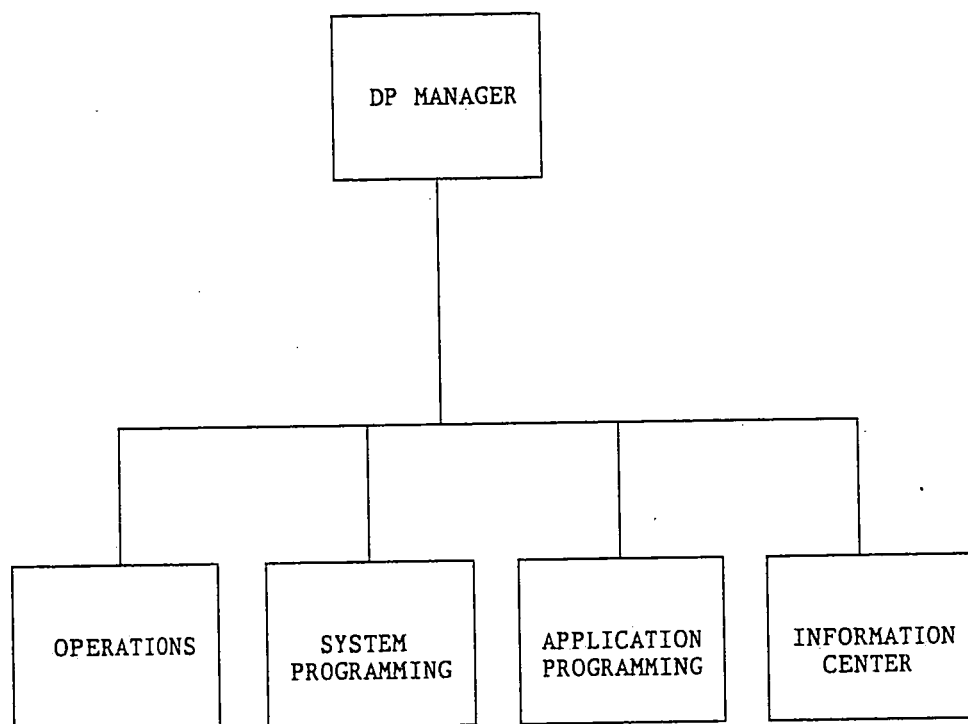


Figure 4

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XV. PERSONAL DATA

Daniel J. Topp was born January 31, 1952 to Mr. and Mrs. Herman J. Topp of Delphos, Ohio. After graduating St. Johns High School in May, 1970 he was accepted by Bowling Green State University, Bowling Green, Ohio in September 1970. He graduated in June 1974 with a Bachelor of Science degree in Business Administration with a major in Information Systems and a minor in Computer Science.

Upon graduation he married Debra L. Hickel and relocated to Allentown, Pennsylvania where he accepted a full-time position with Air Products and Chemicals, Inc. as a computer programmer/analyst.

In April, 1978 he left Air Products and Chemicals and was hired by A T & T (formerly Western Electric Company) also in Allentown, Pennsylvania, as an Information Systems Designer. He remains currently with A T & T where he is now head of the Information Center at the Cedar Crest I location.

On November 13, 1984 their first child, Daniel Jr. was born.