THE INFORMATION CENTER--A REVIEW OF THE CONCEPT
R. H. Torgler, IBM Corporation

ABSTRACT

The Information Center is an organizational approach that offers potential productivity gains by effectively supporting end user computing to satisfy demand processing requirements. The Center provides guidance, training, and assistance to end users in the use of appropriate products to improve the effectiveness and productivity of managers and staff professionals.

THE PROBLEM--A DEMAND SIDE VIEW

INTRODUCTION

The delivery of computer power to the non-data processing end user who can benefit from it has been a problem for most organizations. It has only been in the last few years that there has been significant activity to effectively address the problem with an in-house solution which is under the control of the data processing organization. By giving end users a "do-it-yourself" capability, considerable benefits can be realized in the areas of productivity, decision support, traditional application development, and in application maintenance. The organizational aspect of the solution is called the Information Center. Why this particular solution at this particular time? The answer lies in the nature of the problems faced by business and government which have forced a major addition to the traditional service strategy of most data processing groups.

It is well to begin with a discussion of the problems and their impact in order that the approaches to the solutions be better understood.

THE ORGANIZATION UNDER PRESSURE

The relationship among operational, functional, and executive management levels is a hierarchical structure which is fundamental to business and other institutionalized organizations throughout the world. Never before have the pressures on this structure and other cherished notions been as great as they are today.

In his latest book, Alvin Toffler creates a vivid image of civilization in turmoil. "A powerful tide is surging across much of the world today, creating a new, often bizarre, environment in which to work, play, marry, raise children, or retire. In this bewildering context, businessmen swim against highly erratic economic currents, politicians see their ratings bob wildly up and down; universities, hospitals, and other institutions battle desperately against inflation. Value systems splinter and crash, while the lifeboats of family, church, and state are hurled madly about."

Peter Drucker has a much more concise but just as powerful way of describing the times:

"Some time during the 1970s, the longest period of continuity in economic history come to an end. At some time during the last ten years we moved into turbulence."

What Toffler and Drucker are telling us is that we are feeling the impact of pressures which are much more severe and much more chaotic than we know. And it is the resulting stresses on our business, family, and social lives with which we are dealing. Corporate (and government) survival is keyed to our ability to handle these stresses by making the right decisions in time enough to prevent the damage or in time to seize the opportunity.

BUSINESS PROFESSIONALS

Management at every level has had to call upon an ever increasing population of business professionals to do an ever growing amount of staff work in order to support their decision making processes. As economic continuity disappeared as an underpinning of fiscal planning, more and more "staff work" has been needed to support the decision making process.

Among the most important of the decision support functions of business professionals has been planning. The loss of economic continuity has had its effects on the planning function. Drucker says:

"In the twenty-five years after World War II, planning became fashionable. But planning, as commonly practiced, assumes a high degree of continuity. Planning starts out, as a rule, with the trends of yesterday and projects them into the future--using a different "mix" perhaps, but with very much the same elements in the same configuration. This is no longer going to work (emphasis mine)."

DECLINE IN THE COST OF TECHNOLOGY

At the same time as the ranks of the business professional have been swelling and driving up the cost of doing business, the cost of technology has dropped at an extreme rate. From 1953 to 1978 the cost to performance ratio of computing dropped by a factor of 180. According to the Sloan School of Management computer logic costs are currently dropping at a rate of 25% per year, memory costs by 40% and communication costs by 11%. 

427
DATA PROCESSING UNDER PRESSURE

These external forces, loss of economic continuity and low cost technology, have been working together in a way which has produced devastating results on the traditional data processing organization. An economy in turbulence forces business executives to change the ways in which their companies operate. This, in turn, tends to increase the number and significance of the changes required of the installed information systems applications. And this, in turn, increases the maintenance load which takes resources away from new application development.

Technological advances have had another impact which has caused problems for data processing organizations. The boom in small, powerful computers reflects the widespread visibility of the low cost of technology. The phenomenon is quite like that of the automobile. In the early days of the "internal combustion engine", a sociologist's prediction was that only two million automobiles would every be manufactured--because only two million people would be willing to be chauffeurs. That prediction lost out to the unanticipated events brought on by Henry Ford. Those events brought the automobile down in cost and easy enough to be used by nearly everyone--we became our own chauffeurs. Now, low cost, high function, and mass produced computer technology is available. That availability is very visible to the millions of professionals who are being pressured every day for more and more staff work.

All of this technological visibility to the professionals, managers, and executives of business and government caused them to demand that this technology be put to work on their data. "If technology costs so little, why can't I get at my data?" they ask. The attractive price-performance ratio of technology increases user demands on data processing. Thus, the already large backlog for new applications get larger. This runs up against the increased maintenance load which has drawn away the already limited resources. The result is a low level of user satisfaction.

USER NEEDS HAVE CHANGED

In the final report of the CISR work at the Sloan School it is shown that applications were identified by their survey which were not known to the DP organization.

As the Table shows, this invisible backlog is five times as large as the known backlog. The important finding, however, is that the very nature of the backlog has changed, as compared to the total systems installed in the survey sample.

The study categorizes the systems requested by user management into four types:

- Monitor: Transaction processing systems that monitor daily detail activity, producing standard reports on a fixed schedule.
- Exception: The same kinds of systems as above, but producing exception reports based on fixed definitions of exception conditions.
- Inquiry: A system that provides a flexible inquiry capability, enabling managers to design and change their own reports.
- Analysis: A system providing powerful data analysis capability (e.g., modeling, simulation, optimization, or statistical routines) and the appropriate data base to support managerial decision making.

It is obvious from the table that the nature of user needs has changed significantly from traditional transaction processing systems to demand processing systems. The invisible backlog is 33% query and 28% analysis systems. A total of 61% versus 43% of the currently installed base.

<table>
<thead>
<tr>
<th>PERCENT MIX BY SYSTEM TYPE</th>
<th>TOTAL</th>
<th>Monitor</th>
<th>Exception</th>
<th>Query</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currently Installed</td>
<td>5193</td>
<td>63%</td>
<td>16%</td>
<td>12%</td>
<td>9%</td>
</tr>
<tr>
<td>Backlog</td>
<td>255</td>
<td>41%</td>
<td>17%</td>
<td>24%</td>
<td>19%</td>
</tr>
<tr>
<td>Invisible Backlog</td>
<td>1277</td>
<td>22%</td>
<td>17%</td>
<td>33%</td>
<td>28%</td>
</tr>
</tbody>
</table>

Robert M. Alloway, Center for Information Systems Research (CISR) Alfred P. Sloan School of Management, MIT
April 1982.

Figure 1. Nature of Installed Systems Versus Backlog.
DEMAND PROCESSING IN THE TRADITIONAL ENVIRONMENT

Demand processing constitutes query, analysis, reporting, forecasting and 'what if...?' kinds of planning activities, often using private as well as organizational data. Demand processing also includes business communications and personal support. Such things as electronic mail, sending and receiving notes and memos, calendars, facilities scheduling, and activity tracking are all part of the demand processing support needs of the professional. But how can these demand processing needs be effectively supported, given that the cumulative experiences of the data processing professional is composed of 79% transaction processing systems (65% monitor and 16% exception systems in the current installed base). Does DP have the skills and technology, not to mention the resources, to implement Query and Analysis systems to the extent required to meet end user demands?

WHAT ARE END USER'S REQUIREMENTS

In examining the activities and requirements of end users three kinds of support requirements become apparent:

- Decision support systems that directly support management decision making and the decision making process of the organization.
- Personal support that provides individual job support tools and functions.
- Business Communications support that meets the need for document handling, notes, messages, memoranda, conferencing, etc.

DECISION SUPPORT SYSTEMS


Although these systems are used for Managers, they are not necessarily used directly by them. The concept does not imply a terminal on every manager's desk.

The systems support managerial judgement, but do not replace it. They can be used to identify and describe alternatives as an aid to decision making, or perhaps only to validate a decision once more.

Such systems "will be able to focus either on a recurrent problem of concern or a particularly critical one-time problem." For example, a decision support system can be used against operating cost data for periodic profitability analysis; or to analyze the impact of a company dropping its own charge account system and turning customer billing over to major credit cards.

Finally, these systems are designed not so much to save management time, but rather to improve the quality of the decision making process - to improve management effectiveness. Alvin Toffler cites a recent survey that shows that 80% of the manager's time is spent in between 150 and 300 information transactions daily. To be effective, a manager needs access to all the information that bears on the problem at hand, and analytical tools to access the significance of the information.

Decision support systems tend to display the following characteristics:

- Process: They are less structured than operational systems. Often, the data examined are self-defining, being iterative processes where a question provides an answer that leads to another question, another answer, etc. As a chief executive officer has put it, "I don't know what I want, but I'll recognize it when I see it." A decision support system must assist management investigation of complex situations involving many interconnected factors. A rather flexible organization of data is required so that data elements can be freely associated as different hypotheses are tried out: "let's try a different cut at the data."

- Cycle: Decision support activities are often unscheduled, exercised on demand, the same chief executive officer who stated "I don't know what I want but I'll recognize it when I see it," also added: "and I want it on my desk by 10 o'clock tomorrow morning." There are critical situations that arise within a corporation that call for a rapid response capability, anything from a rise in the prime rate to a complete plant shutdown.

- Life: Such tasks are quite unpredictable and often ad hoc, one-time requests: "That's my position on the issue. Now find the data to back it up." On the other hand, they may become regular activities if found to be useful and to meet a continuing need.

- Users: Those using decision support systems are usually not DP trained, and not regular users of an online operational system. They may not use a keyboard for any other purpose.

- Justification: In many cases, the justification for the development of a decision support system will not be found in any cost comparison, but rather in an analysis of the new activities that it makes possible. It might delineate new business opportunities that may expand revenue, as was the case with one customer who termed such a system "our corporate competitive edge." Such systems may generate substantial productivity gains in terms of time savings in the user community. Peter Keen, at the Sloan School of Management finds that in many cases, management will sponsor a decision support system based on perceived value at a reasonable cost. In his survey of 400 users of interactive planning tools, he found that while 30% had hard data on value, only 13% did a cost-benefit study. In a very real sense, such systems enable better informed decision making - and that becomes their ultimate justification.

- Horizon: Decision support systems do not need an "up to the instant" snapshot of current status. Rather, they enable management to learn from the past and relate it to the present situation, but as a basis for
Data: Such systems need to keep access to historical data so that management can identify trends and examine changing relationships. They are more interested in "framed" or aggregated data, summarized so that they can compare the current reporting period to the same period last month or last year.

Emphasis: The systems must be accessible, implying the availability of terminals that are easily signed on to the decision support system. To these non-DP trained users, the interface often is the system. Any obstacle or inhibitor tends to frustrate them, so these systems must be comfortable and easy to use. Given the demands of management decision making, they must also be highly responsive, providing quick answers in an iterative mode so that alternatives can be developed, modified, and compared.

PERSONAL SUPPORT

Personal support needs are met through such functions as Time Management (calendar, appointments), Activity Tracking ("to-do" lists, projects), electronic reminders, and on-line interactive training sessions.

BUSINESS COMMUNICATIONS

Marked by functions like electronic mail, computer-assisted conferencing facilities scheduling, and notes and messages, the business communications area is rapidly being integrated with the decision support functions to form a complete demand processing support system for professionals. The business communications area of support also includes the complete range of document handling: creation, editing and mark-up, filing, retrieval, printing, and transmission over networks.

END USERS, WHO ARE THEY?

In the context of this paper, "end user" means any non-DP trained individual who, with the right tools and support, could take advantage of the power of the computer. A list of end users would include:

- Planners
- Staff Managers
- Administrative Assistants
- Accountants
- Internal Auditors
- Engineers, Scientists
- Financial Managers
- School and Hospital Administrators
- Economists

There are some common characteristics of end users. They tend to be practitioners or specialists in a particular business area or application. Typically, they are their own resource, that is, working on their own with no supporting staff. They are usually under local organization control and often are dispersed throughout an organization (like the presence of a planning function in most business areas). They tend to be demand processing oriented, reacting to the dynamics and pressures of the business environment. Most often, while they are unskilled in data processing, they probably have written at least one computer program (one company's survey of its 7400 non-DP business professionals found that 71% had done so).

THEIR DILEMMA

The dilemma for the non-DP trained end user has traditionally been how to tap the power of the computer without tripping over such technical complexities as Job Control Language. As Ed Haskell, AMOCO Research, puts it, "These people - geophysicists, chemists, physicists - are interested in solving problems, not in learning the intricacies of operating systems."

END USER COMPUTING-THE GENERIC SOLUTION

The potential solution to the demand processing dilemma is end user computing. The knowledge and technology now exists to effectively support end user computing as with the automobile, to let end users "do their own thing." End user products have been developed with the functional capabilities desired by end users.

REQUIREMENTS FOR SUCCESSFUL END USER COMPUTING

From our past experience with interactive products the following requirements emerge:

- "user friendly" software products that permit problem expression in a language natural to the problem area, without requiring data processing knowledge.
- Support and assistance in their use so that the end user is not left floundering in the strange and too often arcane world of the computer.
- Access to the data needed, whether private, public, or organizational, in a manner and format meaningful to someone not versed in programming.

END USER APPLICATIONS

The types of end user processing activities that we have surveyed tend to cluster in the following application areas:
• Query processing
• Analysis/problem solving
• Business Planning
• Data Presentation
  - Row/Column reports
  - Color Business Graphics
• Text processing, Document Handling
• Training
• Electronic mail, notes, etc.
• Calendars and appointments
• Meeting schedules
• Activity tracking, "to-do" lists

BENEFITS

In return for the investment of learning to use new tools and techniques, the end user will receive a number of benefits. Among them are:

• Increased motivation and better use of professional talent
• Timely availability of information
• The ability to analyze business problems more thoroughly
• Increased productivity of office staff, both professional and clerical.

END USER CONCERNS

While the tools are available to address many demand processing requirements, the non-data processing professional can have a number of seemingly simple concerns when attempting to use these tools. And, if these simple concerns are not addressed effectively they can become a very real inhibitor to the success of end user computing in an organization. That is why the second and perhaps the most important ingredient for successful end user computing is support and assistance.

THE INFORMATION CENTER—AN ORGANIZATIONAL SOLUTION

The Information Center is an organization. It is not a walk-in facility of terminals, printers, and plotters. The SHARE Information Center project defines the Information Center as follows:

The Information Center is a formal organizational entity which has a manager and a staff devoted to supporting "do-it-yourself" computing.

MISSION

The mission of an Information Center is to provide easy-to-use computing tools, data access, education, consulting and assistance, to executives, managers, professionals and administrative personnel to fulfill their demand processing needs. Further, the Information Center maintains a continual awareness of the needs of its clients.

OBJECTIVE

The objective of the Information Center is to significantly increase the productivity of the organization's knowledge workers.

FUNCTIONS AND SERVICES

The major functions of an Information Center are to coordinate or perform:

• Client education and "how-to-use" consultation
• Information Center marketing and promotion
• Plans and Controls
• Administration
• Client data support services
• New service evaluation
• Technical interface to other information system functions, e.g.:
  - Data resource management
  - Database administration
  - Systems programming
  - Application development
  - Operations
  - Communications

According to one Information Center manager, the Information Center was "the direct result of a major shift in strategy resulting from the recognition that all the information requirements of a widely varying user community could not be satisfied adequately by a central group of DP professionals."
DATA NEEDS

With respect to access to data, there are three principal types of data that end users require.

The first is private user data - data that is entered, maintained, and "owned" by the end user. Data in this category is necessary to support a specific business function but is not "vital" to the business organization as a whole.

The second type of data required by end users is public purchased data. This is generally proprietary data that can be purchased by businesses, for example, market research data, address lists or census samples. Usually, access to this type of data is made available to users on a read-only basis.

The third type of data to which end users may require access is the protected organization data contained in the corporate data base. This data is the "lifeblood" of operational systems and is usually critical to running the business.

While the major concerns relate to protected organization data, Data Processing has some very legitimate concerns. Among them are:

- Preserving the response time for online, transaction driven systems (end user queries through transaction oriented data bases will not be efficient.)
- Maintaining the integrity of operational data bases.
- Providing security with respect to sensitive company information.

END USER DATA CONCERNS

But the end user has some concerns about data as well. Among them are:

- Stability of data - for example, to predict results to year end, I need to be able to compare the results of the model I ran yesterday. End users generally need data fixed at a "point in time," not "as of now."
- Amount of data - of the vast amount of data sorted in the corporate data base, only a small subset is required for my application.
- Control over data - my planning cycle ends when I am satisfied with the results. Until then, I don't want the data to change or disappear.

THE SOLUTION--EXTRACT FILES

Both sets of concerns are satisfied by providing the end user with extract files. These files will contain the data subset with which the user will interact. Extract files may be produced periodically to meet recurring needs of one or more users or produced on demand to satisfy ad hoc requirements. Once extracted, the data becomes the property of the end user.

ORGANIZING TO SUPPORT THE END USER

Because the Information Center represents an alternative strategy to application development, it should be separate from, and on the same level in the data processing organization as Application Programming. A strong partnership should exist, however, between the Information Center and Application Programming to help insure appropriate use of both alternatives. Establishment of a separate organizational unit also projects an image of commitment to end user computing to both users and others in data processing.

STAFFING THE INFORMATION CENTER

The Information Center will be staffed primarily to perform the consulting, product support, and promotion functions. In staffing an Information Center, emphasis should be on qualities such as business knowledge, patience, enthusiasm, and communication skills rather than on strong technical skills and project orientation. Likely sources for IC staff are application programming, operations, user departments, and new hires.

A CASE STUDY

The following material summarizes one case of an Information Center which was implemented over seven years ago.

The Problem - DP Viewpoint

- DP had a limited amount of application development resources of which 70% was devoted to maintenance.
- DP was unresponsive to user needs and losing control.

The Problem - End User's viewpoint

- Dissatisfied with the long queue for service and the lengthy development cycle.
- Felt they had no flexibility.

The Solution - Establish the Information Center

- Four people were put in place to support two end user products to provide query, report writing, and problem solving capabilities.

The results - After 7 Years

- The Information Center staff supports over 925 users with 11 staff members.
- Five percent of the DP application development resource supports 25% of the computer application utilization.
• Program maintenance dropped from 70% to 32% of the total application development resource.

• Fifty percent of the project requests are satisfied by end user computing.

The Results - For the End User

• It costs less for the users to develop and maintain applications themselves than for DP to do it.

• It has improved the productivity of high-priced professionals.

• It has extended capabilities, especially in planning areas.

• End user computing is more responsive to their needs by providing faster turnaround, more flexibility, and more user control.

• When surveyed after the fact, users identified $2 in benefits for every $1 in cost (includes DP charge for end user computing and user cost to develop the applications.)

The results - For the DP Director

• Development and maintenance requirements are both reduced.

• Relieved of the requirement to develop and maintain user reports, DP resources are now better utilized by concentrating on defining and building the data environment.

• DP now appears responsive and has highly visibility in user areas.

• The return-on-investment is good (100%) as compared to the ROI for DP developed applications (in this case 37% with an average payback period of 30 months.)

• The ratio of DP support resource to machine utilization is in keeping with strategic objectives.

• DP has better control - "Users are going to automate one way or another. It is only a matter of whether they do it with you or within you."

The Information Center as a Productivity Solution

• Business volumes for this company are expected to grow 100% in the next five years. The company objective is to hold the growth of indirect headcount to only 20%.

• The gap is their "productivity wedge," of which approximately two thirds is the Information Center target.

• Therefore, in the words of the vice president of business systems, "The Information Center is our single most important productivity tool."

The Value of an Information Center

The end user benefits from the Information Center in a number of ways. Among them are more systematic and effective decision support, information available when it is needed to solve the business problem or accomplish the task at hand, and freedom from many manual activities and the opportunity to focus more directly on business problems.

For the Data Processing Department, the Information Center strategy allows DP to be responsive to end user demand processing needs by a direct strategy for supporting end user computing. At the same time, DP resource is better utilized to develop operational systems and to structure the data environment for the user. The resulting benefit is accelerated development for both structured and non-structured applications.

The Information Center offers improved productivity to both end user professionals and to DP professionals in an organization. By involving the user where appropriate in application development, more applications will be implemented sooner and the return on the organization's investment in data processing will be realized sooner.
REFERENCES