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Evaluation of Electronic Data Processing

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An Evaluation of Electronic Data Processing

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What do you think of when you hear the word "computer"—a magical thinking machine with a will of its own and an intellect so superior that it can at any time outwit the lowly human who presumes to question it? Of course neither you nor anybody else really believes this. Yet you would be amazed at the number of people who approach the topic of electronic data processing as if these machines were some sort of omniscient beings instead of the singularly limited robots that they actually are. For if the truth were known, these magnificent collections of flashing lights, whirring tape drives and chattering printers can't so much as blink a light without a specific instruction to do so.

The attributes of the computer which put it in its place of prominence are its tremendous speed and uncanny ability to do exactly what it is instructed to do—nothing more, nothing less. Unlike a human employee, this mechanical employee will never get bored, try new approaches of its own, or forget to do something. Instead it will do the same thing over and over again without any variation whatsoever. It is precisely because we are dealing with machines that we are able to achieve results which are always uniform and accurate and obtained at a uniform and extremely high speed.

Data processing, whether it is manual or mechanical, is essentially a matter of collecting and recording data, or facts if you will, and manipulating those facts until they are so arranged that they can be analyzed or summarized into meaningful conclusions and then reporting those conclusions. Actually then, everytime we attempt to think, to solve a problem, to write a speech, we are engaged in data processing. We are in effect performing a function which is precisely the same as that being performed by the electronic data processing equipment. It is not what we are doing that is different, but rather the way in which we are doing it that differs. This is too often forgotten and people do not view electronic data processing in its proper perspective—as simply a new tool to perform the age-old function of data processing.

Let's turn for a moment to a consideration of an area of data processing with which we are all extremely familiar, I'm sure—the accounting records. Certainly all of you can immediately recognize that the accounting records require:

(1) the collection and recording of data, which is commonly known in the electronic data processing world as input;
(2) the classification, summary, and analysis of this data, usually known as processing;
(3) the preparation of reports and recommendations, known as output.

Originally the performance of these phases of data processing was all done manually and by one individual. Gradually as the volume of transactions made the addition of more people necessary, it became necessary to divide the work so that each employee could contribute at the same time. Thus we came to the introduction of special purpose journals and subsidiary ledgers with one employee handling sales transactions, another employee handling purchases, etc. With this separation of duties we began to use one of the principles upon which much of our modern electronic data processing is based—the recognition that certain types of transactions have a sufficiently high volume to justify a separate handling procedure for them and to include only the summarization of these transactions in the general accounting records.

Looking at the typical applications (jobs) installed on automatic data processing equipment, one finds that they all have three characteristics in common. First, they have a high volume of transactions to justify the special procedure, whether it be special journals in a manual system or the expense of installing and operating data processing equipment. Second, the transactions in a particular application are all rather similar and well-defined with relatively few exceptions requiring other than routine handling. Third, but certainly not least, all of these transactions must be reduced to quantitative terms. The machines are not capable of making any qualitative judgments. All decision making, analysis, and reporting done on these machines must be reduced to quantitative form. Of course, descriptions and similar data can be stored in the machines, but this information is strictly for reference and has no significance as far as the processing itself is concerned.

It is not surprising that the earliest jobs put on automatic data processing equipment were accounts receivable, payroll, and inventory. In these areas are found quite clearly the three

characteristics just described—high volume, limited exceptions, quantitative data. In the newer areas such as inventory control, production scheduling, engineering analysis, school scheduling, airline reservations, to name a few, we find again the same old story. Each of these applications is made feasible by the tremendous speed with which this equipment can perform the same routine calculations over and over again. And, again, notice, in the area of engineering design for example, that the data processing equipment in no way does any creative work—it simply performs the myriad calculations laid out for it by some human who does have the ability to think. Thus the engineer is freed from the monotony and trouble of performing the calculations, while at the same time the computer can produce these answers in minutes instead of the hours and sometimes days that manual calculation would require. In the business world, as this equipment can produce faster and faster results, accounting information is becoming less and less a mere historical reporting of past events and more and more a report of business conditions as they occur, providing management with information in time for the normal day-to-day operational decisions.

Data processing equipment in use today generally breaks down into two categories: unit record equipment (sometimes called punched card equipment) and the stored program machines, commonly known as computers. The unit record equipment is the older and is now primarily in use by those businesses whose volume of work is not sufficient to justify the much faster and more sophisticated computer. This equipment is controlled by use of externally wired control panels. Each piece of equipment is designed to perform a specific function—thus there are calculators to multiply and divide; accounting machines to print reports and summarize by addition and subtraction; and sorters to put the data in proper sequence. To process a job on unit record equipment then requires a transfer of the data from machine to machine as each step in the overall job is to be performed.

The computers on the other hand are machines which combine all of these functions into one. Actually a computer is not a single machine at all, but rather a combination of units all centrally controlled by one set of instructions stored internally in the control unit, commonly known as the central processing unit. The operator, instead of carrying the data from machine to machine, as he would with unit record equipment, simply places it in the input unit of the computer. The central processing unit then accepts the data, processes it and transfers the results to the appropriate output mechanism—punched cards, magnetic tape, ramac file, paper tape.

The computer, of course, is a far more complex and sophisticated piece of equipment than the unit record machines. It is tremendously faster, for these machines no longer measure time in minutes but rather micro seconds with plans for even greater speed in the future. The computer has a far greater ability to recognize varying conditions and can store a much greater repertory of processing routine to handle these conditions. And, of course, the computer is not limited to a single media for storing data as unit record equipment is limited to punched cards.

Reviewing for a moment, data processing consists of the preparation of input data, the processing of that data, and the presentation of the output of that data. The techniques which are employed will vary greatly depending upon the available tools, but the overall objectives remain constant. The concern for accurate and complete reporting of any data handled is still the same. And this should not be lost sight of when one is faced with the task of evaluating an electronic data processing installation. The same criteria holds as for a manual system, only the technique differs.

The form of input used in an installation, whether it be cards, magnetic tape, disk, or tele-processing, is of secondary importance to an auditor (although of course it is of great significance to the user and is a major consideration in his system design). What is important to the auditor is that the input, however it is captured, is complete and accurate. Thus it is still important to examine the internal control and procedures in force. To a large extent the path through which data travels from the time it enters a company until it reaches the data processing department is unchanged.

It is in the electronic data processing department itself that the auditor is faced with a change from traditional techniques. Yet, the auditor must retain the proper perspective. After all, the objectives of the user of this equipment are the complete and accurate handling of all information entering the company. Usually the user turns his attention to three areas. First, he is concerned that all information is accurately translated into the language of the particular equipment involved. Second, he attempts to control the flow of the data, once it is properly captured, in order to insure that the proper processing is performed and that none of the data is lost. Third, he is concerned that all of the reports which are turned out are meaningful and accurately depict the situation.

The most common technique of capturing data is to key punch it, although there are, of course, many other techniques such as direct transmission. Usually once the data is punched it will be run through a key verifier operated

by a second person who is repeating the keying operation while the machine compares the punches in the card with the keys depressed to see if they agree. Other common procedures are to list or tabulate these new punched records to verify their accuracy and at the same time develop record counts, accounting control totals, hash totals—all of which can be used to balance that data captured in the records against that received by the data processing department. Once this balancing is accomplished there is assurance that the data to be processed by the equipment is complete and correct. At the same time these totals and counts can now be used as controls against which all subsequent processing and reporting can be balanced.

Checking of the processing itself can be divided into two categories—the checking which is built into the equipment itself and that which is programmed by the user. All equipment provides certain mechanical checks performed automatically by the equipment itself. Some examples are the hole count check, automatic reread, and record length checking performed as an integral part of the input and output commands. Parity and validity checks are performed each time data is manipulated within the central processing unit. All of these are simply part of the equipment and are designed merely to insure that the equipment is functioning properly. As such they are not of great significance to the auditor except to the extent that the auditor must assure himself that they do keep the equipment reliable.

Of greater concern are the programmed controls which check that the equipment has been instructed to handle transactions properly. For while these machines can check themselves to see that they are operating correctly, they can in no way check whether they have been told to do the correct thing. Remember they follow instructions blindly. Thus each program includes, in addition to the actual processing necessary, instructions to take control totals and record counts, to test for maximum-minimum limit conditions and report them, and to test that all records have one of the accepted codes.

To the auditor, the equipment used is of secondary importance. His concern should be that the proper flow of data has been established; that sufficient balancing and control techniques have been provided and are followed. This is not to suggest that one can blindly ignore the differences in equipment and need not acquaint himself with the developments in the field. It is to suggest, however, that one should keep the proper perspective and remember that the equipment and techniques should be fitted to the objectives of good accounting, rather than the objectives tailored to meet the equipment. Of course there must be some revisions and new approaches in the audit of an electronic data processing installation, but we should not forget some of the old basics and certainly the independent verification of such items as cash, accounts receivable, and inventory should still be performed by examining bank statements, confirming accounts, making inquiries to credit customers, and periodic physical inventories.

Source documents will still exist and can be definitely traced to their initial entry into the electronic data processing department. From that point on they can be traced through the processing in several ways. Naturally many of these transactions will appear in the many reports prepared for various individuals in the company. If proper balancing and control procedures are followed, the accuracy of transactions can be verified and they can be traced as they flow through the electronic data processing department. In some instances the auditor can even run a complete test of an automatic procedure by developing a set of test data which includes all of the conditions that it is felt the operation should be able to handle. The test data can then be run through the system and the results analyzed to see if the system is performing as hoped. The volume of data needed to make a good test is usually not large, and the time required by the equipment to test itself by running these transactions is usually very much less than the time required for an auditor to do the same amount of checking.

In conclusion it should be remembered that complete, accurate input, processed by a thorough and closely controlled procedure, will produce accurate and complete output. This has always been the goal of accounting. The introduction of electronic data processing has in no way changed this. It has merely introduced new techniques which have enabled us to handle a vastly increased volume of data with greater accuracy than was ever before possible.

PROFITS

PUBLIC opinion surveys have shown repeatedly that people are critical of business not because of its products or services, but because of things about business which they do not understand. Profits are a case in point. In a special Gallup Poll, participants were asked what per cent of profit they thought a typical American industrial firm earned. Answers ranged from 25% to 60%. Actually, over the past 30 years, American industry has earned less than 5% profit annually on the sales dollar, and less than 10% on the investment dollar.—Joseph T. Nolan, Chase Manhattan Bank