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Elements of successful business automation

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The Elements of Successful Business Automation

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One of our clients whose firm is installing punched-card equipment recently said to me, "You have to think differently with punched cards." This is literally true of any new application of business automation. The client about whom I am speaking is a well-qualified accountant with considerable experience in industry, yet when engaged in supervising a new automation system, he found problems he had never previously considered.

His difficulty was mainly in not thinking of the work planned as a production job that should be done on a relatively fixed schedule. He also had not been careful to plan for the exceptions that occur in most manual systems but that in a mechanized system must be reduced to a pattern of logic.

Business automation to be successful must consider a proper balance of components of the program. The primary factors that must be considered are:

- The job to be done.
- The personnel to do the job.
- The equipment to be used on the job.
- The adequacy of controls to be used on the job.

STUDIES OF THE WORK TO BE DONE

The study of the work flow and the actual operations being performed in a manual system will often be confusing when taken at the individual office worker's level.

For example, a description of a certain job by a clerical worker may sound something like this:

> I get the green tickets every morning from Mary. I put all those with a five in front of the serial number in alphabetic order and add the amount on the bottom of the tickets. I give the tape to Bill and file the tickets in the vault. I don't know what Bill does with it. The tickets I have left I put in my right hand middle drawer and Mr. Smith gets them around the end of the month.

Certainly this is a confusing picture of a record-keeping function since there is no framework for reference. We cannot tell what this worker is doing. Is he working on accounts payable, accounts receivable, or some payroll processing? Still, this may be exactly the way the clerk sees his or her job.

We must therefore establish the functions of processing before we attempt to put the individual worker's processing into the picture.

Having established what is being done and obtained estimates of the volumes of each type of transaction, we should then begin to study the "what's & why's" of each step.

- What are we really trying to do?
- Why must we do this?
- Why must we do it this way?
- What caused this to be an exception?

If the system is largely manual and if the processing has not been reduced to written procedures, it is usually possible to obtain substantial savings by taking this first step even without the use of automation equipment. Written procedures will insure continuity of processing even when personnel changes occur. Written procedures will also free the accounting executive to be a true executive, concerning himself with the unusual problem rather than the routine problem.

If the "what & why" questions referred to above are properly analyzed and the indicated changes made, the written procedure will surely be a more efficient method than the previous hand methods, since the practices that have grown up without reason for existing will have been eliminated.

I see no reason why written procedures cannot be used with benefit even in a very small office.

It is very important to seek out the exceptions and obtain an accurate estimate of their frequency.

A type of exception difficult to handle under automation is the "special deal" situation. The story behind it is often like this:

> Each retailer gets price 5. (This is the rule.) But—
>
> Jones Hardware gets price 4 on wire rope only. This is a special deal that the president made with Mr. Jones fifteen years ago and we can't change it.

To instruct a machine to recognize this type of exception is very difficult if there are many of them or if they do not fit a pattern.

It is a relatively simple thing to instruct a machine:

Take price 5 on all retail store orders.

But to say to the machine:

Take price 5 on all retail stores except account 1234 (Jones Hardware), which will receive price 5 on all orders except items numbered 123456 through 123556, which will receive price 4

is a much more complex instruction.

When the exceptions and their frequency have been catalogued, their future status must be determined. Will the operating practices be changed to eliminate the exceptions? Or must a plan be developed to cope with them within the logic of the program?

To determine the proper action it is usually advisable to meet with the executives who have the power to change the actual operating procedure. In our case, above, the president may well have intended that Jones Hardware only get price 4 for one special promotion fifteen years ago and may even have forgotten that the special price policy is in effect.

Having reviewed the exceptions, we find they resolve into three categories:

- *Exceptions where operating procedures are changed to make them fit the pattern.* We hope most of the exceptions fall in this category.
- *Exceptions that must be retained, but are sufficiently homogeneous to allow a solution within the framework of the computer program.* In other words, we change the program to take into account new rules that make the exceptions no longer exceptions.
- *Cases that are neither eliminated from operating practices nor solved in the computer program.* This is usually of the "Jones Hardware" type; often the only practical solution is to price all at price 5 and adjust them manually at the end of each period.

We have now studied the characteristics of the job to be done. In most cases this is the largest effort that must be made in business automation. In some cases several years will be expended in making this study, utilizing large staffs.

PERSONNEL TO DO THE JOB

Selection of personnel to plan and install a business automation system is not a simple thing. The people selected should have out-

standing reasoning ability, be able to weigh alternatives objectively, and to make decisions based on their observations.

They must have mechanical aptitude and the ability to learn rapidly. Usually these people will be young and perhaps inexperienced. For these reasons supervision of planners can be difficult.

While planning is in progress it is also difficult to determine whether satisfactory progress is being made since there is no point of reference nor simple measure that can be used to evaluate results.

Some organizations solve this evaluation problem by breaking the program into phases so that completion of a part of the program can be reported and progress determined on this basis. The result may be some inefficiency in the over-all plan, however, since the best solution will usually be achieved by considering the program as a whole.

Planners or programmers must be selected not by their present assignments but by their aptitudes. Usually it is desirable to train employees from within your organization rather than to hire experienced programmers from other companies. In this way the selected personnel will have a knowledge of your business and, if their aptitude examinations show a high score in this area, they are usually able without great difficulty to assimilate the necessary knowledge of programming.

The aptitude examinations given by equipment manufacturers are very reliable, particularly if outstanding grades are achieved. The examinations, however, must be administered precisely as specified since additional time will cause erroneously high grades. If on testing it is found that only average grades are obtained by all candidates, it would be wise to test additional personnel rather than select all from the average group.

Women do compete with men on an equal footing in this type of work, which perhaps offers greater opportunity for the weaker sex than other occupations available to them. Women should certainly be considered on an equal basis of aptitude.

The discussion of personnel above applies mainly to the programmer level. There must also be executive direction of such a group and the proper person for this category may be very difficult to find.

Desirable characteristics in this supervisor will include:

- Prior computer installation experience with the same general scale of equipment.

- Some aptitude in programming.
- Ability to organize a practical plan and to report objectively to his superiors the accomplishments being made.
- Ability to handle the people under his direction in a sympathetic manner while still producing the necessary work. This programming supervisor is directing a group engaged primarily in producing original thoughts. His ability to evaluate personnel and create the proper atmosphere may be considerably more important than his own knowledge of programming.

SELECTION OF PROPER EQUIPMENT

The selection of the proper equipment to process your work is an area where outside advice is desirable.

Quite obviously almost any manufacturer will recommend his own equipment if he believes the job can be done on it, even though he may know that another system could do the job more efficiently.

Also it is unlikely that a company will have on its own staff, personnel who are fully informed on operating abilities of all the available automation equipment. The problem of keeping up-to-date in this area is a full-time occupation and it would be uneconomical to assign such a task to any staff man except in a very large company.

In this regard it is interesting to note that even the largest companies with extensive background in automation often call on consulting firms for unbiased opinions of their program, analyses of manufacturers' recommendations, and the monitoring of their progress in making installations.

This type of service can now be furnished by most major public accounting firms as well as by the firms that restrict themselves to management consulting.

In business automation, outside advice seems to me to be justified because of the rather large sums of money that may be expended and the relative inexperience of most business executives in the automation field.

Determining the precise complement of equipment is an exacting job requiring a full knowledge of the work to be done and of the capacities and abilities of the equipment selected. This also is an area where outside impartial advice is desirable.

A recent proposal we were called on to review specified certain equipment that would have satisfactorily done the work proposed, but

that presented an unbalanced configuration for any further applications. We were able in this case to advise our client that he would almost surely desire further capacity, and that in his economic justification of the equipment he should therefore be planning for a more expanded system at a higher cost. By having this knowledge before automation planning was started, more efficient utilization will be made on earlier programs and a change in equipment will not be necessary in order to expand beyond the original application.

An executive who starts an automation program based on a certain budget, and after reaching a point from which he cannot withdraw finds that the costs are actually higher than anticipated, may well find himself in a difficult position with his management. Consultants in data professing offer an opportunity to avoid such situations.

CONTROLLING THE JOB

John Von Neumann in *The General and Logical Theory of Automata,* while discussing Precision and Reliability Requirements, states: "I am not aware of any other field of human effort where the result really depends on a sequence of a billion steps in any artifact, and where, furthermore, it is characteristic that every step actually matters—or, at least, may matter with a considerable probability. Yet, precisely this is true for computing machines—this is their most specific and difficult characteristic."

He further states, "Any step is (or may potentially be) as important as the whole result; any error can vitiate the result in its entirety."

This control problem is solved by different methods by the various computer manufacturers; most equipment has extensive internal checking for validity or results. Internal checking, however, should not be the only means of detecting malfunctions.

Controls maintained outside the machine would be rigorously applied, particularly during the early phases of new installations. During this early period it is better to over-control the system operations than to under-control them or to disregard controls entirely, as has been done in some cases.

CONCLUSION

Business automation, whether it be with the simplest bookkeeping machine or the most complex tape system, will achieve success

only when applied to a suitable problem and when applied to this problem with proper planning and proper personnel.

Executives must recognize that it is not a case of "simply rolling the machine in," but that their unqualified backing is essential to accomplish the desired result. Half-measures will not make possible a successful program.