

# THE PLACE OF THE COMPUTER IN THE ORGANIZATION

Paper delivered at the recent Symposium  
"Management and the Computer".

André Botha, MSc, MBA, MCCSA,  
Branch Manager, IBM

## OBJECTIVES OF THIS PAPER

- To emphasize and clarify the need for careful thought to be given to the placement of the data processing (DP) function within the organization.
- To examine the relationship of the DP function vis-a-vis the formal organizational hierarchy.
- To examine some of the major interrelationships between the DP function and the formal and informal work units in the organization.
- To point out the reverse effect i.e. the implications of growing computer usage both on the formal organization chart of tomorrow's businesses and on the people filling these formal slots.

## IMPORTANCE OF GIVING CAREFUL THOUGHT TO THE PLACE OF THE COMPUTER

Anything likely to cost the organization anywhere between R20,000 and R1,000,000 a year (both extremes being well-represented on the South African computer scene today) merits careful examination when deciding where it should reside!

Let us now pose to South African computer users the question: "Where in your organization does the computer function sit **and why?**" At least a substantial body of replies will fall in some of the following categories:

- "In the accounting (production, sales, engineering, etc) department since its primary application is/was payroll (inventory control, sales analysis, research, etc.)."

- "In the ..... department; since Joe Smith kicked up all the fuss to get the computer in the first place, it's only poetic justice that he should wrestle with the beast!"
- "In the ..... department; where else?"
- "In the ..... department; I suppose it just happened that way."
- "I'm not too sure; you'd better ask Joe"(!)

This type of answer, of course, indicates either a surprisingly sophisticated (blasé?) attitude towards the expenditure of large sums of business funds or a lamentable abdication of what should be a very real management responsibility.

A second reason for addressing this issue is to be found simply in the cost-effectiveness of computer usage within a business. Almost without exception, every book, article or speech on the subject of effective computer usage will define as a prime requisite that, before a computer is acquired, its **mission** should be carefully and quantitatively examined and defined; not only in the short term but also as regards the long term integration of the DP function within the overall corporate goals and objectives. Surely it is self-evident that such an evaluation should include (and to some considerable extent even dictates) where in the organizational pattern it fits best.

Finally, I would like to address that subject which issues as a continuous and plaintive plea from both DP managers and computer suppliers viz. the need for top management involvement. This, of course, is just another way of accusing top management of being, far too often, **not** involved! Similarly, at frequent intervals, we hear

the complaint: "We have been oversold by the computer suppliers". As a representative of a supplier and thus speaking, as it were, from the accused box, this has always struck me as a rather terrible indictment, not of the suppliers, **but of the firm itself**. To my mind, there can be only two possible reasons for this.

- a lack of understanding of how the computer works, or
- again, an abdication of managerial responsibility.

The first alternative above (the "computers-are-too-complex-for-simple-old-me" -syndrome) is a very attractive and disarmingly simple escape hatch which merits closer scrutiny. Let me be provocative and state that, as an excuse for **non-involvement**, this is arrant nonsense. Of course computers are complex (although a substantial body of opinion would say that the people who sell, program and operate them are even more way-out!) and nobody can seriously expect the busy top executive (-s) to understand how the "gizmo" addresses the "widget" through the "convertible frammiss interface" with a program written in HADACOL ("Half-adequate Data Acquisition Oriented Language"). On the other hand, very few, if any, top executives in today's technological world fully understand the inner workings of the complex machines and tools used in their production processes. Yet this doesn't prevent them from fully exercising their managerial responsibilities and specifically:

- getting a clear understanding of the **function** of the machine or tool
- clearly defining its **mission** within the overall corporate objectives
- establishing the **total costs** involved
- critically evaluating and validating the minimum acceptable **return on the investment** required
- etc., etc.

If, as it seems, the answer lies in an abdication of responsibility vis-a-vis the computer, we need to ask: "Why?" Why do these same intelligent, mature, responsible managers so often have a "blind spot" when it concerns the DP function? A commonly presented answer is that it is be-

cause the computer does not deliver a tangible, marketable end-product. I suspect that there is a considerable element of truth in this although anybody who has encountered even one hour's output from a 1000 lines-per-minute printer might dispute the product's intangibility! Again, it cannot be the whole answer since it is often this very manager who minutely scrutinizes the cost figures for a new coffee-machine which, after all, produces the most temporary product in the business! I should like to present as an alternative thesis that the reason for this inexplicable "turning-away" from the computer has a much deeper, psychological basis: In the computer, the older top executive sees a business tool which, unlike the traditional ones he is accustomed to, **clearly and visibly cuts across all the traditional functional divisions of the business in an impersonal way, refuses to be subordinated to any of them and, in fact, demands that they present data in the format dictated by it**. I invite the reader to re-examine the above phrase: doesn't it read remarkably like a description of the top executive himself! The thesis I propose then is that the top executive sees in the computer a potential threat (and a superfast, super-efficient, never-tiring one at that!) to himself, giving rise to real feelings of unease, resentment or even fear. It is axiomatic that man reacts to such feelings in one of two ways: by attacking the enemy or by ignoring him, hoping that he will go away or at least bite somebody else! The former is exemplified by Mr. Harry Matuzow (1) and his "International Society for the Abolition of Data Processing Machines"; the latter, I submit, provides a rational (?) explanation for top management's reluctance to get involved. This paper examines not only the place of the computer in the formal hierarchy of the organization but also some of the implications of the computer on the "human" or informal functional blocks in the business.

## THE PLACE OF THE COMPUTER IN THE FORMAL HIERARCHY

### Definition:

The formal organization chart depicts the relative place in the organization for each

job; the formal lines of responsibility as well as authority between jobs. The position titles also show the role of the particular function in the overall structure.

Before attempting to fit the computer into its "correct" slot in the organization chart, it should be pointed out that the data processing function is, of course, not new. Every business has all along had its payroll files, inventory records, production sheets, etc. and these **data files** were duly **processed**, by manual methods first and later assisted by adding machines, tabulators, etc. to produce the relevant management reports.

In this pre-computer period the data processing activity was normally carried out on a completely decentralized and functional basis by, for example, the finance, marketing and manufacturing divisions. The coming of the computer, however, introduced a significant change in that, because of cost and state-of-technology limitations, the data processing activity, for the first time, became really centralized; and it is this centralized function which we are now attempting to fit into

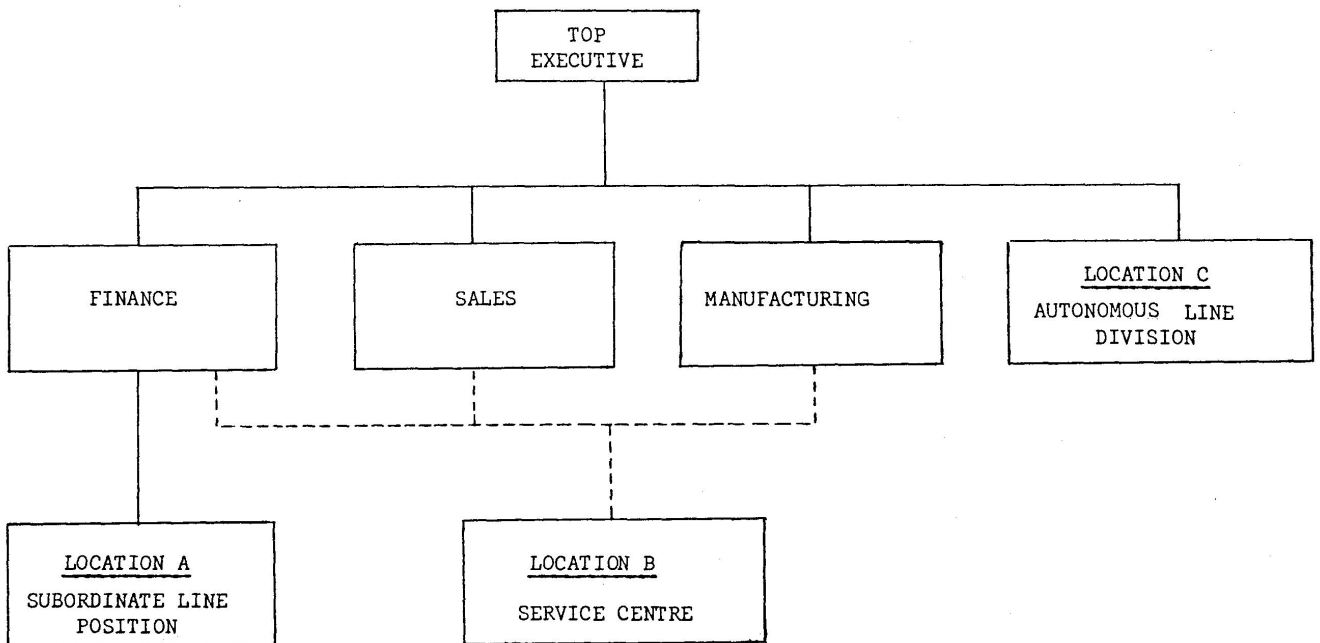
its proper slot in the organization chart.

The **latest** developments in computers (2) however, such as mass direct-access storage devices, function-oriented terminals, quick-response teleprocessing systems and, above all, lower hardware costs, have enabled the user to reverse this trend and again to decentralize the data processing activity **if the needs of the business are best served by decentralization**. However, this option only refers to possible centralization/decentralization of the DP activity; the need remains unchanged to define the correct organizational slot for the DP responsibility and authority.

There is no such thing as a "correct" organizational location which is valid for everybody. What is "correct" for a particular firm might depend on such factors as the applications to be processed, the degree of systems integration achieved or sought and the amount and type of use to be made of the computer by the various executive levels.

Figure 1 shows, the three broad alternatives for locating the computer department.

FIGURE 1



- (i) In location A the computer department as a subordinate to one of the major line divisions. The horizontal level varies widely and may, in some firms, be as many as five or six levels removed from the top executive. In theory, the reporting structure could be to any of the major line functions. In practice, the majority of computer departments report to the finance function. (3) The reason for this is largely historical in that, traditionally, the accounting applications were the first to be mechanized. To a considerable extent then, the computer's location depends on its original sponsor.

The DP Manager's career path consists of creeping up the ladder by the natural process of ageing and osmosis. Since, by definition, he is very seldom, if ever, a real financial expert he is, again by definition, barred forever from rising to head the finance function. Similarly, from the top executive's viewpoint, however interested he might be in the computer, the fact remains that it is subordinate to an extremely vital line division and as such might well be accorded less than its fair share of attention. Indeed, it is this "built-in" barrier between top executive and DP Manager which is often cited as a reason why this particular arrangement is "wrong".

The disadvantages of this arrangement are:

- (a) Possible lack of objectivity in setting priorities eg. priority to accounting applications; deference to the wishes of his own superior, etc.
- (b) Possible limited viewpoint.  
If staffing continues to be by people oriented towards accounting, there is a real danger of a lack of corporatewide orientation.
- (c) Possible lack of organizational status.  
Obviously, burying the computer manager several layers down in one functional division, implies a lack of status and authority. A firm can expect little in the way of needed systems integration when the DP manager has little or no power to bring about interdepartmental changes.

Nevertheless, in the case of the firm acquiring its first computer or where the range of applications is essentially limited to one division, there exists no real reason why location A cannot function satisfactorily. However, with modern equipment it is unlikely that one area can utilize all the computing capacity and/or that non-financial divisions will not require information which the computer can provide. It is therefore of prime importance that as the scope of DP activities expands, the computer location be reviewed and, if necessary, migrated to one of the two following locations.

- (ii) In location B the computer department basically functions on the periphery of, or outside the main organizational structure. Its position is essentially a passive one, only responding to the needs of its user departments. In this sense, of course, it obviates the main disadvantage of the previous arrangements viz. lack of objectivity in setting priorities.

At the same time, this could well be also its biggest disadvantage! In its role as a service centre, the centre manager would normally report to a neutral executive i.e. a staff function such as Administrative Services or even (shades of Parkinson!) to an executive committee. As such he generally has little status or authority outside his own department. Thus, little attempt is made to initiate systems improvements or to integrate existing systems; the normal result is a fragmented, every-department-for-itself approach. Indeed, I feel that this is generally the worst location for business data processing.

There is, however, one sphere in which this arrangement works well and is, in fact, to be preferred. I refer to the type of organization where there are no easily-defined overall corporate objectives. There may well be businesses like that also, but universities and other research-type institutions are good examples of organizations where the overall needs of the data processing community can best be served by a completely neutral service centre. Even so, it is essential that the user departments be encouraged to support and assist in optimizing the utilization of computer resources. An unfailingly successful method of achieving this, is to charge every user

department a proportionate share of the total centre costs!.

(iii) The establishment of the computer department as an autonomous line division of the business is a fairly recent development, at present largely restricted to the larger firms with sizeable investments in computers. Nevertheless, a number of persuasive arguments can be put forward to suggest that once the firm has outgrown its initial bread-and-butter applications stage and is starting to think about an integrated information system serving the overall needs of management, location C may be the best to reap the optimum benefits from the data processing department.

The more important of these arguments are:

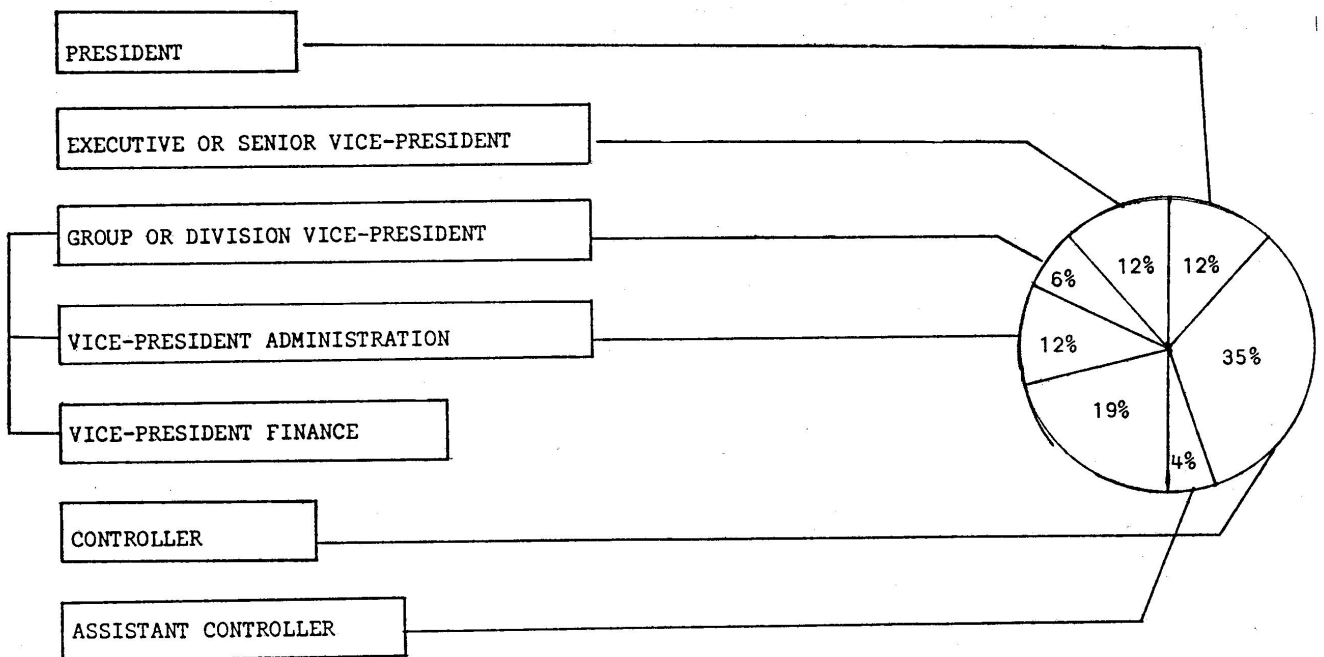
- (a) Giving organizational recognition to the fact that the computer serves the overall information needs of the business.
- (b) Conferring organizational status in putting the top computer executive in a position where he has a strong say in determining processing priorities, advising on the suitability of new applications and generally being active in the design of overall systems and procedures for the business as a whole. Should significant changes in the company's existing systems be proposed or disputes

arise, the computer manager should be on a level at least no lower than the highest information-using department and report to an executive higher than the disputing parties.

- (c) By raising the status of the computer manager, the firm not only confers on him additional **authority** but pinpoints his **responsibility** as a profit centre i.e. acknowledges the computer not only as an (expensive!) investment, but one from which, as with any other investment, a suitable return can and should be demanded; an investment which can and should be regularly audited for cost-effectiveness and an organizational position which recognizes the computer division as having a significant impact on the business as a whole.
- (d) Encourages the personnel of the computer division to innovate i.e. recommend fresh approaches even if they upset existing and/or conventional systems.

A growing number of firms are adopting this organization as can be seen from Figure 2, taken from a study done in the U.S.A. (4). The emergence of the TCE (= Top Computer Executive) is clear!

FIGURE 2



## CONCLUSION

The place of the computer in the formal organization chart must be evaluated and decided by each firm for itself. Size, scope of applications, state of sophistication, etc. are all factors which may well lead to different decisions. There can be no single correct answer.

In general, however, in principle at least, there is nothing wrong with the computer department starting off by reporting to one of the line divisions. This phase is usually characterized by:

- (i) A relatively modest investment in EDP;
- (ii) Emphasis on financial/accounting applications;
- (iii) Primary use of the computer to produce information to the company's customers or employees (eg. statements, payroll, etc.).

When, however, the computer system(s) "matures" i.e. with a shift in emphasis to its use as a tool for providing decision-making information to corporate management, serious thought should be given to the establishment of a full line division in order that due recognition and attention is given to the computer's potential not only for earning profits but also for incurring substantial costs!

## FUTURE IMPACT OF THE COMPUTER ON THE ORGANIZATION AND THE PEOPLE THEREIN

With its increasing use, importance and capabilities, the computer is going to have a substantial impact on the shape and form of to-morrow's business and will, to a greater or lesser degree even dictate it! Furthermore, we have ignored up to now the fact that a business is and always will be made up of **people**: people whose jobs and lives are going to be increasingly affected by the computer. In the effect of to-morrow's computers on **all** the people, both inside and outside the business, this is rapidly turning into one of the most burning social issues of our time. I would like to conclude by considering some of the potential impacts of the computer on to-morrow's business and the managers managing it.

Previously, we have considered the computer's possible impact on the centralization or decentralization of **activities or functions** in the business. I pointed out that the computer really only enabled the business to adopt **whichever one of these two alternative best suits its particular requirements.**

A broader issue and of perhaps more personal interest to the manager, is what impact increasing computer usage is likely to have in terms of the centralization or decentralization of managerial authority.

Before the general advent of computers the overall trend in business was towards decentralization of managerial authority. This was more often done from necessity rather than choice: the top executive in to-day's large and complex business has three choices:

- patiently wait for all relevant facts to filter up through the various levels and thus being in a position to make a "faultless" decision, the only drawback on this choice being that old age retirement will usually arrive long before the golden day;
- "fly by the seat of his pants" — great for speed of decision but horribly rough on the pants in the case of hidden nails!
- delegate or decentralize at least some decisions.

Is the computer likely to change this? A sizeable body of opinion avers that the answer is no; that the computer is and always will be only a tool, essentially neutral towards the organizational structure. (5) Viewed as an inanimate object programmed to rigorously follow a series of instructions, there is no doubt that this is true. The important question, however, is whether the integrated systems now emerging will still be neutral. Convincing arguments can be put forward to argue that to-morrow's computer systems will have a decisive influence on the organization. Whether, however, this influence will be in the direction of greater **centralization** or **decentralization** of managerial authority is a hotly debated issue.

In the former case, it is argued that the computer's comprehensive memory and fast response

makes it indeed possible to bring back under centralized authority those managerial decisions which have of necessity had to be delegated to an increasing extent in the past decades. Proponents of this viewpoint further argue that since tomorrow's systems will increasingly be able to take many of the decisions presently being taken by middle management, these middle positions will increasingly be consolidated into new and fewer positions. Their thesis thus is that the computer will inevitably lead to fewer levels between first and topline management i.e. a **flattening of the organizational pyramid.** (6,7)

Conversely, the proponents of the "greater-decentralization" theory discount this explicit assumption that all top managers, given a free choice, would opt for strong, centralized exercise of authority. It is argued that two main factors inhibit top managers from even greater delegation of decision-taking authority: a lack of trust in their subordinates' abilities and the lack of availability of adequate controls. The new computer systems being developed will, so their arguments run, on the one hand, provide top management with the means for very speedy detection of deviations from planned objectives and, on the other hand, relieve middle managements of many of their present routine chores thus increasing top managements' faith in their ability to take better and more reasoned decisions. Therefore, they conclude, it is inevitable that to-morrow's computer systems will lead to increasing and accelerating decentralization of authority. (6,7)

Final answers to these vexing questions are not forthcoming at this point in time. It even seems likely that, as with so many innovations in the past, the course the future business ship steers will be dictated by the man at the wheel and not by any instrument at his disposal, in this case the computer. Nevertheless, it is necessary that we understand and face up to the speculations, conflicting viewpoints and predictions surrounding these questions. It is no exaggeration to say that the future career of every business student and even of today's young manager could be significantly affected by the eventual answers.

Obviously, if there is controversy over the effect of computers on future **organizational**

**patterns,** serious thought should also be given to the impact of these new systems on the **people** within the organization.

Again, opinions are widely divergent and different viewpoints are being put forward vociferously (and sometimes with more than a touch of hysteria!) As far as the great majority of people in the average business i.e. the clerical, administrative and even manufacturing workers are concerned, experience thus far has effectively disproved the bogeyman picture of thousands of unemployed workers, their jobs taken over by impersonal and super-efficient computers. It seems that till now, and for the foreseeable future, the computer has merely enabled management to **contain** what otherwise might have been an explosive increase in the numbers of such workers, caused by the increasing size and complexity of the modern business and its ever-increasing demand for information.

Let us now take a look at the next level, namely first-line or supervisory management. Certainly no one will dispute that the computer has relieved the forman or first-line administrative manager of a substantial amount of his clerical, reporting and administrative duties. This will probably happen to a greater extent. These, however, surely do not constitute his prime responsibility: in the vital role of providing motivation, direction and direct communication to production-oriented workers, it is difficult to see the computer having a substantial impact. Their numbers might reduce slightly; the job content is unlikely to change significantly.

Similar arguments apply when considering the future role of the top executive. (8) Increasingly advanced and integrated computer systems may, as previously pointed out, make the top executive reassume some of the decision-taking powers previously delegated to subordinates (recentralization theory) or give him increased confidence to delegate to an even greater extent (decentralization theory). The top manager's prime function, however, is to formulate company policies, plans and objectives and to plan and guide strategy. Since a major source of information in arriving at these decisions is environmental or extra-company in nature and origin, his job

again cannot, I think, be expected to change fundamentally. Certainly the computer can assist him substantially in removing some of the uncertainties from the usually unique and ill-structured problems he faces; it can provide him with fast, accurate intra-company information, but it can never take the decisions!

Naturally, there are top executives who still see, in the not-too-distant future, a Utopia where they and their fellow-top executives will sit in tidy, orderly offices, each with a video-screen on an otherwise uncluttered desk; with the total universe of business facts and figures safely stored on and instantly retrievable from some as yet uninvented random access storage device. Business decisions in this paradise would consist of posing the correct questions, pressing the right button and making the correct — almost pre-defined — decision! This myth of the packaged Management Information System, or Total Information System, or Corporate Data Base (it goes by many names!) will, no doubt, continue to offer substantial rewards to the enterprising computer salesman and ever-more glittering hardware to the ambitious DP Manager. Unfortunately, as quite a number of firms have discovered, there are quite a few serpents in this paradise:

- the effort involved in implementing such a system has, up to now, consistently been underrated by one or more orders of magnitude;
- the cost, even with today's improved hardware can be staggering, especially if a number of false starts are made;
- As more and more executives are starting to appreciate, an Information System is not a product you buy from your computer supplier and install over a week-end. It can only be the **evolutionary result** of a continued and planned exercise to integrate existing applications, carefully evaluating and interfacing new applications with these; in general, an active and sustained effort on the part of top management to see the computer as a vital and integral tool towards realising the overall corporate objectives.

This finally leaves that substantial and rather

vaguely-defined body, middle management. It is generally conceded that this is where the computer systems of to-morrow are going to have their greatest impact. As to the nature and size of the impact, opinions vary between extreme pessimism and extreme optimism or any position in between. (9,10, 11)

The viewpoint of the pessimists has been admirably summed up as follows: (12)

- (i) Many middle management decisions are highly structured and repetitive and are thus programmable on a computer.
- (ii) Therefore, many planning and decision activities will move from middle managers and will be handled by the data-processing systems.
- (iii) The need for middle managers will be greatly reduced; and the content of the remaining jobs at the middle levels will be less challenging, more routine, and more formalized than before.
- (iv) Why will remaining jobs be less challenging? Because the tasks of middle managers will be divided. Duties requiring less judgement and skill will remain with middle managers; other tasks requiring the skilled interpretation of systems information will move toward the top levels.
- (v) Three administrative organizational layers may emerge. There will be the production-oriented workers and their supervisors who will prepare the computer systems input; there will be an elite group of systems and computer specialists who will perform the processing activities; and there will be a small group of top executives who will analyze the facts and make the necessary decisions. There will be a minimum of personnel transfers between these layers.

Some convincing studies exist to support this viewpoint: The Metropolitan Life Insurance Company has, for example, experienced a 75% increase in business volume since their first computer installation in 1954, but with an absolutely minimal increase of less than 2% in the number of middle management positions. Similarly, Gulf Oil, another major and advanced



computer user, employs today the same number of middle managers as in 1959.

Eminent writers such as Crowley (13) and Drucker (14) disagree completely and, see the computer as a major tool for relieving middle managers of many of their routine chores leaving them much freer to concentrate on the planning and decision-taking functions. Even this group, however, concedes a substantial reduction in the **number** of middle management jobs but offers the counterbalance of substantially **enriched job content** for those remaining jobs.

Whatever the final outcome, it seems certain that the computer is going to demand of tomorrow's middle management new skills, new flexibilities and a greater understanding of the high-level managerial functions of planning and evaluation.

1. Author of the book "The Beast of Business" and President of the ISFTADPM.
2. See, for example, "Who gets the Computer?" by Victor Z. Brink, Columbia Journal of World Business, Fall Edition, 1966.
3. Cf. "The Computer comes of Age" by Neal J. Dean, Harvard Business Review 46 No. 1, Jan - Feb 1968.
4. See Ref. 3 above.
5. See, for example, "The Impact of Computers in Management". Edited by Charles A. Myers, M.I.T. Press 1967.
6. An example of this viewpoint is found in:
  7. For example: "How will Total System Affect the Corporation" by Donald L. Caruth, Journal of Systems Management, February 1969.
  8. Cf. "Top Management looks at the Computer" by Victor Z. Brink, Columbia Journal of World Business, Jan — Feb 1969.
  9. "Middle Managers vs. The Computer" by G. Berkwitt, Dun's Review, November 1966.
  10. "Implications of a Systems Approach to Organizations and Management" by R. Ehrle, Personnel Journal XLIV, February, 1965.
  11. "Automation and the Middle Manager" Summary of this report published in Admin. Management, June 1966.
  12. "The Computer's Impact on Future Organization" from "Computers and Management" by Donald H. Sanders, McGraw-Hill Press, 1970.
  13. "Can We Integrate Systems Without Integrating Management?" by W. J. Crowley, Journal of Data Management, IV, August 1966.
  14. "What the Computers will be telling you" by Peter F. Drucker, Nations Business, 54, August 1966.