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November-December 1969

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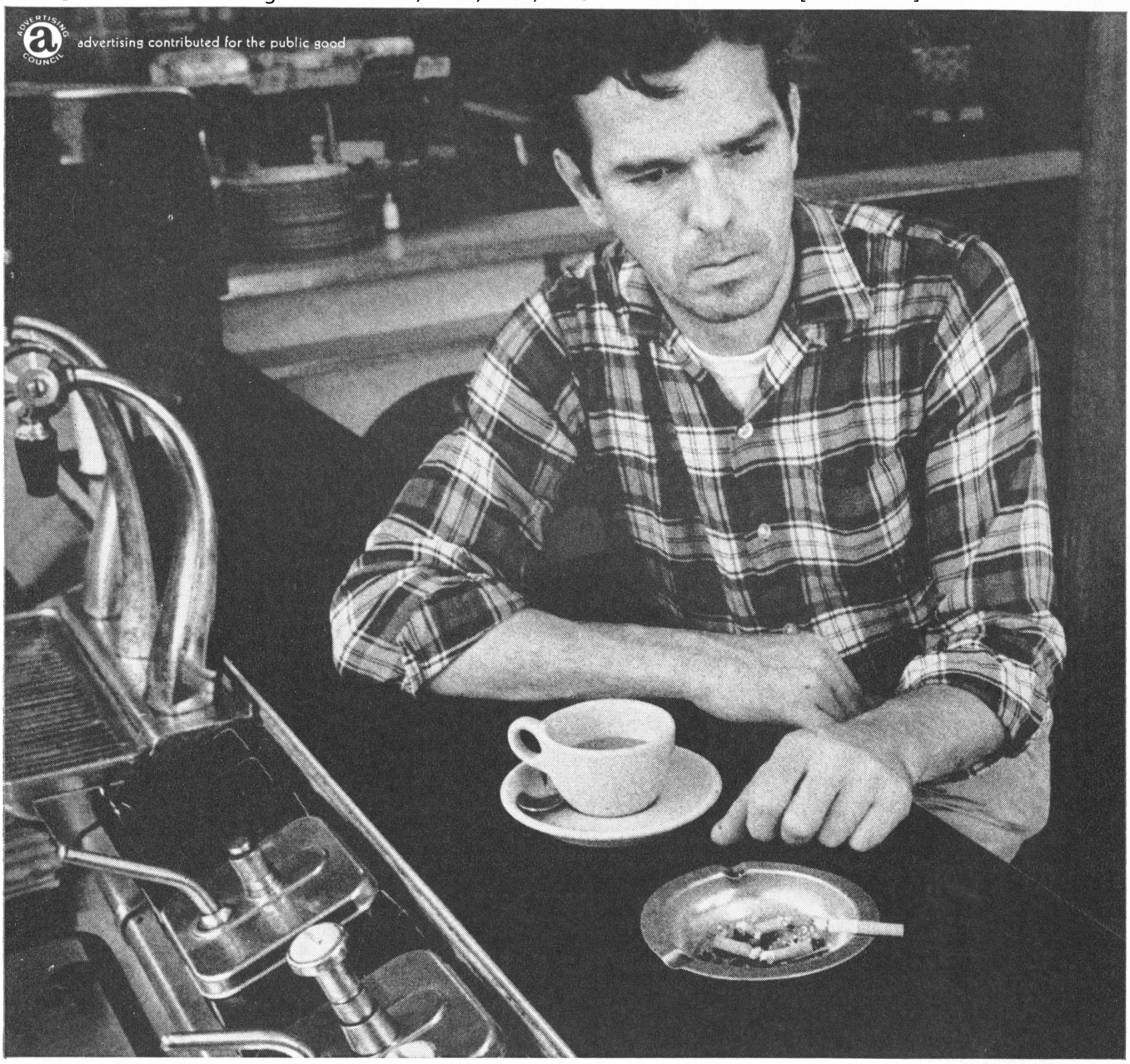

Disabled.
One of the most damaging and inaccurate words in the English language.

Tell a man with a physical or mental handicap he's disabled. Tell him often. And your chances of crippling his spirit are excellent.

Disabled is a word that has "hopelessness" written all over it.

A word that suggests total impairment. Yet most often, it's one area that isn't functioning normally. One non-functioning area in a total human being and bingo!

Disabled.

If we could take the word out of the dictionary, we would. Since we can't, we'll do the next best thing. Change the meaning.

From now on, a "disabled" person is someone who can overcome his problem with medical aid. Someone who can learn to take care of himself. Someone who can be taught to do a job he likes.

If it sounds like we're talking about you (or someone you know and care for), write and tell us.

You've got nothing to lose but your disability.

Write: Help, Box 1200, Washington, D.C. 20013

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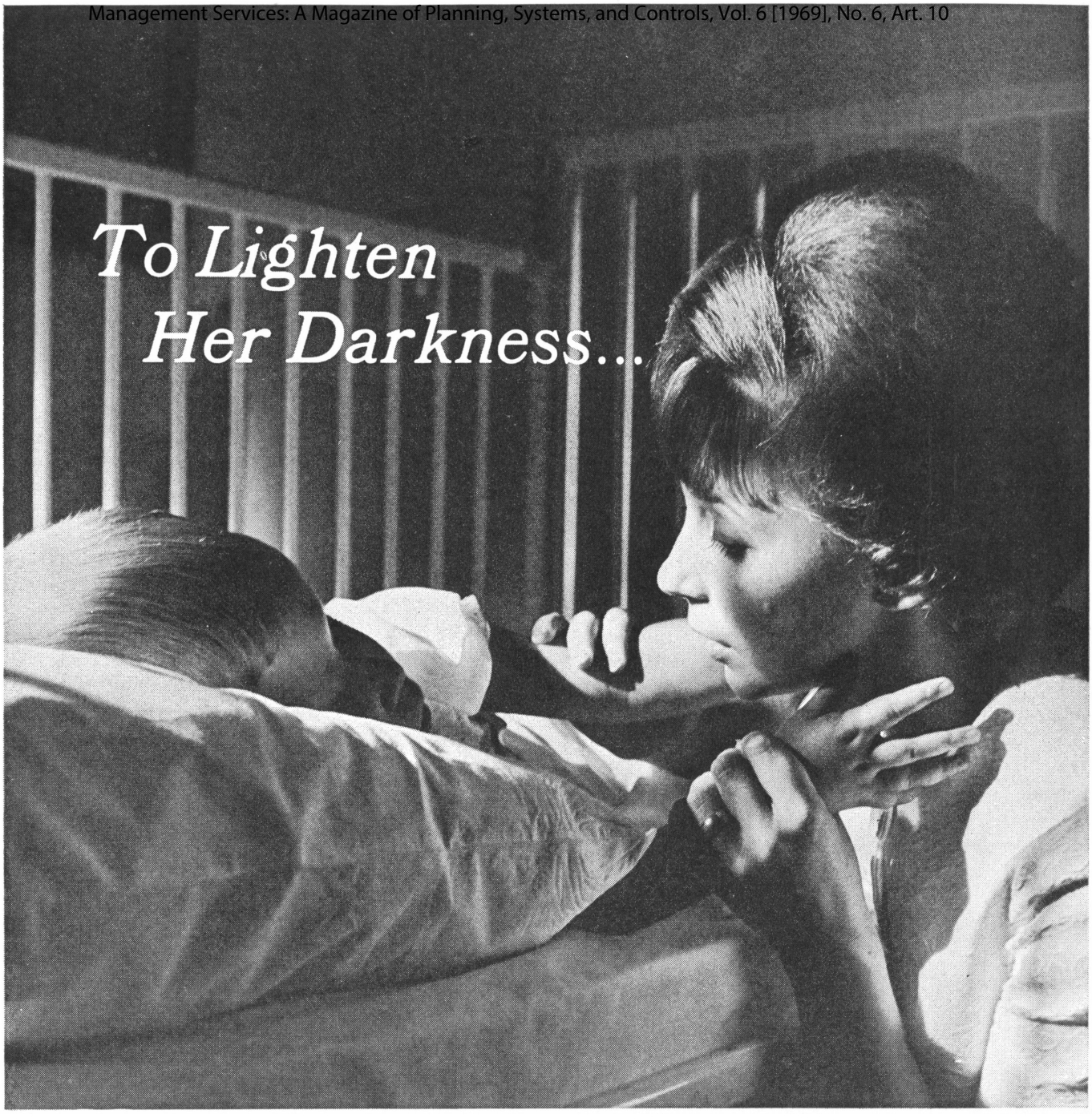


. . . will take many a helping hand.

Vickie has never seen her lovely mother. Deprived of sight by a birth defect, Vickie will need more than her mother's love, more than ordinary care.

Each year 250,000 babies are born with birth defects.

The March of Dimes supports medical care and research seeking ways to prevent tragedies like Vickie's.

Your gift is help, not only for Vickie but for millions yet unborn.

And where there's help, there's hope.

Give to the MARCH OF DIMES PREVENT BIRTH DEFECTS

people, events, techniques

IBM and RCA Announce Production of Largest Computers Yet; Speeds Three Times as Fast as Previous Models Promised

Two leading computer manufacturers, IBM and RCA, have announced large new additions to their product families.

IBM says its System/360 Model 195 is the most powerful computer it has ever developed. The Model 195 is designed to solve very difficult computing problems in many areas.

"This new top of the System/360 line offers unique performance, not only for scientists, but for large-scale commercial users as well," said F. G. Rodgers, president of IBM's Data Processing Division. It has been used at IBM's Poughkeepsie, N.Y., laboratory for engineering tests and verification of engineering and performance data.

The Model 195 can process an instruction in 54 billionths of a second. It has a memory capacity of 4,000,000 bytes of data.

The largest previous computer in the IBM product line was the Model 85, and the largest special purpose computers were Models 91 and 95.

First delivery next year

Initial delivery will be in the first quarter of 1970. Monthly rental of the Model 195 ranges from $165,000 to $300,000, and purchase prices go from $7,000,000 to $12,000,000.

RCA's new product is the Spectra 70/61. Robert W. Sarnoff, RCA president, described the new computer as the most advanced and sophisticated system yet developed for remote computing.

He said the Spectra 70/61 is the "larger and stronger brother" of the Spectra 70/46, RCA's initial entry into the time sharing computer field. The new model handles bigger jobs at three times the speed of the earlier one.

The 70/61 can also serve 350 terminal users, the largest number supported by any computer yet announced, RCA says.

"These two systems together assure for RCA a long head start in remote computing systems," Mr. Sarnoff said. "They capitalize on a shift in the market which is ex-

pected to advance remote processing from a 13 per cent share last year to some 50 per cent by 1973."

The Spectra 70/61 will sell for $2,000,000, with monthly rentals starting at a $40,000 minimum.

Major Suit Filed Against EDP-Communications Complex in Washington

The largest damage suit ever recorded in United States District Court, Washington, D.C., has been filed against four firms that have been linking computers and communications systems.

Photo Magnetic Systems Inc., of Beltsville, Md., claims AT&T, IBM, the Western Electric Company, Inc., and the Chesapeake and Potomac Telephone Company have infringed on its patent on a computer system. The plaintiff claims $1 billion in actual damages and an equal amount in punitive damages.

The patent in question was granted to Peter James, president and chairman of the board of PMS and currently Republican candidate for governor of Maryland. Mr. James, after obtaining his patent in 1968, subsequently sold it to PMS.

His system employs a dial signal which works with a digital converter to transfer data to the computer. PMS alleges the four defendants have been using similar telephone-computer systems which infringe on the James patent.

In letters Mr. James notified both IBM and AT&T that he found them to be infringing and that his company would be willing to discuss granting them licenses. Spokesmen for both companies said they found the charge without merit.

PMS intends to inform more than 300 other data communications-computer manufacturers and users of push button telephones linked to computers that they too are infringing on the patent.

Management Services Forum, the new magazine feature inaugurated with the September-October issue of MANAGEMENT SERVICES, appears on pages 12, 13, and 14 in this issue.

California Credit Files Now Subject To Review on Request

California consumers who feel their credit records do not accurately reflect their true standing can now ask for review of their case by a body higher than their local credit bureau.

Review group created

The Associated Credit Bureaus of California has established a special supervisory committee to review the reports of consumers dissatisfied after interviews with their local bureaus.

William L. Pickens, president of ACB of California, said this action was taken to help guarantee a helpful and impartial attitude on the part of the bureaus and to ensure fair credit reporting.

The consumer will also be given a chance to add to his record. If he disputes an item in his report it will be so noted and his explanation of the matter included.

All members in program

All 125 credit bureau members of ACB of California will participate in this new review program and have pledged that the information accumulated as a result of the program will be made available to Governor Ronald Reagan's recently appointed Special Task Force on Credit and Personnel Reporting.

New File Offers Individual Plant Purchase Record

Information about some 300,000 U.S. factories is contained in the EIS/CMS Market Datafile of U.S. Manufacturing Plants. This new business information service gives facts the Census Bureau is legally forced to withhold.

The Datafile gives the following information about each listed plant: name of plant, address, type of business, employment, total plant shipments, and plant purchases of selected products. Information is also available by geographic location or by industry. While the Census Bureau cannot publicly identify individual firms with their percentages of the total market shipments, Datafile does.

Datafile is the result of collaboration between Economic Information Systems, Inc., of New York City, and Creative Mailing Service, Inc., of Garden City, N. Y.

Based on public sources

Initial information for the marketing file came from public records. Throughout the year letters are mailed to the plants to update information. Staff researchers watch for new factories coming into operation, as well as any marketing changes noted by other sources. EIS says that there is enough information currently in the Datafile to fill 16 volumes of 500 pages each.

The promoters of Datafile suggest it can be used by business management to determine a company's competitive market position, establish new marketing areas, find and reach new customers, and evaluate the sales potential in broad geographic areas and specific plants.

Geographic data and information on specific industries can be obtained by clients at a basic rate of 30 cents per plant, subject to a minimum price of $300. Data are furnished either as computer print-

out or on punched cards from magnetic tape. Where orders involve several thousands of plants the cost per plant will drop as the number covered increases.

Used Industrial Machines Now Listed on National Computer Network

The inventories of 250 used industrial machinery dealers are now linked in a nationwide computer-controlled network called Machinery Dealers National Information System, Inc.

A manufacturer who desires a particular piece of used production equipment can contact his local participating dealer for its location. A phone call to the MDNIS computer in Washington, D.C., will tell the dealer where throughout the country the equipment can be found, MDNIS says.

The full MDNIS inventory is also presented monthly in a publication entitled *Locator*. Its first issue was mailed to over 50,000 buyers and dealers of used machinery. It contained 240 pages with more than 7,500 items listed.

Dealers are encouraged to use telephone, Telex, and TWX to transmit listing information and inventory inquiries to the MDNIS offices at 1400 20th Street, N.W., Washington, D.C. A UNIVAC 1108 is at the center of the system.

Three files maintained

MDNIS maintains three computerized inventory files: a file listing all machinery and equipment by uniform characteristics, to aid in searching by size, age, model number, etc.; a file of easy-to-read descriptions for each item; and a file containing the full specifications and prices of most available used machinery equipment. These files are for the use of MDNIS dealers only.

Underwriters' Labs Will Now Rate Used Machinery

The Underwriters' Laboratories Inc. is now preparing to give its safety listing mark not only to new data processing equipment and office machines, but to rebuilt machines as well.

Four guidelines have been established for the relisting of reconditioned machines: 1—The machine will be rebuilt only by its original manufacturer; 2—the machine will be incapable of an overload by its operator; 3—relisting will be restricted to grounded machines and double-insulated machines in which the protecting insulation is renewed; and 4—the manufacturer's entire program will be reviewed as will the test procedures he employs in rebuilding.

The UL says it will take special note of the criteria manufacturers use for the replacing or reusing of

electrical parts; what cleaning agents are used on electrical parts; and how quality control procedures compare between reconditioning and new product manufacturing methods.

Recent price unbundling by large computer manufacturers brings added importance to the UL's listing decision. Since supportive services are now being priced separately from some manufacturers' hardware, EDP users can employ old machines without special concern for these peripheral prices.

Control Data 'unbundles'

A new addition to the list of unbundled computer manufacturers is Control Data Corporation. Its maintenance services for leased systems were priced separately as of October 1, and as of January 1 education and training services, standard software systems and programs, and systems and application analysts' support services will all be priced individually.

The General Electric Company recently announced that it would not unbundle its prices, but it has raised them. GE increased domestic rentals on computers smaller than GE-200 systems by 5.1 per cent and on medium and larger computers by 3 per cent, and its monthly maintenance charges on 200, 400, and 600 systems are up 5 per cent. Series models 50 and 100 did not change in price.

MIS Society Holds Founding Conference In Minneapolis

The Society for Management Information Systems held its Founders' Conference September 8 through 9 in Minneapolis, Minn. Technical papers on five topics of significance to users and designers of information systems were presented.

The papers presented were: "Data Management— Fundamental Building Block for Management Information Systems," by Guy Dobbs, of Isaacs-Dobbs Systems of Los Angeles; "Decision Systems for Planning and Control," by James L. Fischer, assistant vice president of corporate management systems for Texas Instruments; "Manpower Resources for MIS," by Dr. G. Truman Hunter, of IBM; "Distributed Computer Networks" by Joseph W. Redding, of Standard Oil of Indiana; and "Trends of MIS Technology" by Frederick G. Withington, of Arthur D. Little. The papers will be published as part of the conference proceedings.

A booklet describing the charter, purposes, and activities of this new organization is available on request to Richard E. Dooley, Secretary, Society for Management Information Systems, One First National Plaza, Chicago, Ill. 60670.

New System Designed To Eliminate Handwritten Brokerage Transactions

A system which promises small and medium-sized brokerage houses that it will eliminate as many as 25 handwritten slips of paper for each of their trades is now being offered by Wall Street Information Services, Inc.

VISTA (Viewing Instantly Security Transactions Automatically) is the first product of the new company formed by John Diebold, Inc., the consulting firm, and Hirsch & Co., the brokerage concern.

The aim of the system is to automate the functions of the cashier's department of a securities house, including such operations as receive, deliver, transfer, box, segregation, stock loan, and bank loan.

It is being offered on a cost per transaction basis of 50 cents to $1; therefore, cost will fluctuate with volume.

According to John R. Bermingham, executive vice president of Wall Street Information Services, Inc., "The significant aspect is that this system will enable small and medium-sized firms to automate quickly at very minimal cost without making the huge capital investment that automation ordinarily would require."

VISTA uses dual IBM 360 computers and Sanders' display units. The new company will install the equipment and train cashier department clerks to use it. The clerks key information they see and obtain instructions from the display units. The computers record itemized transactions, which are instantly available for examination and processing. These transactions are printed out daily for a complete audit trail.

Hirsch & Co. is the first user of the VISTA system. The initial impetus for the system's creation came from Robert Fraiman, a partner of Hirsch & Co. and a member of the Board of Governors of the New York Stock Exchange. He realized that ever increasing paper costs could push small investors and all but the largest brokerage firms out of the market.

Wilbur Wright Associates, a management consulting firm working in the Wall Street area, has found that there are on an average 13 clerical mistakes for every thousand transactions made. Each error costs between $40 and $100 to rectify. Per day $120,000 is spent looking for errors.

VISTA promoters point out human loss of papers and the high cost of reimbursement are also factors that favor an automated system.

New Computer Language Geared to 'Worksheet' Is Introduced

A new computer language, OMNITAB, designed for routines used extensively by controllers, budget planners, statisticians, mathematicians, actuaries, research analysts and those in related fields, is based on the familiar 49-column, 101-row

worksheet. Data are entered in the appropriate columns of the worksheet, but then directions for all needed calculations are coded into simple commands for entry into a keyboard terminal connected to a central computer at the developer's headquarters.

Thus, if it were desired to raise the numbers in Column 1 to the 4.3 power, store the results in Column 20, and print both Columns 1 and 20, the command would be typed in as:

RAISE COL 1 TO 4.3 AND STORE IN COL 20 PRINT COLS 1 AND 20.

The central computer, located at International Telecomputer Network, Bethesda, Maryland, would perform the desired computation and print the results either in the designated columns of a duplicate worksheet or on line printers, or else key punch them into cards.

More than 200 commands and 100 subroutines are available within the OMNITAB system.

Mexico Seen as Base For South American Computer Network

Computers are moving south of the border. The Information and Computing Centers Corporation of Dallas has recently established a $4-million corporation with headquarters in Mexico City.

The Information and Computing Centers Corporation de Mexico, S.A., is the joint effort of ICCC and a group of Mexican financial, scientific, and industrial leaders headed by Sr. Guillermo Rossell de la Lama, Secretary of State.

ICCC President Ed L. Dillon said the corporation hoped the Mexican base would be a bridge for its computer network into the whole of Latin and South America.

ICCC de Mexico, S.A., will provide computer time needed for specific applications on a time sharing basis, software services, and development of memory data banks. Sr. Virgilio Varela, president of Credito Central de Mexico, said, "We are very happy to be associated with ICCC, which will now allow us to fulfill a need existing in Mexico in the banking, industrial, commercial, and scientific areas."

Specialized Business Translation Services Offered in Two Cities

Specialized translators for foreign business correspondence are available in the New York and Washington areas through a new electronic service of the American Express Company.

The Institute of Modern Languages, Inc., a wholly owned subsidiary of American Express, has set up three centers equipped with Xerox Telecopier IIs. Papers for translation can be brought to the IML centers, one in Washington and two in New York, or if organizations have their own Xerox telecopiers they can transmit the translation material directly.

"Word-for-word translations can't do the job for today's international businessman," M. X. Rocca, president of IML, said. "The translation must be faithful to the meaning of the original, preserving every nuance. This takes the work of highly skilled translators that IML can bring quickly to the client's doorstep electronically."

If the material to be translated is of a specialized nature it will be routed to a translator who not only knows the desired language but also is familiar with the field being discussed.

Anyone can use the service without special subscription arrangements. Charges are based on the length of the document and its technical complexity.

IML says the average one- or two-page document delivered in the morning for translation can be returned to the client the same afternoon.

1969 SJCC Proceedings Now Available; 112 Papers Included

The proceedings of the 1969 Spring Joint Computer Conference are now available in an 866-page hard-cover volume published by The American Federation of Information Processing Societies Press, 210 Summit Avenue, Montvale, N.J. 07645.

The 112 papers included were presented at the conference held in Boston from May 14 through 16. They cover a wide range of topics, ranging from computers and the underprivileged, computer systems vs. health systems, and computer-assisted instruction to on line business applications, time sharing systems, and software.

Copies may be obtained from AFIPS for $22.00 each for nonmembers, and for $11.10 for members of AFIPS constituent societies. The AICPA is a constituent society.

Model Trains Grow Up; Southern Pacific Uses Model of Its System

A mathematical model of a railway network is being built by McDonnell Automation Company, a division of the McDonnell Douglas Corporation, for the Southern Pacific Railway. Once the model is completed it will be used to simulate load movement with respect to clearances and bridge capacities.

The Southern Pacific has given McDonnell a contract to develop an extensive computerized system which will permit rapid route selection and clearance of unusually heavy or large loads. The Computer Aided Railway Engineering System (CARES) will have a mathematical model of the railway's bridges and tunnels in its data bank.

CARES will designate the exact route to be taken, permissible speeds, and how the cars are to be loaded, McDonnell says. Additionally, it will provide information on the structural adequacy of bridges, helping management to determine where new construction is needed.

Already in use are the bridge analysis and heavy load clearance portions of the system. These will be made available to other railroads, McDonnell reports.

Computer Performance Analyzer Offered by New Jersey Firm

A low-cost computer performance analyzer is being offered by Computer and Programming Analysis, Inc., of Cherry Hill, N.J. The CPA Series 7700 Analyzer costs less than $5,000.

The analyzer consists of a control module, a counter module, and probes. The probes are universal high-impedance differential amplifier probes which serve as an interface, making the analyzer compatible with any existing computer system.

Probes are attached to the system under analysis at points which indicate the status of the functions monitored. Up to 18 different computer functions can be monitored simultaneously without interfering with normal computer operations.

Computer and Programming Analysis says the resulting readouts enable the computer user to increase the throughput of the system, reduce overhead, and accurately evaluate system configurations.

Upon customer request the company will provide technical assistance in interpreting the analyzer's report and will recommend system improvements.

Facsimile Transceivers Used for Remote Input In OCR System

Standard facsimile transceivers serve as remote data-input units in an optical character recognition system developed by Recognition Equipment Incorporated, Dallas.

Information does not need to be keyed before it is entered into the terminal unit. The transceivers send information to a central processor for character recognition and translation into computer language. The transceiver can also be used to send messages back to the original sending station.

"By using facsimile transceivers as data-entry terminals, we are blending common, existing office equipment with advanced character recognition technology," said Recognition Equipment's president, Herman L. Philipson, Jr. "We have found a new use for the facsimile transceiver, transforming it into an OCR device without altering its basic business office purpose."

Mr. Philipson cited some areas of application for the new system: "Certain banks, government agencies, transportation companies, large retail chains, wholesalers, and manufacturing companies with dispersed distribution points have applications that often require capture of widely dispersed, low-volume, time-critical source data for computer processing."

Honeywell Training Non-College Graduates As Systems Analysts

This month high school graduates without advanced education or work experience are becoming part of Honeywell Inc.'s growing educational program.

The program is aimed at helping to fill the 285,000 job openings expected in the computer industry by 1972. Though Honeywell's current class of students without college degrees has room for only 25, the company hopes to train 1,500 of these students within three years. It graduated 37 students in September who began work in June, but these students were college graduates when they came to Honeywell.

"We really are looking only for the exceptional high school graduates, those who can compete with persons who have advanced education or business experience," John McMurrer, manager of the computer-education program, said. "All applicants will be given our standard hour-and-a-half aptitude test—the same test we give college graduates—we will expect from them the same rigorous dedication to their work that we have found in our graduate students."

The high school graduates will be given a nine-month course that meets three evenings a week in Honeywell's education center in Wellesley Hills, Mass. Students will be taught the fundamentals of computer programing and computer-related systems analysis.

They will have 475 hours of laboratory work, lectures, and case studies. The pupils will do substantial problem solving with hands-on

computer contact. Upon completion of the course students will be awarded a certificate for programing or systems positions.

Patent Court Overrules Patent Office; Declares Software Patentable

A decision heralded as the magna carta of the software industry has been handed down by the United States Court of Customs and Patent Appeals. The court held that computer programs are patentable, directly contradicting the Patent Office's previous stand that such programs were not patentable.

"In one sense a general-purpose digital computer may be regarded as but a storeroom of parts and/or electrical components," the court explained. "But once a program has been introduced, the general-purpose digital computer . . . along with the process by which it operates, may be patented. . ."

In an interview with *The New York Times*, Morton C. Jacobs, counsel for Applied Data Research, Inc., and the Association of Independent Software Companies, interpreted the decision in this way: "You build a special-purpose computer by placing it under the control of a computer program. A user having a single general-purpose computer and a thousand programs in his library has a thousand special-purpose computers."

The case came from an appeal by the Mobil Oil Corporation from a decision of the Patent Office Board of Appeals.

Previous Patent Office policy had given patent protection only to those programs which were built into the hardware, but not to those on punched cards or tapes.

An IBM spokesman said his firm supported the previous policy, but no official company statement was made following the new decision since IBM believes there may be future proceedings.

Commissioner of Patents William E. Schuyler, Jr., later announced the cancellation of last year's guidelines for the granting of patents to EDP programs.

"Even though the law of patentability of computer programs must develop on a case-by-case basis," Mr. Schuyler said, "I believe you will agree that many computer programs will be unpatentable because they are obvious to a skilled programer."

The commissioner pointed out that copyrighting programs means that they must be published. He suggested that a registration system which would better protect their secrecy be worked out.

Mr. Schuyler promised that the Department of Commerce and the Patent Office would fully cooperate with a committee being formed by the National Council of Patent Law Associations to study software protection and to draft the needed legislation.

IRS issues standards

On the other hand, a new set of guidelines in the software field has been established by the Internal Revenue Service. Last month the IRS issued for the first time its standards for the evaluation of tax returns, which include the cost of buying, leasing, or developing computer software.

Justice Charges Airlines' Reservations System Violates Antitrust Act

An agreement between 11 major domestic airlines to use a common automated reservations system has been found by the Justice Department to be, in effect, a collective boycott violating the Sherman Anti-trust Act. The department has requested that the Civil Aeronautics Board either disapprove of the agreement or hold a full hearing on it.

The 11 member airlines of the Air Transport Association's air traffic conference had asked the Civil Aeronautics Board for approval of their joint use of the reservations system developed by ATAR Computer Systems, Inc.

Sellers of other automated reservation systems, travel agents, reservation services, and hotel groups had opposed the shared system.

Included in the agreement made by the 11 were promises not to use other equipment, not to put equipment in the offices of any travel agents, and not to pass on information to ATAR competitors.

Opponents' arguments

Opponents of the agreement pointed out that the use of multiple systems was possible both technically and economically; travel agents would not be able to choose reservation service sellers or service equipment; the development of a better system would be hindered; and the operation of airlines not included in the agreement would be hurt.

MANAGEMENT SERVICES FORUM

The inquiry that follows came from a CPA firm in a small Midwestern city:

Gentlemen:

We would like to accept your offer of help which appeared in the May–June issue of MANAGEMENT SERVICES. We are a small CPA firm wrestling with the problem of whether to enter the computer service bureau business. We need to know what questions to ask and where to find answers.

Several of our clients are using a local service bureau for payroll, accounts receivable, accounts payable, check register, and similar jobs. We have become quite dissatisfied with the quality of work our clients are receiving. We want to explore the possibilities of doing this bookkeeping ourselves, both for clients now using the service bureau and for new clients we might acquire if we offered this service.

Once we are established in the computer field it appears we would be in a position to offer more sophisticated services to our clients. These might include sales analyses, inventory controls, budgeting, and similar studies.

We thought Mr. Kaufman's article regarding time sharing in the November-December issue of MANAGEMENT SERVICES presented an intriguing approach for our firm. How do we follow up on his ideas to see if they would fit our needs?

This outlines our thinking so far. Can you help us proceed from here?

To the reader who posed this inquiry the editors sent the complete text of a speech made at the AICPA Chicago computer conference by Edwin A. Boyle, CPA, of Hackensack, N. J. (This speech is excerpted in the article that begins on page 43 of this issue.) Although Mr. Boyle is not a member of our panel of advisors, his speech seemed so pertinent to the problems facing our Midwestern correspondent that we obtained his permission to release his full text to the questioner in advance of the publication of the report on the conference.

In addition, the question was submitted to two members of the panel. One of them replied as follows:

I cannot answer your questions specifically but feel you may be interested in a few of the uses we have made of our computer. The project is still in the development stage. Much of the computer time is used in keeping our own client time charge records. Other uses are summarized in the following memorandum, which was written to keep the members of our own staff advised:

TO: All partners, managers and seniors.
FROM: Management Services
SUBJECT: In-house computer

Our New York office now has its own in-house computer, an IBM 360 Model 20 card system. A model 360/25 is on order and is expected to be installed in a few months. The availability of a computer increases the management services capabilities we can offer

PANEL OF ADVISORS:

Under the auspices of MANAGEMENT SERVICES, a panel of management services advisors from leading accounting firms have agreed to answer to the best of their ability questions about any area of management services with which readers would like help. Both questioners and advisors will remain anonymous. One or more of the following members of our panel are responsible for the answers published in this department:

WILLIAM E. ARNSTEIN, *Main Lafrentz & Co., New York*
PHILIP L. BLUMENTHAL, *Geo. S. Olive & Co., Indianapolis, Ind.*
ROY A. LINDBERG, *J. H. Cohn & Company, Newark, N. J.*
ARTHUR B. TOAN, JR., *Price Waterhouse & Co., New York*
H. G. TRENTIN, *Arthur Andersen & Co., New York*

to our clients. In the New York area we can offer the use of the machine to our clients. For clients outside the New York area who may wish to use a local service bureau, we can supply systems experience and, in some cases, programs already written. The following examples illustrate the various ways in which the computer has been used on management services engagements:

1. In the case of two clients, we conducted surveys and in each case recommended the installation of basic unit record equipment (key punch, sorter, and a calculating accounting machine). We proposed a tub file approach (prepunched item cards and prepunched name and address cards) for order writing and invoicing. In both cases, our computer was used to assist in the conversion of the old system to a new system. The computer was used to print a list of product items in preparation for a product item coding structure and it also assigned and punched customer account codes into name and address cards. When the installations were complete, our computer was used on a monthly basis to prepare sales analyses and inventory reports from punched cards forwarded to us by the client.

The client has a low-cost billing system without losing the analytical ability of a computer. The computer-prepared reports have given the client valuable management information not previously available.

2. For billing a client uses the Friden Computyper that is coupled to an IBM key-punch machine. The by-product cards generated in the billing operation are submitted to us at month end along with cards punched for cash receipts and merchandising receipts. We process these cards on the computer and prepare monthly customer statements, an aged accounts receivable trial balance, stock status reports, sales statistics, and profitability by salesman and customer.

Again, client's on-premise equipment is limited to that needed for daily processing while valuable periodic reports are available from our computer.

In both preceding assignments, our computer department personnel wired the client's control panel and assisted Management Services personnel in designing and implementing the system.

3. A system was designed for a law firm to computer-prepare time analysis and work-in-progress reports. Each attorney in the firm prepares a daily time sheet summarizing his billable and non-billable time with appropriate service codes. Clerical help completes the time sheet by posting client number and matter number to the time sheet. These time sheets are submitted to us and key-punched. The following reports are computer-prepared:

a) Detail time report listing.
b) Work-in-progress report — this report shows the detail for hours and standard amount (hours and standard rate) by client and matter (open and unbilled).
c) Work-in-progress summary — this report summarizes into one line the dollars of time still open (unbilled) by client and matter.
d) Monthly billing report—this report shows the billings for the month, the standard amount, and over/under standard for each client and matter.
e) Completed and billed summary — this report shows the same information as the monthly billing report and also a year-to-date analysis of billed, standard, and over/under standard for each client and matter number.

The client, through the use of the above-described reports, has eliminated the problems inherent in a cumbersome manual system and has established better control over time and billings.

4. A client in the travel business obtains customers through leads obtained from advertising in various media (newspapers, radio, etc.). In the case of printed media advertising, coupons are clipped from the ad and mailed to the client. These coupons are preprinted with a code identifying the advertising medium and placement date. Leads received over the telephone are coded to identify the source (radio, referral, etc.). Coupons and other documents representing leads are key-punched by the client, (name, address, zip code, telephone number, and media code). Each week these cards are forwarded to us for the following computer processing:

a) Printing of pressure-sensitive address labels.
b) Printing of Wheeldex index reference cards.
c) Weekly analysis of the number of leads obtained from each medium.

If the salesman is successful in selling the lead, he prepares a form with all of the essential data. Cards punched from this form are forwarded to us for the following month-end computer processing:

a) Purging of lead file of those

leads that have been converted to customers.

b) A media analysis.

This approach has helped the client to process his leads expeditiously and at the same time to provide the information to identify the best return for his advertising dollar.

5. In the area of accounting systems, books of account (journals and general ledger) have been computer-prepared for clients. At the end of the month or quarter, financial statements (profit and loss and balance sheet) are printed. The client in these cases may either punch the cards or submit properly coded documents (copies of checks and cash receipt listing) to us for key-punching.

This approach has special advantage to the small client who requires periodic financial statements showing interim, year-to-date, and comparative results of operations as well as a balance sheet showing current and previous period data.

6. Physical inventory sheets, or tags, are submitted to us by some of our clients for computer processing. We key-punch the cards and run physical inventory listings. These listings may be sequenced by tag number. If the client has a perpetual inventory, cards may be punched (if not already in punched card form) and a report prepared by comparing the physical inventory to the perpetual inventory by item number. This approach to the physical inventory is of value to the client as a means to reduce clerical effort in processing physical inventories as well as establishing control over inventories. In addition, if a certified financial statement is required by our audit staff, automating the physical inventory can materially reduce the audit steps required.

7. For many regular audit clients, the computer has replaced the staff auditor in the mechanical work of preparing both individual company and consolidated trial balance work-sheet spreads and financial statements. This releases our audit personnel for other work and speeds up our time to complete engagements.

The foregoing examples are just a few of the ways in which our computer capabilities can be used to broaden the services we can offer to our clients.

The other advisor had these suggestions to offer:

Time sharing does appear to be an attractive solution for many of the problems which a small firm may encounter with a service bureau like excessive turnaround times, errors in reports, and increasing costs. It should be noted, however, that these difficulties may be a function of poor systems design rather than an inherent problem with service bureau processing.

The three basic steps which must be taken prior to developing a "packaged" time shared system are the selection of the applications, the selection of the processing hardware, and the determination of the operating policies which will exist between you and your clients.

In selecting applications, you should choose those which appear similar among several of your clients. If you have one or more clients with difficulties on a particular application you may be able to arrange for them to share some of the cost involved in developing the application's "packages."

In selecting the time sharing service, you should consider the cost of the service and the geographical locations of its computers, communications centers, and sales offices. Another important question at present is whether the service has the ability to generate high-volume reports on a high-speed printer at the computer site rather than on the terminal. An effective method of processing business applications on a time sharing basis is to have the input and validation on the terminal, the printing of low-volume reports on the terminal, and the printing of high-volume reports at the time shared computer facility. Time sharing services that are interested in business applications in addition to scientific calculations normally provide this capability. Other important factors are the human engineering characteristics of the terminals that are supported and the types of programing language available.

In determining the operating arrangement you may want to process the data on a terminal in your firm or provide terminals for each of your clients. If the latter arrangement is chosen, you will want to maintain some control over the system programs by participating in the installation and assisting with necessary program changes.

Specifically, your next steps may be to familiarize yourself with the types of time sharing applications by discussing them with representatives of time sharing services, to select one or more applications based on specific needs of your clients, to determine your operating policies, and to select the specific service.

Meaningful work measurement is more than a single technique, this author believes. Rather it is a complex, involving operations analysis, manpower planning, and one of the work measurement tools—

THE USES OF WORK MANAGEMENT

by Harvey E. Schatz

Touche, Ross & Co.

Work measurement programs have for some time been a sort of stepchild in systems work. They are tedious to carry out; workers often resent them; they lack the glamor of computer feasibility studies or creating a management information system.

They have only one great advantage: if done well, they can produce significant savings.

And that is no small advantage in this era of rising costs, a diminishing labor market, and lower profit margins.

Work measurement plans are no panacea.

But taken in the proper context —viewed as a plan rather than a single technique — they almost always produce increased efficiency.

It should be noted that the applicability of work measurement is not limited to organizations with massive clerical staffs or that, because of its quantitative nature and the dollar savings objective, its use must preclude recognition of human relationships. Work measurement can be quite effective in small and medium-sized companies and can be instituted without morale-shattering effects if a properly structured program is developed.

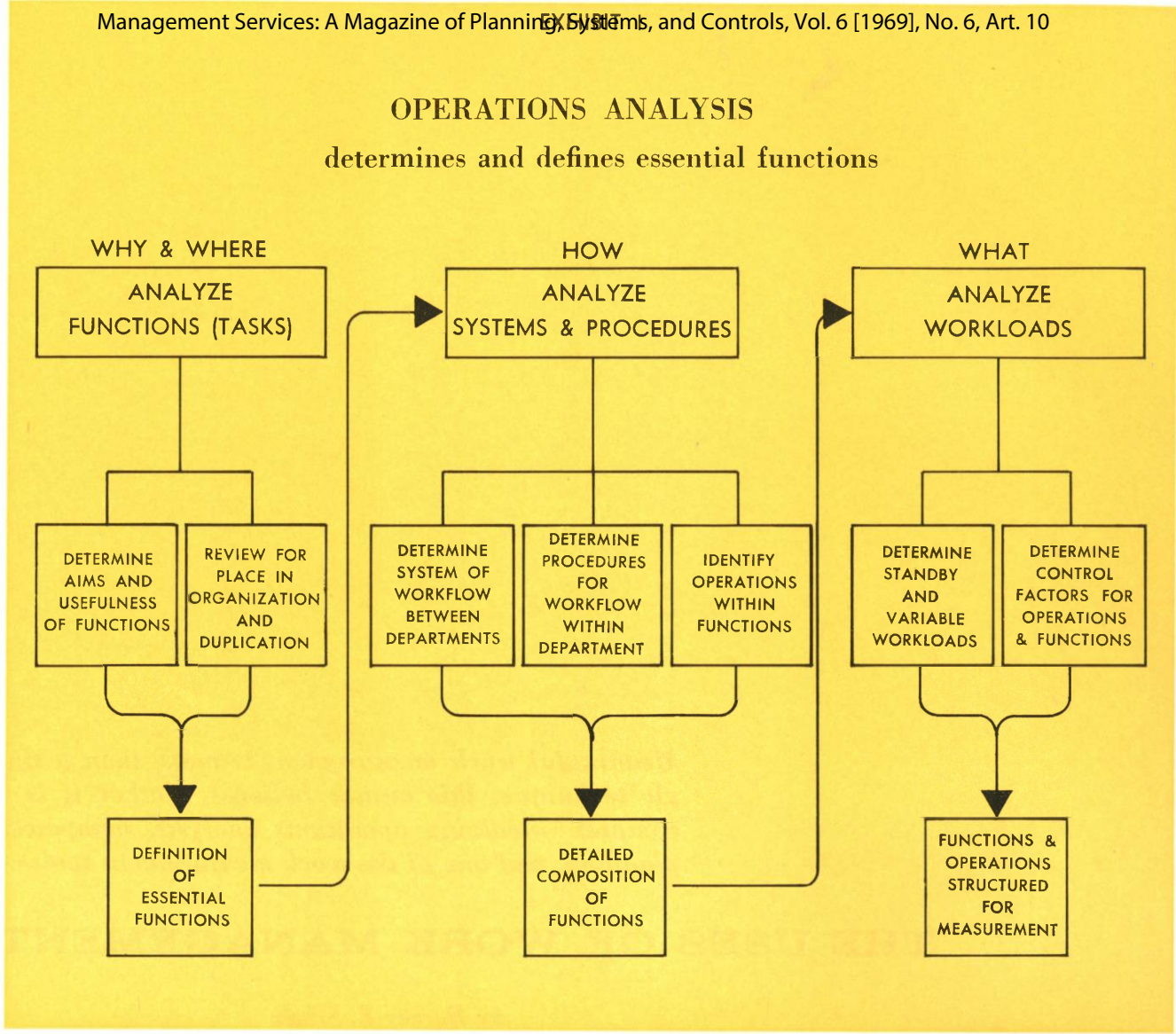
By a complete work measurement plan we do not mean any single work measurement technique that establishes a standard time for performing a given task. An effective work measurement program integrates this component, of course, but to be effective it must incorporate additional managerial control tools as well:

1. Operations Analysis
2. Manpower Assignment
3. Variable Budgeting.

The following discussions and examples illustrate how these can work with the others to create a meaningful and integrated savings program.

A principal reason that work measurement is so often successful in effecting a reduction in the work force is the fact that employees who are not working against a standard or established goal will generally work at a 60 per cent to

EXHIBIT 1



70 per cent effort level or pace. Simply improving the effort levels, however, is but one way of reducing the time required to perform a task. Even a well engineered standard for an inefficient task will contain built-in inefficiency. Before performing work measurement, therefore, a methods study, or operations analysis, should be performed. (See Exhibit 1, above.)

Operations Analysis consists of an intensive review of the manner in which tasks are currently being performed. First, functions of each department are studied to ascertain the purpose and usefulness of each function, to detect overlaping or duplication, and to determine where the function can best be performed.

In the past decade, the rapid rate of corporate growth, the advent of the computer, and the frequent movement of managerial personnel have produced significant changes in organizations. These changes often are not reflected in the functions being performed. Frequently, functions are made unnecessary because they have been superseded or are being performed in another department. For example, in the Operations Analysis of a manufacturing plant, it was determined that certain functions performed by the Timekeeping Department were performed the next day, in an almost identical manner, by the Payroll Department. In addition, computation of piecework earnings, performed manually in the Timekeeping Department, was also performed as part of the computerized payroll program.

The second step in Operations Analysis is to review the work flow and the detailed systems and pro-

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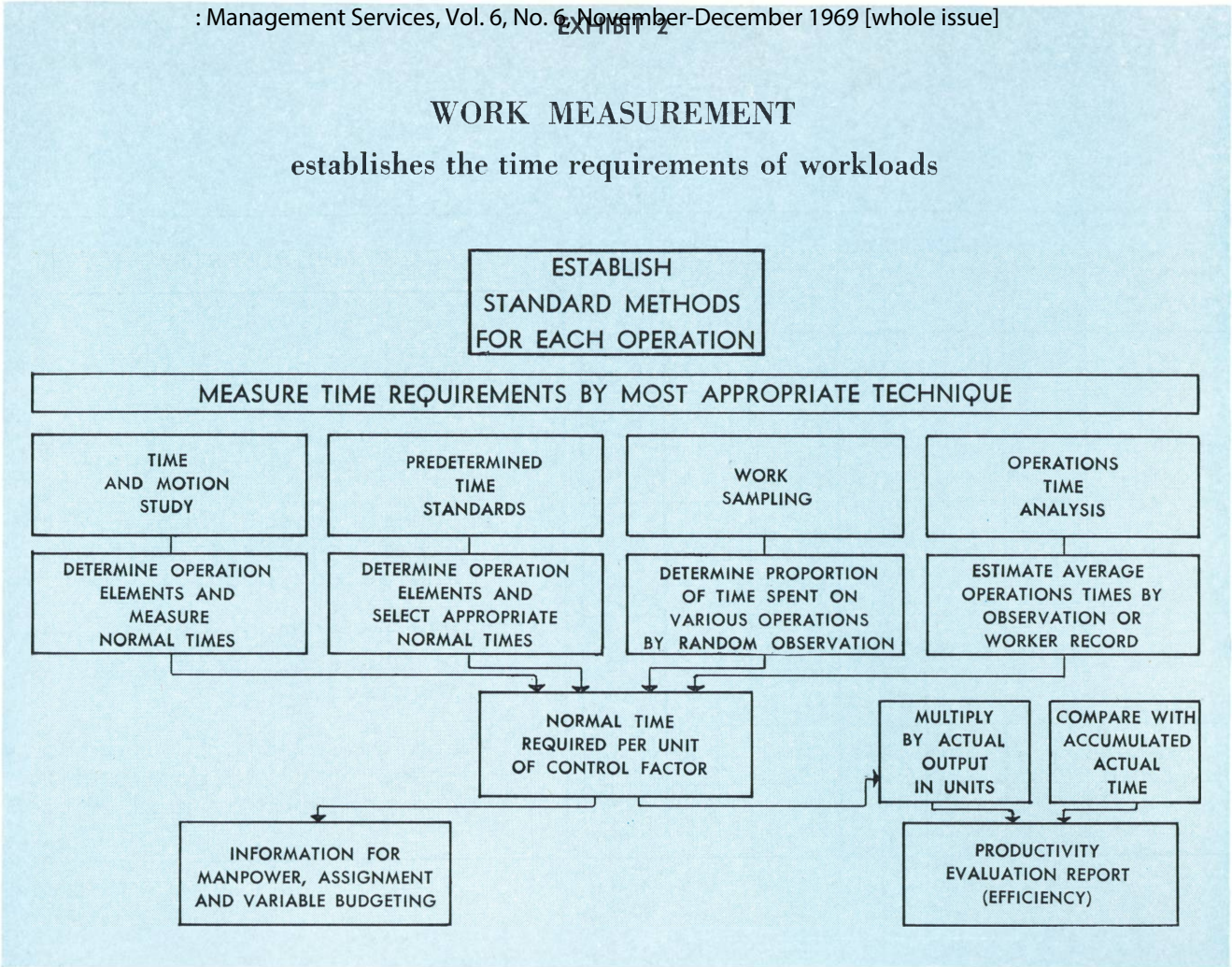
EXHIBIT 2



cedures used in performing each function within departments and between departments. Each function is broken down into the operations of which it is composed. These operations are studied using work simplification techniques.

For example, in analyzing the material handling function of a multistory manufacturing plant, flow process charts were prepared for each of the principal products, indicating operations, transport, storage, and inspection performed. Distances moved were noted. Evaluation of the feasibility of additional monorail conveyors for transporting and storing several million parts per year was greatly facilitated by use of the flow charts. Determination of material handling manning requirements was deferred until this evaluation was completed.

The third step in Operations Analysis is the analysis of work loads. In the case of office clerical jobs, particularly in smaller companies, there is a lack of repetitiveness in the work and many tasks are difficult to measure (for example, look-ups in an accounts receivable department). However, on the basis of information gathered to this point, it is usually possible to break each job down into the factors which are the determinants of the work load. In the Purchasing Department case which is discussed later as a case study, a number of factors, such as issue of purchase orders, issue of change notices, and salesmen's interviews, determined the work load of the buyers. The relative importance of these factors, which we will call control factors, is determined from an analysis of time spent on each factor during a four- or five-day trial period.

Another product of this analysis is the determination of fixed and variable work loads. That is, how much of the work load would continue to exist under a 60- to 90-day plant shutdown condition and what index or indices of activity would cause the remaining work load to vary.

As a result of the operations analysis, the areas which are most amenable to work measurement are determined and a sequence established for the additional studies to be performed.

There are four methods of work measurement commonly used to establish standards of performance:

1. Time Study
2. Operations Time Analysis
3. Predetermined Time Standards
4. Work Sampling

Exhibit 2 above illustrates the interrelationship of the four. Each method has certain advantages and disadvantages; the selection of a particular method will depend upon the nature of the operation to be measured, skills available, cost, company policy, etc.

EXHIBIT 3

METHODS-TIME MEASUREMENT
APPLICATION DATA IN TMU

REACH - R

DISTANCE MOVED INCHES	TIME TMU				HAND IN MOTION	
	A	B	C or D	E	A	B
10	8.7	11.5	12.9	10.5	7.3	8.6
12	9.6	12.9	14.2	11.8	8.1	10.1
14	10.5	14.4	15.6	13.0	8.9	11.5
16	11.4	15.8	17.0	14.2	9.7	12.9
18	12.3	17.2	18.4	15.5	10.5	14.4
20	13.1	18.6	19.8	16.7	11.3	15.8
22	14.0	20.1	21.2	18.0	12.1	17.3
24	14.9	21.5	22.5	19.2	12.9	18.8
26	15.8	22.9	23.9	20.4	13.7	20.2

CASE AND DESCRIPTION

A. Reach to object in fixed location.

B. Reach to object in location which may vary slightly.

C. Reach to object jumbled with other objects so that search and select occur.

D. Reach to a very small object or where accurate grasp is required.

E. Reach to indefinite location to get hand in position for body balance or next motion.

GRASP - G

CASE	TIME TMU	DESCRIPTION
1A	2.0	PICK UP GRASP - Small, medium or large object easily grasped.
1B	3.5	Very small object or object lying close against a flat surface.
1C1	7.3	Interference with grasp of cylindrical object. Diameter over 1/2".
1C2	8.7	Interference with grasp of cylindrical object. Diameter 1/4" - 1/2".
1C3	10.8	Interference with grasp of cylindrical object. Diameter under 1/4".
2	5.6	REGRASP
3	5.6	TRANSFER GRASP
4A	7.3	Object jumbled with other objects. Larger than 1"x1"x1".
4B	9.1	Object jumbled with other objects. 1/4"x1/4"x1/8" to 1"x1"x1".
4C	12.9	Object jumbled with other objects. Under 1/4"x1/4"x1/8".
5	0	Contact, sliding or hook grasp.

EXHIBIT 4

METHODS-TIME MEASUREMENT
GENERAL PURPOSE DATA

BGT - BASIC GET		Distance	f"	1 - 3"	3 - 9"	9 - 15"	15 - 21"	21 - 27"
		Code	01	02	06	12	18	24
CO - Contact Object			2	4	9	13	17	22
E - Easily Grasped	F - Fixed Location		6	8	11	14	16	19
	V - Variable Location		6	8	13	17	21	26
	A - Additional Object		17	19				
J - Jumbled	O - One Hand		13	17	21	25	30	34
	S - Simo		24	28	32	36	41	45
	H - Handful		33	35	39	44	48	52
	A - Additional Object		24	28				

Time study and operations time analysis will be discussed very briefly; the use of predetermined time standards and work sampling will be illustrated by means of case studies.

During the period 1910–1920, stopwatch time studies became an accepted method for setting standards for factory direct labor operations. Even today such studies are accepted by organized labor. Time study is used to determine standard times for short-cycle, highly repetitive operations. Operations are broken down into regular and noncyclical elements for which average times are determined as a result of timing many cycles of the operation. (Elements as small as .03-.04 minutes can be timed with good accuracy.) The observed average cycle time is the sum of the average times for the regular elements, plus provision for the noncyclical elements. This *observed time* is adjusted, based upon the time study observer's rating or leveling of the effort observed, to arrive at the *normal time* for the operation. This is the time required by an average, trained employee working at a normal pace. Allowances for personal time, unavoidable delays, and fatigue are added to the normal time to determine the *standard time* for the operation.

Operations time analysis is simply the development of standards based upon historical averages, estimates of supervisors, or batch scheduling. Batch scheduling refers to the use of a schedule desk which dispatches uniform batches of work to each work center about every hour or half hour. After some trial and error, the actual time required to complete each batch is averaged to arrive at a standard. An article in the NAA *Management Accounting* magazine cited Southern Bell's use of a three-month historical average to set standard times for processing toll tickets and other media. Using methods such as these, standards can be developed at a low cost since no specialized technical skills are required. Although the standards can be used to analyze subsequent trends, they do not possess the normal amount of precision and, therefore, build in existing inefficiencies.

Predetermined time data exist in various forms. Initially, companies developed averages of elements common to several time studies and used these to set times for those elements when they occurred in subsequent operations, in lieu of performing another time study. Gradually, a company could develop sufficient time study data to synthesize standards for most of its operations.

Subsequently, as a result of industrial engineering studies of thousands of frames of slow motion film, predetermined time data were developed and published for minute elements of motion. These data exist in various sizes of building blocks. Methods-Time Measurement (MTM) data (Exhibit 3, page 18), the lowest common denominator, have been combined to produce Methods-Time Measurement General Purpose Data (Exhibit 4 above). An even larger building block has been developed in the form of Clerical Standard Data (Exhibit 5, page 20).

Standards for nonrepetitive tasks or for estimates for bidding purposes can be developed by breaking the tasks down into appropriately sized elements, depending on the predetermined data to be used, and assigning the published times

to these elements. Predetermined time data are widely used in the office areas, where the use of a stopwatch is frequently considered objectionable. A high degree of consistency of standards is obtained because a common element has a uniformly assigned time and no effort rating is required. However, in order to develop qualified analysts, considerable training is required.

The fourth method of work measurement, work sampling, got its name in 1952 although the technique was conceived 40 years ago. An Englishman named Tippett was making time studies in a textile mill to determine lost time for various causes. Time study was tedious and he was looking for a less detailed and easier approach when a weaving manager remarked:

> "I can tell at a glance whether the weaving in the shed is good. If most of the weavers are bent over their looms mending warp breaks, weaving is bad; if the weavers are mostly watching running looms, weaving is good."

Tippett realized that this instantaneous reading gave an indication of production conditions in the brief interval surrounding the reading.

EXHIBIT 5

CLERICAL STANDARD DATA

CODE: SCDD-XX

OPERATION: OPEN AND/OR CLOSE DESK DRAWER

DRAWER	DISTANCE OPENED OR CLOSED	OPEN DRAWER TMU		CLOSE DRAWER HAND LOCATION IN OR AT DRAWER TMU		CLOSE DRAWER HAND LOCATION OVER DESK TMU		OPEN AND CLOSE TMU	
Center	Part 6"	10	26	12	18	14	22	16	44
	Full 12"	11	55	13	51	15	55	17	106
Side Top	Part 12"	20	34	22	22	24	35	26	56
	Full 18"	21	38	23	34	25	39	27	72
Side Lower	Part 12"	30	39	32	22	34	35	36	61
	Full 18"	31	43	33	34	35	39	37	77
File Drawer	Part 12"	40	48	42	31	44	44	46	79
	Full 18"	41	52	43	43	45	48	47	95

DATA CODES

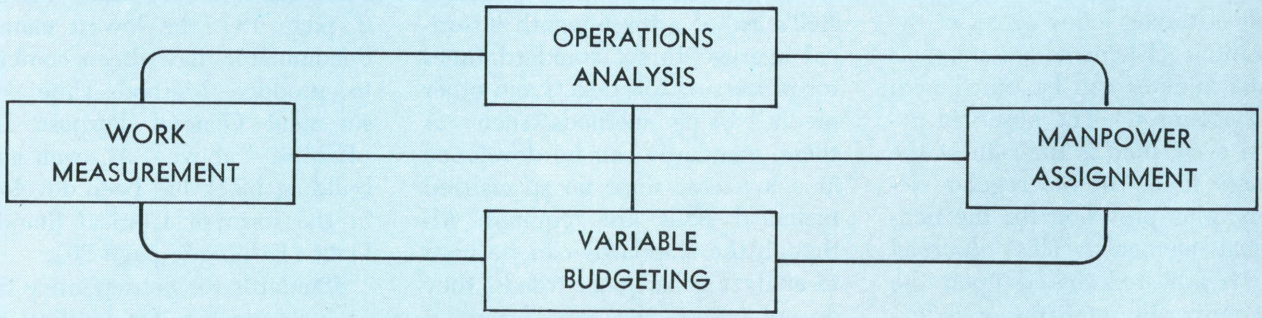
START: Hand over desk

END: Hand on drawer

Table from *Universal Office Controls*, copyright, H. B. Maynard & Co., Pittsburgh, Pa.

EXHIBIT 6

ALTHOUGH each of the activities
can be USEFUL SEPARATELY



They are MOST USEFUL
when properly COMBINED

EXHIBIT 7

VB1

VARIABLE BUDGETS

ANALYSIS OF DEPARTMENTAL FUNCTIONS

DEPT. NO. 16 NAME PURCHASING DATE

Description of Departmental Functions

PURCHASE ALL PRODUCTIVE MATERIALS, TOOLS, SUPPLIES AND EQUIPMENT, PROCESS PURCHASE REQUISITIONS, DETERMINE ECONOMIC PURCHASE QUANTITIES AND SOURCES WHICH WILL SUPPLY BEST QUALITY AT LOWEST PRICE.

ISSUE PURCHASE ORDER CHANGE NOTICES.

INTERVIEW SALESMEN.

Remarks

H. F. SNYDER
ANALYST

J. P. ENGLE
Supervisor

EXHIBIT 8

VB2

VARIABLE BUDGETS 1 OF 2

CURRENT INDIRECT WORKING FORCE ANALYSIS

DEPT. NO. 16 NAME PURCHASING

NO. OF SHIFTS _____ SHIFT NO. _____ DATE _____

PERSONNEL STATUS

No. As Of		JOB CLASSIFICATION		Functions Performed	Ref. No.
Sal.	Hr.	No.	Description		
1			GENERAL PURCHASING AGENT	SUPERVISE PURCHASING DEPT. WHICH INCLUDES SEVEN BUYERS AND FOUR GIRLS. CHECK VENDORS FACILITIES, CAPABILITY AND RELIABILITY. ASSISTS BUYERS WITH THEIR PROBLEMS. COORDINATE WITH QUALITY CONTROL AND ENGINEERING DEPTS. HANDLES PURCHASING ON SPECIAL PROJECTS.	
6			BUYERS	PURCHASES ALL PRODUCTIVE MATERIALS, TOOLS, SUPPLIES AND EQUIPMENT. PROCESSES PURCHASE REQUISITIONS, FOLLOWS UP ON DELIVERY AND INTERVIEWS SALESMEN.	
1			SECRETARY	SECRETARY TO THE GENERAL PURCHASING AGENT. TYPES LETTERS, SORTS MAIL AND DELIVERS IT TO BUYERS, DOES GENERAL FILING, AND ASSISTS WITH TYPING OF PURCHASE ORDERS.	
			TOTAL		

H. F. SNYDER
ANALYST

J. P. ENGLE
Supervisor

EXHIBIT 7

VB 4/

WORKLOAD ANALYSIS

DEPT. NO. 16 DEPT. NAME PURCHASING DATE SHEET NO. 43 OF

TIME START	TIME STOP	NO. UNITS	CODE NO.	CODE NO. 1 MIN E.T.	CODE NO. 1 NO. UNITS	CODE NO. 1 MIN A.T.	CODE NO. 2 MIN E.T.	CODE NO. 2 NO. UNITS	CODE NO. 2 MIN A.T.	CODE NO. 3 MIN E.T.	CODE NO. 3 NO. UNITS	CODE NO. 3 MIN A.T.	CODE NO. 4 MIN E.T.	CODE NO. 4 NO. UNITS	CODE NO. 4 MIN A.T.	CODE NO. 5 MIN E.T.	CODE NO. 5 NO. UNITS	CODE NO. 5 MIN A.T.	CODE NO. 6 MIN E.T.	CODE NO. 6 NO. UNITS	CODE NO. 6 MIN A.T.	CODE NO. MIN E.T.	CODE NO. NO UNIT
8:00	8:15		8D																				
8:15	9:02	5	1	47	5	9.4																	
9:02	9:11		2A																				
9:11	9:41	2	2				30	2	15.0														
9:41	9:50		8D																				
9:50	10:00		8A																				
10:00	10:15		7																			15	
10:15	10:19		8A																				
10:19	11:05	4	1	46	4	10.5																	
11:05	11:09		1A																				
11:09	12:00	6	1	51	6	8.50																	
12:00	1:20		4										20	1	20.0								
1:20	1:25		5C																				
1:25	1:40	1	5													15	1	15.0					
1:40	2:30	5	1	50	5	10.0																	
2:30	2:45		7																			15	
2:45	3:11	1	4										26	1	26.0								
3:11	3:31	1	2				20	1	20.0														
3:31	3:42	1	5													11	1	11.0					
3:42	3:55	4	3							13	4	3.3											
3:55	4:20		8A																				
4:20	5:00	2	1	40	4	10.0																	
TOTALS	TODAY			234	24	9.75	50	3	16.7	13	4	3.3	46	2	23.0	26	2	13.0				30	
	ACCUM.			4930	486	10.1	918	60	15.3	75	27	2.8	843	55	15.33	677	67	10.1				660	

Work sampling is based upon the laws of probability. A sample number of chance occurrences tends to follow the same distribution as the large group from which the sample was drawn. Work sampling is an extremely useful technique for determining the time distribution for activities being performed by direct and indirect factory labor and by office employees; it can be used to establish standards. It is widely used to determine allowances for delays which occur at irregular intervals; this application has been named ratio delay. Another common application is the use of work sampling to determine utilization of facilities, such as machines, material handling equipment, or truck loading docks.

This method is less expensive than time study or the use of predetermined time data and does not require observers with specialized engineering skills. It is more acceptable to factory and office employees than are continuous time studies. Its broad range of applicability facilitates obtaining facts which otherwise might not be obtained. Work sampling has the disadvantage of being somewhat difficult to comprehend and does not provide as much detailed information as time study or the use of predetermined time data.

In both of the case studies presented further on, manning is ultimately related to an index of activity. By projecting the level of activity, manpower requirements can be determined in advance and varied as required with the work load. This does not necessarily mean short-term hiring and firing. In the office, for example, peak loads will not occur simultaneously in all departments. Utility personnel and overtime can be used to handle peaks when a department is manned at a level less than that required for the peak.

A vice president of a major company was quoted as saying:

"I'd hate to think how I'd have been able to run the office without work measurement. The greatest value comes in knowing the work loads are reasonably equitable."

By tieing the results of work measurement to flexible budgets, the savings effected can be perpetuated. In many cases where the work measurement technique was used as a one-time cost cutter, personnel who were eliminated ultimately reappeared on the scene. The use of flexible budgets allows for an increase in manning when justified by an increase in the work load. Meaningful budget reports highlight deviations from standard manning.

Operations Analysis, Work Measurement, Manpower Assignment, and Variable Budgeting have all been discussed. (See Exhibit 6,

EXHIBIT 10

3 4C

SUMMARY OF WORKLOAD
ACTUAL TIME ANALYSIS

PERIOD COVERED
FROM _____ TO _____

DEPT. NO. 16 DEPT. NAME PURCHASING – BUYERS

EMPLOYEES NAME	WORKLOAD CODE NUMBER													
	1	2	3	4	5	6	7	8	9	10	11	12	13	1
J. P. ENGLE – GENERAL PURCHASING AGENT						9900	660							
S. A. FOSTER – BUYER	4816	821	202	1022	719		650	1558	141	306	98	117		
B. F. GOULD "	4701	997	165	946	612		650	1830	61	358	44	186		
R. I. HARRISON "	5177	705	59	1116	538		660	1863	101	146	61	134		
L. B. MAUER "	4664	802	28	1216	444		748	1949	162	402	39	106		
K. V. STRONG "	4930	918	75	843	677		660	1836	83	278	46	214		
H. C. WOODS "	5222	906	221	734	798		660	1259	155	384	60	161		
TOTAL TIME (MINUTES)	29,510	5149	750	5877	3788	9900	4703	10,395	703	1874	348	918		
TOTAL UNITS OF CONTROL FACTOR	3,049	329	270	278	255	–	–							
UNASSIGNED TIME DISTRIBUTED TO CONTROL FACTORS														
CODE NO. 8 (3378 UNITS AT 3.077 EACH)	9382	1013						(10,395)						
	703								(703)					
		1874								(1874)				
			348								(348)			
					918							(918)		
TOTAL REASSIGNED TIME	10,985	2887	346		918			(10,395)	(703)	(1874)	(348)	(918)		
REASSIGNED TIME % TO C.F.	34.17	50.07	46.40		24.23									

page 20). Each is a powerful managerial control tool. They are most powerful, however, when integrated to create an effective Work Measurement Program.

This effectiveness has been proved dramatically by applications ranging from small individual departments to large organizations with massive clerical staffs—annual dollar savings in the millions have been reported.

Work measurement is mundane, and it is time consuming. But at a time when labor is becoming a larger and larger item in a firm's expenses—in many cases the largest item—the effectiveness of Work Measurement cannot be ignored.

Case study 1:

The following Purchasing Department case study illustrates an application of work measurement using predetermined time data.

Brief descriptions of departmental and personnel functions were prepared on preprinted forms (Exhibits 7 and 8, pages 21 and 22). In the case of the buyers, the control factors or determinants of work load were listed and assigned code numbers. Provision was made for a breakdown of miscellaneous time to include accumulation of time spent on telephone calls, personal time, dictation, etc. These code numbers were noted on work load analysis or logging sheets (Exhibit 9, page 23), which were used by the employees to record their time for several days.

Based upon the summary of actual time spent working on each control factor (Exhibit 10, above), the most significant control factors for which standards would be developed were identified. In addition, time spent on other control factors was allocated to the appropriate standard control factors and expressed as a percentage of the actual recorded time.

At this point, each selected function was broken down into its required operations and times were determined, using MTM–General Purpose Data (Exhibit 11, page 25). Note that since all functions are not to be timed, provision has been made for unmeasured functions by adding an allowance to the MTM times. The allowance is based upon the percentage of allocated unmeasured time to time recorded for the selected control factors.

Two other allowances are included: a safety factor of 10 per cent to allow for elements too small to identify in the operation breakdown and a personal time allowance of 6.7 per cent, or 30 minutes of an eight-hour day. The

EXHIBIT II

VB4

CONTROL FACTOR
DETAILED OPERATION
UNIT TIME REQUIREMENT

DEPARTMENT NO. 16 DEPARTMENT NAME: Purchasing - Buyers DATE:

OPERATION DESCRIPTION	CONTROL FACTOR AND OPERATION TIME (MINUTES)				
	PURCHASE ORDERS (REGULAR) AVERAGE 2 LINE ITEMS	PURCHASE ORDERS (SPECIAL) AVERAGE 1 LINE ITEM	CHANGE NOTICES AVERAGE 1 LINE ITEM	SALESMEN INTER-VIEWS	LETTERS
1. Receive and review purchase requisition	1.75	2.00			
2. Determine possible sources	3.67	6.30			
3. Check quantity requested with economic purchase quantity	1.25				
4. Enter quantity	.14	.07			
5. Determine delivery date	.15	3.00			
6. Write delivery date	.07	.07			
7. Write unit price	.16	.08			
8. Initial requisition	.05	.05			
9. Drop in box for typing	.03	.03			
10. Review change request			1.42		
11. Check with purchase order:					
(a) Select order			.25		
(b) Check item description			.08		
(c) Write unit price			.08		
(d) Post quantity change			.15		
(e) Initial			.05		
Sign	.05	.05	.05		
Salesmen interviews				15.00	
Dictate review and sign					11.00
Total measured time allowance	7.32	11.65	2.08	15.00	11.00
Unmeasured time (Pct. VB 4 c)	2.50	5.36	.97		2.67
Safety factor 10% of measured time	.73	1.17	.21	1.50	1.10
Total	10.55	18.18	3.26	16.50	14.77
Personal time allowance 6.7%	.71	1.22	.22	1.11	.99
Total time allowance	11.26	19.40	3.48	17.61	15.76

EXHIBIT 12

VB5 PERSONNEL REQUIREMENTS ANALYSIS

DEPT. NO. 16 DEPT. NAME: Purchasing - Buyers DATE:

CURRENT WORKING FORCE PRODUCTIVITY EVALUATION

VARIABLE CONTROL FACTORS EARNED FROM TO						
NO.	NAME	ACTUAL UNITS	WEIGHTS APPLIED	WEIGHTED VALUE	ORGANIZATION WORK LOAD CAPABILITIES	ADDITIONAL WORK LOAD CAPABILITIES DURING PERIOD EQUIV. PEOPLE
1	Purchase orders - regular	4,125	1.00	4,125	22 days x 480 min. per day = 10,560	7,502 minus 5,648 = 1,854
2	Purchase orders - special	385	1.69	651		
3	Change notices	270	.31	84	10,560 ÷ 11.26 min. for base unit = 937.83	1,854 ÷ 938 = additional work load capabilities equivalent to -
4	Salesmen's interviews	276	1.56	431		
5	Letters dictated	255	1.40	357	W. L. cap. of one person	
					8 people x 937.83 = organization's work load capabilities totaling -	
Total weighted units of control factor				5,648	7,502	1.98 persons

H. F. SNYDER
ANALYST

J. P. ENGLE
SUPERVISOR

total of measured time and allowances is the standard time for each control factor. These standard times are then summarized. Each control factor is given a weighted unit value by assigning a value of 1.0 to any factor identified as the base unit and relating each factor's time to the base unit time.

The Personnel Requirements Analysis (Exhibit 12, above) is used to determine the excess number of buyers in the current organization based on standard units. The standard is developed by using the actual units for each control factor, converted to weighted values. The total weighted units of control factor are compared to the number of units the existing organization can produce at standard. This comparison indicates the additional work load capability, or the excess number of persons, based upon the existing staff.

An example of the integration of work measurement with variable budgeting and performance reporting for an order and billing department is shown by a chart comparing actual to standard performance. Between mid-April and the end of May, there was a steady improvement in performance as indicated by the convergence of the actual and standard lines. The falloff of output concurrent with the increase in staffing beginning in June is highlighted by this graphic type of reporting and indicates that corrective action is required.

Let us look at an actual application of work sampling on a pilot basis in a manufacturing department. It was mentioned earlier that work measurement can be instituted without harmful effects on employee morale. In this example, some of the steps taken to maintain good personnel relations will be discussed.

Case study 2:

As in the case of any work measurement study, the objectives of this study were clearly defined. In this case the objectives were:

1. To train company management personnel in the use of work measurement techniques
2. To acquaint factory indirect and office employees with work measurement (Time study was currently being used for the direct labor force.)
3. To develop a program for work measurement of indirect factory and office areas to be implemented by company personnel with the objective of cost reduction.

The above objectives were to be accomplished by two consultants working with selected company personnel for a two-week period. Two pilot studies were to be conducted, one in an office department and one in a factory department.

The factory departments were selected by preparing a matrix which listed the number of indirect labor employees by classification, by department. From this matrix an assembly department with seventeen direct and five regular indirect employees was selected because of the relatively high indirect to direct employee ratio. The primary interest was to determine how indirect labor personnel spent their time. It was decided to include direct labor personnel in the observations, however, since little additional effort would be required.

An index of the activity level must be selected so that the time distribution observed during the study can be related. Since indirect labor employees were a supporting function to direct labor, it was decided to use standard direct labor hours as the index.

The next requirement in preparing for the study was the selection and training of observers. The fact that observers were selected from departments, such as cost accounting, production control, and plant engineering, is an indication of the ease with which people can be trained in the use of work sampling. This type of selection also established a nucleus of trained personnel in the various departments. The plant time study man was selected to be in charge of the study. Training sessions were held with this group and with the plant foremen to familiarize them with the practical aspects, but not the detailed theoretical concepts, of work sampling.

It is essential that the employees being studied be informed of what is taking place. The initial reaction to work measurement, in one instance, has been described as running "from tears to fears." This can be overcome by careful and tactful communication—before the fact. The following excerpts are from the letter issued to the employees by the plant manager concerning the "Labor Utilization Survey."

> "The plan is to study one department in the office and one department in the plant during this two-week period. In addition to a careful examination of the selected departments, this will be a training program for the supervision assigned so that they can in turn complete the study of all departments on an extended-schedule basis. The studies in both the plant and office will be performed using a work sampling procedure which is an accepted industrial engineering technique. Random observations of job performance will be recorded and the results evaluated statistically.
>
> "There is no need for any personnel to be disturbed because they are being observed during the course of these studies. Please do not attempt to put on any special performance or show. Be natural, do your work normally, and try to ignore the fact that you are participating in a special program."

The objective of matching manning to work loads was emphasized to supervision and to the employees. In addition, the company policy of depending on attrition alone for reductions highlighted by work measurement was reiterated.

Randomness and instantaneous observations are essential to a proper study. Consequently, the study must be organized in such a manner that:

1. Each observer is consistent in his classification of an activity
2. Tour times are random
3. Tour routes are random
4. The activity first observed is noted without anticipation of an activity about to happen.

In order to ensure that these conditions are met, detailed instruction sheets are prepared which include definitions of each of the

It is essential that the employees being studied be informed of what is taking place. The initial reaction to work measurement, in one instance, has been described as running "from tears to fears." This can be overcome by careful and tactful communication before the fact.

EXHIBIT 13

Random Tour Times & Routes
For Work Sampling of Department 14

Wednesday, September 18, 1963

Gladstone			Baranowski			Buckley			Tabacsko			Lemon			Latovick		
Tour No.	Rt.	Time	Tour No.	Rt.	Time	Tour No.	Rt.	Time	Tour No.	Rt.	Time	Tour No.	Rt.	Time	Tour No.	Rt.	Time
241	2	7:18	251	1	11:12	261	2	7:17	271	1	12:34	281	2	7:10	291	1	12:07
242	1	7:39	252	1	11:26	262	2	7:31	272	2	12:48	282	1	7:28	292	1	12:23
243	1	7:53	253	2	11:47	263	1	8:06	273	2	12:58	283	1	8:06	293	2	12:35
244	2	8:03	254	2	11:57	264	1	8:31	274	1	1:15	284	1	8:32	294	1	12:46
245	1	8:44	255	1	12:40	265	2	8:50	275	1	1:31	285	2	8:52	295	1	1:02
246	1	8:55	256	1	1:15	266	2	10:07	276	2	1:59	286	2	9:51	296	2	1:32
247	1	9:18	257	2	1:25	267	2	10:22	277	2	2:09	287	1	10:05	297	1	2:04
248	2	9:30	258	2	2:54	268	2	11:23	278	2	2:28	288	2	11:13	298	2	2:21
249	2	9:49	259	1	3:06	269	2	12:00	279	1	2:58	289	2	11:33	299	2	2:49
250	2	10:25	260	1	3:21	270	2	12:21	280	2	3:08	290	2	11:44	300	2	3:19

activities to be studied. These activities are preprinted on the observation sheet. The vertical column lists badge numbers. These badges were worn by the employees during the study to identify their job classifications and to facilitate accounting for all employees on each tour. IBM cards were used for observations made during a much larger study. It is interesting to observe that at no time during either of these studies was any dissatisfaction expressed by the employees because they were required to wear these badges.

A table of random numbers is used to select random tour times and routes. A schedule of these times and routes (Exhibit 13, above) is prepared for the observers; the routes are shown on a sketch of the department included in the instructions.

An initial trial run is made and a control center established for observers to note for each other any aspects of the operations which had not been anticipated and to re-

EXHIBIT 14

SCHEDULE B

MATERIAL HANDLERS

Time Distribution Based Upon 4-Day Work Sampling (1)
(457 Observations)

		Percent	Hours
A. Average attendance hours per day			16.0
B. Hours during which observations were not made because of breaks and cleanup period			.8
C. Hours available to be observed			15.2
D. Hours not observed—13.9% x C			2.1
E. Hours in observation area			13.1
F. Time distribution per work sampling observations:			
ACTIVITY OBSERVED			
Material Handling		56.7	7.4
Unrack in Dept. 3		5.3	.7
Direct Labor:			
Assembly	2.6		
Obtain Prod. Mat'l.	2.5	5.1	.7
Production Inspection		.2	.1
Expedite		.4	
Janitorial		1.8	.2
Idle		11.6	1.5
Walking		16.2	2.1
Discussion		2.7	.4
		100.0	13.1

(1) Observations during the first day of the sampling were not classified in a manner consistent with that used during the remainder of the study. The first day's results, therefore, have been excluded.

solve problems which develop. The trial run also provides the first reading of the distribution of time between the activities observed. The percentage of total time occupied by an activity or delay, for example, idle time, is used to make an initial determination of the total number of observations required. This can be determined by formula, chart, or table.

To determine the number of observations required, the desired confidence level and degree of accuracy must be specified. A 95 per cent confidence level simply means that one is confident that 95 per cent of the time the random observations will represent the true condition and 5 per cent of the time they will not. The degree of accuracy required will determine the number of observations, which in turn affects the cost of the study.

Based upon the trial run some redefinition of the study may be made. Observations are then made and the results tabulated daily. The percentage occurrence of an activity can be plotted daily on control charts to detect changed conditions which would affect the validity of the results. A particular advantage of work sampling is that accuracy of the results can be evaluated at any point during the study by use of a table similar to the one previously discussed. In other words, the number of observations may be cut short of the original plan if at some point it is determined that improvement in accuracy would not be warranted by the additional number of observations required.

The pilot work sampling study conducted in the manufacturing department indicated, with varying degrees of accuracy, the amount of time spent in direct and indirect activities by persons working in the department. About 7,000 observations were made of the 17 direct employees, two material handlers, a repairman, an inspector, and an expediter.

The accuracy with which the occurrence of a particular activity can be stated, at a specific level of confidence, is dependent upon the number of observations and the percentage occurrence of the activity. The larger the number of observations and the higher the percentage occurrence, the greater the accuracy with which the results can be stated. Consequently, the percentage indicated for each activity would have to be expressed as a range rather than a single number to say, with 95 per cent certainty, that the result is correct. As a practical matter this was not done in each case. Idle percentages by job classification, however, were determined in this manner.

Direct labor had a very low occurrence of idle time; the repairman had virtually none. A point which should be emphasized with respect to idle time is that in some cases it is difficult to define the nature of an observed activity. Examples of this situation are material handlers or an expediter observed walking or talking to other employees. Each of these activities could be an element of work or of idle time. The approach used was to classify the activity actually observed, that is, walking or discussion, and to use experience and judgment in evaluating the results. As a result of this approach, the idle percentages shown represent time which was definitely identifiable as idle time.

Exhibit 14 on page 28 illustrates the time distribution for the two material handlers, based upon 460 observations. Based upon these data it was determined that 10 hours of material handling were required to support the level of activity which existed during the study. By reassigning two hours to material handlers in an adjacent department, who had available time, one material handler was eliminated.

This may seem to be excessive effort to eliminate one man. The total impact of this program, however, was significant. About 60 per cent of all indirect employees were measured. Of this number about 10 per cent were eliminated by the program, through attrition.

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Much less is heard of the management information system today than was true a few years ago. But the concept, if not the title, is still very much alive in spite of the many pitfalls that have occurred in its development —

MANAGEMENT INFORMATION SYSTEMS IN THE REAL WORLD

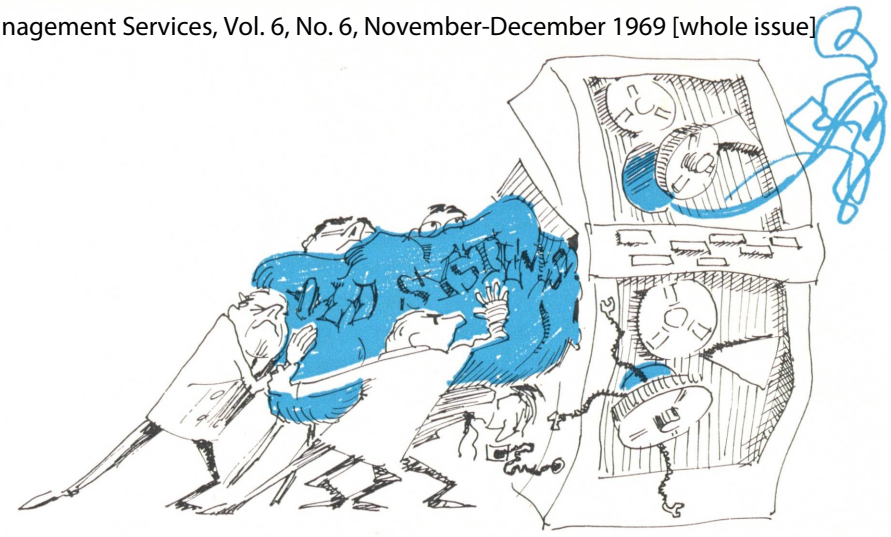
by Harold M. Sollenberger
Michigan State University

WHAT has happened to the popularity of management information systems, particularly those based on the so-called systems concept? This concept was widely discussed a few years ago amid confident predictions that its attainment would be easy when the highly touted capabilities of the third generation of computers became available. More recently, much less has been said about plans to install highly sophisticated, comprehensive, company-wide, long-range information systems. Instead, in many companies there have been reassessment, retrenchment, and reorganization in the management information systems area.*

A combination of factors, some of them internal to the data processing area, others external to it —and even external to the company itself—appear to be responsible. It is clear that many companies have had serious problems in transforming glamorous ideas and theoretical concepts into workable, efficient operating systems. Although some have succeeded in avoiding major pitfalls, it is safe to say that no one can claim complete victory over all these forces.

Companies have taken various steps to cure their problems with management information systems, sometimes with traumatic effects on their systems efforts. Often high-level managers have had to increase the investment of their time

*The research work that underlies this article was begun in 1966 as part of dissertation field research supported by the National Association of Accountants. Additional field research was conducted in 1968. Data from nearly twenty firms, mostly manufacturing-oriented, have been collected. The results of the earlier research have been published by N.A.A. in a monograph entitled *Major Changes Caused by the Implementation of a Management Information System.*



Jamming existing, independent subsystems into the grand new design was one of the first problems that had to be faced.

and of company funds in order to remedy their previous failure to police their systems efforts adequately. Many have made basic changes in systems policies, emphasis, and management.

No claim is made here that large-scale information systems, even those that approach the "total systems concept" in size, cannot be planned, executed, and operated effectively and efficiently. The intent, rather, is to show that the expected benefits attached to the concepts of advanced management information systems are not and have not been available to all.

The causes that appear to have been responsible for much of the decline in "total systems" activity are listed and discussed in this article, along with some of the immediately observable results of remedial actions. The causes are identified as follows:

1. Disillusionment with third generation computer capabilities and their availability
2. An internal credibility gap between computer personnel and operating management
3. The decrease in availability of funds for systems development
4. Poor management of computer area resources:
   a. Lack of decision making authority and of willingness to exert the authority available
   b. Inability to convert plans to action
   c. Poor economic analysis and priority systems
   d. Inability to maintain schedules and budgets
5. Organizational problems.

The results of de-emphasizing "total systems" concepts are observable from actions taken to solve the problems that have arisen. Among them are these:

1. Changes in computer utilization philosophies
2. Changes in organizational structure
3. Changes in personnel
4. Reassessment of "master plans"
5. More executive-level interest in producing a successful operation
6. More concern for proven investment analysis.

Whether the actions taken will solve the problems of systems development cannot be answered here. The speed with which changes occur in the computer and communications fields can often turn what seems to be a solution into a problem of its own.

The lack of success of many MIS projects may stem partly from unrealistic expectations about third generation hardware. Large and cheap memory core, simple operating characteristics, high-speed and cheap random access capability, lower operating and support costs, easy adaptation of current systems to new equipment, and ability to include greater flexibility in systems programs were assumed in most of the systems designs for advanced MIS projects.

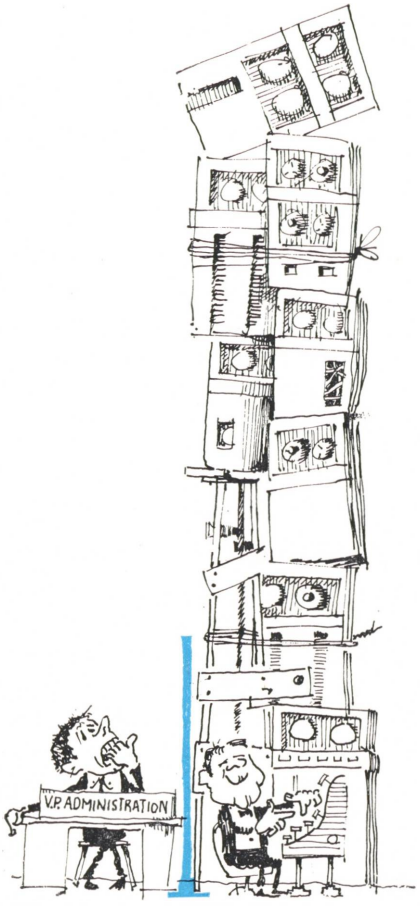
Claims finally materializing

To be sure, most of the claims of the hardware manufacturers are or soon will become reality, but obtaining these benefits has often proved hundreds of times more costly and time-consuming than was first anticipated. The monumental problems of reprograming and re-establishing operating systems have forced diversion of resources from developing advanced systems to adapting old systems to new equipment. In many cases compatibility devices used as intermediate steps in reprograming failed to utilize the new equipment efficiently and required more conversion work later. Many companies, after two to four years of frustration and hard work, are only now arriving at effective ways of using the newest hardware capabilities.

One company, for example, began planning for its introduction of third generation equipment in September, 1965, with an initial target installation date of early 1967. The installation date was later delayed

to October, 1967, and still later to the actual date of July, 1968—eighteen months beyond the initial target date. The major problems, nearly all related to software, were inadequately trained personnel, the slowness of operating system development, and the need to utilize interim equipment because of the lengthy delays. The uncertainties, underestimations, and revisions combined to undermine the rapport between the systems group and top management—even though strong top-level support had been given to computer investment.

Only now, often five years or more after many MIS dreams were born, can users see the possibility of attaining the major benefits that were promised them. In many cases these users no longer are aiming at "total systems." Rather, particular needs and possibilities that were formerly viewed as integral parts of the "total system" are being selected for emphasis. Users are now more capable of describing their needs, computer technologists are more aware of the problems of meeting those needs, and systems staffs are better equipped to tie the two groups together. But many hours of effort and dollars have been spent in acquiring this experience and knowledge.



Computer specialists, building their own empires, were at odds with operating personnel in the business.

Credibility gap

The idea still prevails in many companies that paper work is a necessary but evil cost of being in business and, therefore, that the objective is to minimize that cost. Usually there are several groups pulling in different directions. The computer technologist has an objective of service but is well aware that a new power center is being created around him. He sees his services as vital to the survival of the firm. The faster the range of computer services grows the stronger this view becomes. Computerization in the computer manager's eyes tends to take on an additional objective different from that originally intended—one of growth for its own sake.

Many operating managers saw numerous dangers and few advantages in computerization. They feared loss of their influence; they felt at a disadvantage because of their lack of knowledge about the computer, and they failed to understand the intent of computerized systems. In some cases, top management made little effort to reduce this uneasiness. Many executives appeared to believe that computerized systems, even through they are internal and cross functional by nature, could be managed in the same way as externally oriented or functional areas. Even with the great emphasis in the literature on the importance of executive-level involvement, lack of knowledge and lack of interest are still common.

Two incompatible approaches

Some operating functional managers did see a need for better information handling and requested aid in improving their data services. Their focus, unfortunately, often did not match that of the computer operations theorist. In too many cases one group had a practical need, and the other group had a complex solution to a different problem. Not only did the two groups speak different languages, but also in some cases they were further separated by a third group—the corporate MIS group. Computerized management services require technical knowledge, but solving the actual problem may require extensive company operating knowledge. The systems personnel in the middle, promoting a total systems concept, have difficulty in bridging the gap. The result has been a lack of communications between the areas needing systems applications and the firm's systems development talent.

The introduction of MIS concepts did little to break the communications barriers. In fact, many problems grew larger as plans and systems were suggested without operating management's involvement. The breadth of systems plans

in some cases caused operating managers to question their validity and the desirability of relegating immediate needs to secondary importance. In addition, the comprehensive plans suggested by corporate-level MIS personnel often were not well received by the divisional or operational systems organizations. At these lower levels, where day-to-day operations and practicalities rule, the need for efficient methods of managing the firm each day far overshadowed the need for the ambitious integrative concepts commonly found in corporate-level master plans.

Conflict between corporate and divisional systems groups is common. At the corporate level of one company, plans for company-wide data banks were being developed. However, within at least two divisions little or no importance was attached to these long-range plans. The divisional units concentrated on improving and maintaining daily operating systems since the divisional personnel were primarily responsible to divisional management and the corporate unit had asked the divisions for only a limited amount of assistance on its project. As a result the data bank concept, the core of this company's MIS, has not moved far in the past three years.

Decline of available funds

The 1960's have represented a period of unequaled sustained economic growth. With this growth have come high profit levels—to the extent that few companies require new offerings of equity capital. Unfortunately, increased profitability also brings forth demands for further increasing, or at least maintaining, the new, higher levels of dollar profits. Inflation-related cost-price squeezes have varying effects on companies' resource allocation processes.

The impact on the information handling area may fall anywhere within a wide span. These managers hope the company will view their area as the way to reduce costs and to improve its competitive position. However, with millions of dollars already spent on MIS plans and little tangible to show for the investment, impatience has led to budget cutting. The plans that are not yet implemented, the large studies still in process, and the encompassing systems projects only partially advanced along a four- or five-year timetable are often viewed as huge pits capable of consuming as much cash as can be tossed in.

Unfortunately, in more than one case studied, the former systems director's objectives seemed to be in conflict with the overall corporate outlook. In one company, while various cost reduction programs were being promoted to reduce the impact of a cost-price squeeze, the MIS group was planning an extensive and expensive on line customer service system requiring larger computer capacity. Whatever the true worth of the project, the outward appearance of goal incongruence resulted in a forced reversal of the corporate systems group's direction.

The return on investment analysis may not be of much help in saving such a project from budget cuts or in getting approval of expansion plans. The easily analyzed clerical-cost-reduction-type systems projects are disappearing fast. The major objective of most MIS projects is to improve information services to decision makers rather than to cut costs; thus, many intended benefits are intangible. Large, long-term projects with little segmentation show little payoff compared to outlay until major

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parts of the project are complete. The subjective nature of the ultimate benefits; the limited returns from the efforts already made; and, in too many cases, artificial and exaggerated promises of clerical cost savings combine to undermine the support of continued investment with little short-run return.

In the last few years external funds have become more expensive; the availability of internal funds has not increased greatly; and the demand for funds has remained as great or greater in most other areas. The need to show sound economic justification has become much stronger. It is not surprising that the changing atmosphere within many companies has caught their systems personnel with little supportable economic data for defense of their proposals.

Computer management

Among the constraints facing a company in its expanding need for computer and computer-related services, none has been more severe than the limited management talent available to guide the information handling function. As the concepts of comprehensive company-wide systems became popular, the quality standards for computer management equal to the task also increased. This newly developing area had not, and still has not, been able to establish workable guides for computer and systems managers.

Lack of decision making

In many cases poor systems management has resulted from management's failure to grant adequate decision making authority in the first place or, second, from the apparent unwillingness of systems managers to exercise the authority that was granted. Exposure tc company problems and ability to influence corporate use of information handling facilities can be severely hampered by inadequate decision making authority. It is difficult enough to develop a broad, company-wide systems concept without the handicap of doing it from a middle-level staff position. At best the MIS concepts are theoretical and likely to be viewed as unworkable by operations-oriented line personnel. If the systems manager lacks organizational status, his comprehensive plans may never even get a fair hearing at top level.

Some systems directors can be criticized for failure to utilize the power attached to their position. It is generally agreed that MIS projects must be segmented and scheduled in stages, but the ordering process may not place the most needed areas first. Glamorous projects of lesser utility or those most loudly demanded can consume much of the systems effort.

Furthermore, how to decide when planning has reached its optimal point and when action should begin is a problem that few have solved. One company's total systems project stalled in the task force planning stage. Schedules and deadlines were not enforced, and task force interfaces were not well established. The task force phase came to a close only when it became obvious that the plans were becoming unduly complex, practically uninstallable, and too highly structured for the quality of operating personnel.

Comprehensive MIS projects require great coordination of efforts within the systems area because so many phases are in process at any one time. If too much detail is considered necessary in any one

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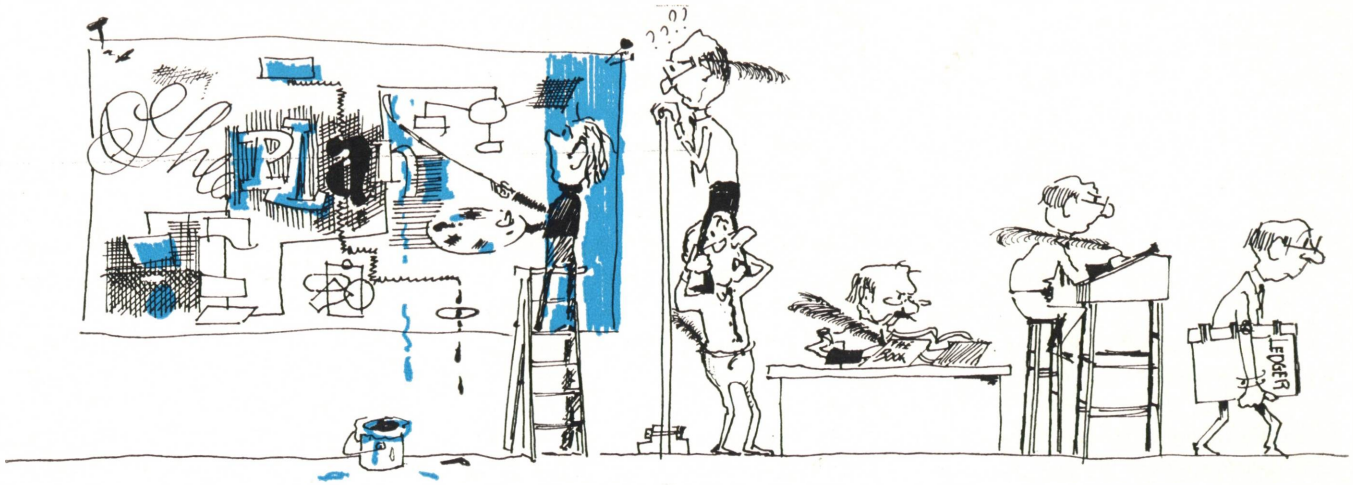


Too often MIS plans became an end rather than a means; complexity built on complexity while the company labored along in its outdated and timeworn methods.

segment, its collection may delay significant action on other segments until that phase has become critical for the entire project. Bottlenecks along critical paths have often been created or expanded by poor control.

Decisions on the allocation of resources appear so critical to systems efforts that a number of companies have foregone the advantage of having a technical expert as the information systems manager and have selected a person with administrative experience and company know-how to manage budget and intracompany relations for the systems development and computer operations areas.

Converting plans to action

Sometimes MIS developers become so obsessed with the beauty of their plans that the plans become an end rather than a means. Too often complexity builds on complexity, and a highly sophisticated plan with little hope of actual implementation results. Too often, exaggerated publicity displays painting glowing pictures of multistage MIS projects appear in Stage One, but the plans are never fulfilled and the company receives few of the intended benefits from the stages that were intended to be the main focus of the project.

Getting a plan off the shelf and into operation often requires more resources than the MIS management can or wants to provide. There has been much discussion of the need for "support by top management." In addition, a capable staff must be available, company operating characteristics must be studied and acknowledged, and control techniques must be designed. A number of potential trouble areas can decrease the effectiveness of a systems effort if it is not properly managed. Software problems may force a scaling down of complex plans to meet practical capabilities. Sufficient competent personnel for detailed systems design and programing work may not be available to achieve the desired output within time budgets. Surprisingly few systems development programs have adequate performance measures by which to judge the effectiveness of systems planning and design activities. Granted, much of this work is creative and heterogeneous; however, guides such as progress reports and regular reviews can help reduce the frequency of off-schedule situations and help emphasize the value of careful planning and performance.

Making the MIS project wanted and needed by operating management is the most vital step in implementing a broad systems plan. Unfortunately, too few MIS people have succeeded in reaching the operating managers. The plans may be too academic and generalized, be based on inadequate operating know-how, or be viewed by operating people as an undesirable outside influence rather than a solution to particular communications problems in specific areas. Systems manpower must depend on operating departments for staffing and operational expertise. In several cases, getting MIS plans into production has been hindered by:

1. Excluding non-systems personnel from planning and execution phases
2. Working around the present organization instead of through it
3. Failing to communicate clearly the intent and objectives of systems changes
4. Not coordinating the various functional elements affected by the planned integration of systems.

MIS plans suffer if there is alienation from non-systems personnel. Although an expensive lesson has been learned, operating managers' involvement is still a major chal-

lenge to executive systems manage- ment.

A completely integrated and automated total information system is probably not yet feasible. Business data systems are often not in a state that would permit an easy evolution into a "total system." In most cases there are enough relatively independent subsystems that are outdated to require that priorities be based upon criteria other than their relation to an appropriate sequence for a predetermined comprehensive systems plan. The daily operating needs of the company, the potential areas of high return, and the importance given to subsystems by top- and middle-level operating managers should receive major consideration in the ranking of potential projects. A priority system must be tailored to the company's needs, not to its systems plan.

Many MIS projects include major subsystems in areas of low marginal return relative to the required investment. Those operating areas in which the company has committed its resources most heavily must receive major emphasis in data handling. An on line personnel system in one company and a customer credit and collection system in another were early victims of MIS re-evaluations because of high development costs and low potential returns. Both of these systems had received high priority ratings from the systems directors.

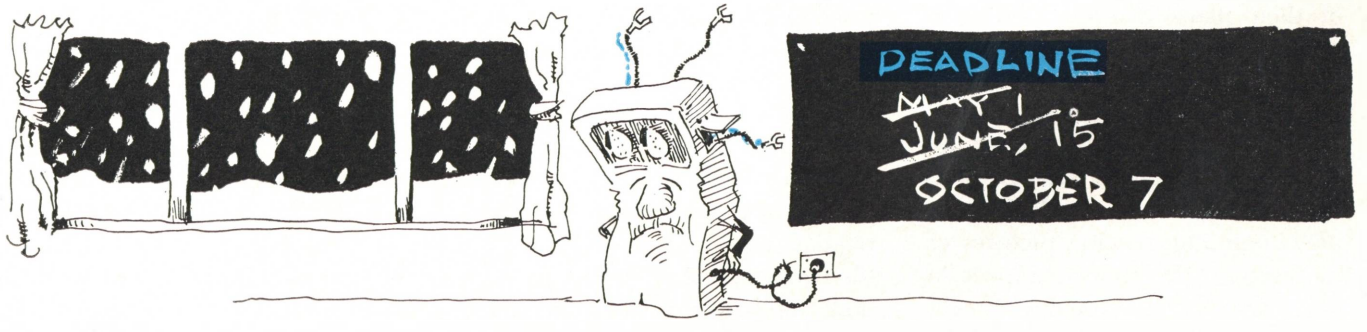
Cost reduction was a convenient economic measure for early automation projects. Its usefulness is still being promoted artifically even though accurately measurable potential cost savings have largely disappeared. Whether or not failure to achieve promised cost reductions results from poor estimation, intentional initial overstatement, or other controllable factors, overemphasis on cost reduction is not compatible with the objectives of most MIS projects. If projects must depend on cost savings for justification when they have little cost reduction to offer, there is danger that their design will be shifted to meet a tangible goal and possible worthwhile intangible benefits will be foregone.

Schedules and budgets

Confidence in systems design and computer operations can be shaken severely by a series of over-budget, behind-schedule situations. (The schedule and budget problems are closely related since much of the cost involved is manpower.) The problems of schedule maintenance are complex and multistage. Perhaps the largest problem area in the past few years has been the adoption of third generation computer equipment with the accompanying software nightmares that many companies have experienced. Delays of eighteen months to two years from the first detailed estimates of conversion dates to actual dates have been common. These delays were not necessarily the fault of the companies' systems personnel. The equipment often needed re-engineering, the existing staff had to be retrained, new staff had to be found, and the usual learn-by-experience processes proved to be much more time-consuming and expensive than anticipated. Because schedules of MIS projects and equipment conversions became intertwined, the MIS programs' timing was upset, causing loss of both momentum and active support.

As information systems become more comprehensive, scheduling is more complex and time estimates are less definite. Unforseen problems, built-in optimism, lack of managerial control devices, and poor segmentation of tasks combine to create off-schedule, over-budget situations. Realism, a commodity in good supply in most computer specialists, somehow has been lacking in many MIS developers.

The need to segment and schedule pieces of a comprehensive whole is a major prerequisite to getting useful output from the MIS work. As work progresses in one area, subsystems that need to interface with one another are added, and soon the original plan has been violated. Time schedules set according to estimated requirements may not accurately reflect



Delays of eighteen months to two years from the first detailed estimates of conversion dates to actual dates were a common experience.

the complexity of the project, the present condition of the system, or the time required to arrange agreements among the principals involved.

In many cases, the necessary order of projects could only be determined after an incorrect sequence was begun. In other cases, the interlocking nature of the original MIS plans forced much retracing and redesigning of segments already installed. The costs, largely labor in design stages, soared as schedules were revised or abandoned. There was little control over these situations, and few guidelines for solving these problems have been available.

With somewhat less comprehensive plans than those of early MIS programs and more realistic assessment of design needs and capabilities, the scheduling problem is being reduced in many systems departments. Mechanical, manpower, design, and testing problems still place severe strains on deadlines, budgets, and performance guides. However, at least measures are now being taken to identify problems and to guide systems planning and implementation work.

Organizational problems

The decision to develop a management information system can spring from almost any corner of a company. Top executives, accountants, marketers, production people, and, of course, data processing staff have given birth to the ideas behind MIS projects. The organizations that have evolved to accomplish the projects' objectives are rarely well thought through. The apparent trend toward appointment of a "top computer executive" may solve some of the problems of in-fighting and communication gaps; however, the systems and computer organizations still suffer from a lack of coordination within and outside the function.

In one case, the systems planning staff and the systems implementation staff reported to two different executives. The output of the two groups was slight since most of the effort centered on settling disagreements between them. Another company had separated computer operations and systems design groups in such a way that tests by the development group could not be conducted satisfactorily.

Personnel problems

Inability to obtain management cooperation has often been cited as a reason for ineffectiveness. The growth pains in converting a paper flow systems and procedures department, an electronic accounting machines department, or a small job-oriented data processing unit into a unit capable of creating an MIS are often acute. Too often this organization is ill equipped in terms of talent, numbers of people, and organizational status. An MIS project also can be stifled by resistance from entrenched organizations in functional areas. The company's existing organization structure must be considered an initial constraint. The systems organization, given its specific goals, must be capable of working within the existing structure, of instigating change, and of creating the needed communications links. No one organization make-up can meet the needs of even a majority of companies.

The organizations assigned to create management information systems often have failed to live up to their advance notices. Those that attempted to superimpose themselves on functional departments were not accepted. Others that attempted to work from within were not allowed to rise to the needed level. In addition to the organizational problems within the systems units, their inability to fit in with already established functions has been a major factor leading to de-emphasis on integrated systems and substitution of independent segments of the master plan with little coordination.

In spite of the serious problems many companies have experienced in the development of MIS projects, few have completely abandoned the concepts. The major casualties have been the phrases and acronyms.

Many systems and computer managements have grown in experience and in quality despite early miscalculations in MIS programs. The ideas of interrelated data handling systems, of advanced hardware applications, of functionalized information management, and of coordinated planning of all information flows and data banks, among others, have definitely matured and become more realistic and applicable. These concepts are still very much alive, even in companies that have abandoned the formal pretense of having a management information systems program. Either as part of other programs or as part of the responsibility of the systems and computer functions, the objectives of the MIS are now better defined and better related to information handling needs.

The worst is over

MIS projects have been an expensive romance for many companies and individuals. Changes of personnel have been painful for some; budgets spent with little return have been discouraging to others; and lack of organization and leadership has been frustrating to most. However, from these disagreeable situations have emerged more active interest at executive management levels, improved control over systems and computer investments and performance, and a more experienced, company-goals-oriented leadership in the information management function.

What has happened to the popularity of the *management information system* and the *total systems* concepts? The terms are either dead or dying, but the underlying concepts are very much alive and moving toward fruition in many companies.

One of the most important characteristics of a professional man is writing ability. It's necessary in every report, every letter, every communication. Yet on few subjects is there so much bad advice —

THE ANATOMY OF A SHIBBOLETH

by Allen Weiss
P & L Careers, Inc.

" . . . when any of the fugitives of Ephraim said 'Let me go over,' the men of Gilead said unto him 'Art thou an Ephraimite?' If he said 'Nay,' then said they unto him 'Say now Shibboleth'; and he said 'Sibboleth,' for he could not frame to pronounce it right. . ."
Judges 12

ALL but the most fortunate—and gifted—businessmen are concerned with writing. All communications are important, they realize, but the form that awes them most is the written word. A simple letter, a report, a management letter—all take the businessman more hours of thought and concern than a talk, formal or informal, with associates, clients, or superiors.

This is perhaps more emphatically underlined with the accountant specializing in management services than it is with any other CPA. The precision and clarity of his writing style are vital to his work. For the management services specialist frequently finds himself inducing change. So he must often convince, cajole, persuade, or instruct.

Language—and primarily the written language—is one of his most essential accessories.

Yet the person in a business or technical field who wants to improve his writing has a host of bad advice available to him. Perhaps the worst—because the most common—prescription is that advising the use of shorter words and fewer words. For this is one of the major shibboleths by which too much modern writing is judged.

Excerpts from this article appeared in an earlier article by the author, "Choosing the Right Word," in *Supervisory Management*, a publication of the American Management Association.

Since the theory of shortness first appeared some years ago, it has been attacked again and again by writers and teachers of writing. Still it manages to retain a sizable following. Many loyal adherents firmly believe that the short word is always superior to the long word and the fewer words the better. Some extremists go so far as to imply that shortness is the panacea for all writing ills.

And yet, the criticisms of the shibboleth are valid and cogent. Certainly the best word in a given situation is the one that conveys the meaning (including nuances and connotations) most accurately, without fighting the context. Syllable count has nothing at all to do with it.

Furthermore, reading ease is not necessarily promoted by uniformly short words or excessively spare writing. Without variety, writing can be painfully boring, dull, and —yes—difficult.

Why then is the shibboleth so durable? Why do so many people feel that they are helped by advice that must cramp their writing style? Perhaps the answer is to be found in those incidental benefits that shortness confers by overlapping other, more useful, guides at a number of points.

Adherence to the criterion of shortness instills in some writers a measure of confidence that is, unfortunately, specious. We ought therefore to examine the criterion in detail, to uncover the reasons for such success as it can claim, and to formulate proper standards that will save the baby when the bath water is thrown out. For shortness in itself will never produce a good writing style.

Pretentiousness

One common fault, perhaps more than all others, stands out as having brought success and popularity to the idea of brevity for the sake of brevity. That fault is pretentious writing. The writer who has a tendency to reach for longer words, the one "who endeavors to secure maximum utilization of existing equipment" where others would simply "try to use the machines" can indeed be helped by a reminder to use shorter words. Still, the real target to shoot down in these cases ought to be, not polysyllables, but pompous language.

Accordingly, such a writer should take aim at the unnatural, the unusual, the bombastic words, regardless of length. It is true that many pompous words are also long, but short words can offend, too, if they are unfamiliar to the reader. Much jargon fits into this category.

Beware the unfamiliar word

On the other hand, many three- and four-syllable words are quite common in ordinary speech and therefore quite safe. This page is studded with them. It is hard to see how "unfamiliarity," a seven-syllable word, can cause the kinds of problem, ranging from annoyance to misunderstanding, that "ergo," "parlous," or "discrete" can impose.

Foreign words and phrases create needless difficulty. "Vis-a-vis" means literally "face to face." To write "vis-a-vis" for "as compared with" is to use a metaphor involving foreign words, a practice not to be recommended. The phrase "au fait" (to the point) is likely to make readers uneasy because most people will have no handle with which to try to extract a meaning. "Per se" (of itself), though used more often, is as much an affectation as "au fait" because in both cases there are simple English phrases to say what is meant without any difficulty.

On the other hand, a phrase like "de novo," which can be understood by people who have not seen it before and which has a precise meaning not easily expressed in English—"anew" and "afresh" sound pedantic, "all over again" is not as precise, "from scratch" has not quite the same meaning—may be permissible for occasional use. Its strangeness is a mark against it, though, even to observers unjaundiced by xenophobia. A similar conclusion may be drawn for "quid pro quo." "Something in exchange" is just different enough to lead us to prefer the Latin phrase on occasion, but some caution is advisable.

In the end, the decision to use a given word involves a judgment concerning your readers. Should you delete a word like "damp" because a colleague happens to ask what it means or because he is surprised to learn that fluctuations or oscillations are damped when they are reduced in amplitude? Should you allow yourself to be inhibited by the man who thinks that "cull" is an unusual word? Should you drop "xenophobia" from your vocabulary even though no other word can replace it?

A reasonable solution to the problem is to allow a certain number of risky words, words that are neither so rare as to be startling nor so common as to be in every educated vocabulary. The golden mean is a good enough rule here. Don't eliminate these words altogether, but don't overdo their use, either. Try to write for most of your audience, but not necessarily for every last reader who may happen along.

Humor, conscious and not

This advice is not meant to condone the replacement of a short word by a long one just to foster an air of weightiness, or to appear to be saying something significant when you are not. Someone who says "face-to-face communications" when he means "conversations," or just "talking," has more than a mere writing problem. He has a peculiar view of the world and the people in it.

A phrase like "face-to-face communciations" is so grotesque as to almost qualify as humor. It is sometimes tempting to mimic such writing in search of a laugh, but the risk is great. Your audience may not recognize your intention. After all, they have seen so much bombast that was written seriously,

why should they suspect that you are only joking? Indeed, some porpous writing is so exaggerated that it parodies itself. In these circumstances, your effort to be facetious by being pretentious may give you far more enjoyment than it does your audience.

If you must indulge in polysyllabic humor, perhaps the way to do it is with words that are elaborately precise, like "sesquipedalian," with its whimsical implication that a word can be measured in feet (one and one-half feet, to be exact). Excessive gentility can be funny, too, but somehow the genteel words get to be hackneyed euphemisms ("intestinal fortitude" is one), and the humor vanishes.

The fact that people do find pompous language laughable is perhaps all that has to be said in criticism of it. The additional fact that bombast is so widely employed in misguided efforts to display erudition is saddening. There are easier ways to make oneself ridiculous.

The esoteric

A technical word is often so fitting in place of a long expression that it cries out to be used, even though you may be writing for an audience of laymen. The thing to do is to explain the meaning of the word the first time you use it. It matters far less whether you come straight out with a definition or you attempt an indirect, perhaps more urbane, method for making your meaning clear; sometimes the context may accomplish the purpose for you. Whatever your method, be sure you introduce each technical word in a way that assures your readers' understanding it.

Acronyms like PERT (for Project Evaluation and Review Technique), initials, and abbreviations are easy to handle. Just write the expression out in full the first time it occurs, and follow with the shortened designation: "Electronic Data Processing (EDP) provides a means for coping with these difficulties."

A particular kind of word, usually long, is dangerous for reasons other than length. This is the –tion word, which originates in one of two ways. Words like "conceptualization," typically formed in several stages (concept, conceptual, conceptualize, conceptualization) cause the most trouble. Rightly used, there is a place for such a word as "conceptualization." But it must never be allowed to stand for "concept." "Conceptualization" is the name for a thought process, "concept" for the idea it produces.

The second –tion group consists of nouns formed by adding suffixes to simpler verbs: demonstration, consideration, explanation. As nouns, they require verbs to bring them into a sentence. But then an awkward construction results. It is better to "demonstrate" a procedure than to "give a demonstration" of it. (Sometimes there is room for further improvement in "showing" instead of "demonstrating," but this is not always a gain.) It is better to "consider" a possibility than to "give consideration to" it. And it is better to "explain" one's position than to "give an explanation of" it.

To state the principle in general terms: Wherever possible, use a specific verb that states your precise meaning, rather than a combination of broad verb and specific noun. Never "make an announcement" of an upcoming event; just announce it. As for the committee member who always wants to "make a motion," perhaps he should himself be moved—off the committee.

There are other suffixes besides "tion" and "ment" for changing verbs into noun forms, and they are all dangerous. It is no gain to "have a fondness for" something, or to "have a liking for" it, when you can simply "like" it. Incidentally, the advice to use fewer words is not nearly specific enough to treat this common difficulty as a problem in its own right.

There is a situation where a simple, active verb can cause trouble, and it occurs frequently enough to warrant attention. Take the sentence, "The kind of customer a firm attracts affects its operations." The juxtaposition of two active verbs, each with a different subject, is confusing enough to be avoided at all costs. Here "firm" is the subject of "attracts" and "kind" is the subject of "affects." Such a sentence must be rewritten. "A firm's operations are affected by the kind of customer it attracts" uses a passive verb to make an unambiguous statement. "The kind of customer a firm attracts will have an effect on its operations" is also better than the original, even though it employs a combination of verb and noun to replace a verb alone.

Verbal phrases

Sometimes a stock phrase is made to substitute for a verb, to the detriment of writing style. There are times, of course, when a "result" should be announced, but more often "as a result of" is used where words like indicating, proving, showing, or implying would serve better. "In almost all cases, these errors are the result of improper systems design" can be improved by switching from a causative to a symptomatic viewpoint: "These errors almost always indicate faulty systems design."

Sometimes verbs are converted to adjectives, with equally disastrous results. The sentence you are reading illustrates a point; there is no need to say that this sentence

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"is illustrative of" something. Notice that the derived adjective is longer than the original verb and that it requires both a verb to introduce it and a preposition to relate to its object. Note also that the short-word rules may not work in many of these cases. Both "illustrates" and "illustrative" count as polysyllables, and therefore equals, in one system. The average syllable count is lower for "is illustrative of" than for "illustrates" and therefore is somehow preferable in another system.

Simple active verbs produce better writing than verbal phrases. There is nothing inherently wrong with, "They are afraid of the possible consequences of such an act." But somehow, "They fear the possible consequences . . ." comes through stronger. Again, "They incline toward the first proposal" is more direct than, "They are inclined to accept the first proposal."

Viewpoint

We have several times come upon the changed viewpoint as a technique for improving style. A clear example of this technique involves replacing a passive verb with an active one: "Supervisors who neither instruct nor guide nor manage their sections can hardly be expected to earn the esteem of others" may be written ". . . can hardly expect to earn . . ." By shifting from an outsider's point of view to the subject's, we can make the statement more direct. Word length is not the issue here at all; we have reduced the word "expected" by one syllable, to be sure, but that was an incidental result of something more fundamental.

The other viewpoint can belong to a machine or other inanimate object, or even to something as intangible as a system. Thus a system can introduce new standards of productivity and a machine can ask for instructions or supplies. People who work around data processing equipment frequently personify their machines. They "tell" the black box to do this or that, as though it were alive. In writing, we "program" the computer instead, but with a little care in selecting the audience, we might occasionally "tell" it in writing too. It's a way to avoid stuffiness.

Intensives

There is an easy way to intensify a statement by adding a single word. If we have said that a technique is effective, we can intensify by making it "very effective" or "highly effective." Then, since intensity is relative, we have to try harder next time; so we hit on "very, very effective" or "very highly effective" or perhaps "extremely effective." Some writers go to "extremely" right away, never bothering with lesser degrees of intensity. Others settle for doing everything very soon or very well or very thoroughly, and so on.

The trouble with the extravagant use of words like "very" and "extremely" is that it is self-defeating. Instead of emphasizing a select statement above the rest, we find that we lose our means for giving proper emphasis altogether. Emphasis is relative, and there is no way to stress everything.

The remedy is simple: Avoid intensives. Strike words like very, highly, and extremely from your vocabulary. Use words like extraordinary and unusual only when you are describing those rare things that are indeed extraordinary or unusual.

It is helpful, in avoiding intensives, to use words that are themselves graduated in the meanings they convey. An idea that really is very bright might perhaps be brilliant; a train that is moving very fast might be speeding; a very large backlog might be huge. Of course, this method of overstatement can be carried too far, but not as easily or as carelessly as by inserting "very" wherever it can be made to go.

In the end, the real remedy for overstatement is to treasure understatement. The person who habitually understates seldom finds himself out on a limb; he need not reach for ever higher levels of exaggeration; and his remarks carry greater weight with his audience.

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Modifiers

There is a place for modifiers in writing. An adjective can be as definite as a noun in conjuring up an image. In the laboratory, it can be important to describe a dark blue solution, a stable compound, an amorphous substance. In the factory it is often useful to know that a container is rigid or that its top is flat. Replacing adjectives with circumlocutions can lead to such pompous constructions as, "The platform has a quality of sturdiness."

The method for dealing with explicit adjectives is not to eliminate them from technical writing, but to be sure that they are necessary. If it matters to your reader that an object is round, then say so; if not, then don't.

Some adjectives present opinions rather than facts. When we call a speech dull, or describe a result as important, or consider a report interesting, we are expressing opinions. The same rule applies in any case: State your opinion only if it should matter to the reader, bearing in mind always that it is better to state facts and rely on the reader to draw his own conclusions.

Similar considerations apply to adverbs. A mathematical function may be described as continuously variable over a prescribed interval, and no one will object. But the word "continuously" is so often thrown in where it is meaningless —sometimes incorrect — that its use should be carefully watched.

Modifiers often can be dispensed with by selecting a more precise noun or verb. A substance can be said to produce an explosive reaction, to produce an explosion, to react explosively, or to explode. The primary consideration is to express the meaning precisely. The next most important factor is simplicity.

Modifiers can diminish the force of a noun or a verb. When a person announces that he is "seriously considering" a course of action, many a listener wonders how seriously. The word "considering" by itself raises no such doubt. Words like "generally" and "usually" are inserted for the purpose of hedging statements. When you don't have to hedge, leave them out.

Some modifiers become attached to words and are automatically brought in whether they serve a useful purpose or not. For a while, every risk became a "calculated risk," even when there was no possibility of making a calculation. It is doubtful also that every "considered opinion" has really received all that consideration.

Redundancy

Often an adjective or adverb merely repeats what a noun or verb has already implied. When we predict a result, our readers don't need to be told that we are "predicting an expected result" or one that is anticipated or possible or potential. Nor do we need to "improve the future effectiveness. . ." Similarly "past" is redundant in "report of past activity" and "record of past events."

Some kinds of redundancy merely slow the reader down. "Smaller size" and "smaller in size" fall into this category. An extreme example is, "It is rather hazardous to attempt to predict. . . However, I am going to stick my neck out and. . ." A prediction may be made, or perhaps hazarded, flatly. There is nothing to be gained by "attempting" to predict.

A more dangerous type of redundancy is the one that misleads by implying something that is untrue. When we write "relationships between systems to each other," we indicate by the last three words that there may be some other relationships — something like relationships between systems but not to each other—and a careful reader may legitimately conclude that we mean to exempt all such other relationships. This is nonsense, of course. Deleting "to each other" corrects the problem and loses nothing.

Wordiness

"We are incorporating into a coordinated operation separable and distinct activities, which go on independently from one another." "It is desirable that he be able to devote ample time to researching and developing. . ."

These examples are typical of much that goes out as technical writing. They may be translated in turn as follows: The first says, "We are coordinating activities that are independent." The second, "He should have time for research and development."

Clearly no one would want to read sentences like the original examples above. Why then do people go to the trouble of writing them? That is the mystery. Superfluous words, words used improperly, useless repetition, awkward constructions: All of it is easy to correct, and yet it is allowed to stand.

Summary

From the previous discussion, we may conclude that no simplistic rule is going to produce good writing. A basic need is an appreciation of the effect that our words have on our readers. Are the readers likely to come away with the concepts and the understanding that we intend? Will they know what it is that we are trying to say? These are the pertinent questions.

A writer who seriously works at getting his message across is not likely to be pompous. The intention alone should protect him from the errors of preening himself or patronizing his audience. If he works hard enough at adopting the reader's viewpoint, he is not likely to inflate his writing with unnecessary words. He will delete the useless modifiers and the redundancies, and in the process his writing style will improve. He may even become a better thinker.

Part 2—

Selecting the 'right' service bureau, the 'right' equipment, and problems of auditing were covered at the recent AICPA automation meeting in Chicago—

AICPA COMPUTER CONFERENCE IN CHICAGO ATTRACTS LARGEST ATTENDANCE TO DATE

A Management Services Staff Report

THE SECOND half of the AICPA computer conference in Chicago in May (the first half was reported in the last issue of the magazine) began on Tuesday afternoon, May 20, with the conference attendance divided into two large groups, one for CPAs considering involvement in EDP, the other for those currently involved in electronics. Significantly, attendance at the latter session ran about twice as high as that for the group merely considering EDP.

The session for those considering use of EDP opened with a panel discussion, "The Local Practitioner's Approach to Harnessing EDP," moderated by Robert Nadel, Hertz, Herson & Co. Panel members were Edwin T. Boyle, own account, Hackensack, N.J.; Roy Lindorf, Joseph Bentley & Co.; and William I. Murrell, Parish, Murrell & Co.

Mr. Nadel said that it had been determined that the panel format would require each participant to give the approximate size of his firm, the type of practice it engaged in, and the type of EDP equipment it used. Panelists were asked to comment on three questions:

How did they get started in EDP and what method they used to obtain the necessary knowledge and training?

How are they currently using their equipment?

What problems had they run into and what warnings would they give someone just starting out on the EDP route?

Mr. Boyle, who has been extremely active in the computer field for years, surprised his audience by advising that CPAs, no matter how heavily they became involved with computers, avoid ownership or rental of such machinery. He conceded that this went against the advice he had been giving for years, but said:

"Today, I have reservations with regard to the extent to which a CPA should be a participant in this field—not because of his background or his capability—but because I feel that the CPA organizational structure in which he must operate does not accommodate itself to the demands of the computer industry. I do not question whether or not he should be involved—it is merely the degree of involvement by the CPA. To get involved in complete hardware capability and complete service bureau capability is, I think, highly questionable today."

Questioning whether it is feasible to conduct a computer operation within the CPA framework, Mr. Boyle contrasted some of the problems of the computer industry with the CPA form of organization.

Computers cost a great deal of money both for initial outlay and for keeping the installation modern. CPA firms, on the other hand, are generally limited to the capital of the partners. They cannot raise outside capital freely as can non-CPA groups.

Another problem lies in the field of personnel, he pointed out. The CPA who is just starting a computer installation is not likely to know too much about EDP. Yet he must direct technical personnel in a field with which he himself is unfamiliar. Moreover, trained people in the EDP field are hard to get

and hard to keep. The non-CPA firm can offer stock or stock options, a wealth of financial rewards impossible for the CPA.

Computers also provide a new risk area in terms of accountants' liability.

And, finally, the CPA code of ethics throws major difficulties in the path of a CPA trying to offer service center capabilities, he said, prohibiting as it does advertising, soliciting, and all forms of marketing while the non-CPA service center has no such restrictions.

"The key to success in the computer business is to develop and batch process an application," Mr. Boyle said, "in other words to completely develop and debug a program for industry-wide application or general business application, perfect it, and run that program on a broad scale. Personnel then become completely familiar with operating procedures, the program itself gets debugged to the point of minor maintenance, the client becomes completely familiar with the effectiveness of the application, and profits are made.

"Let me tell you how it is in my office:

"We have one hospital client.

"We have one golf club.

"We have one bank.

"We have one newspaper.

"Etc."

His firm has spent considerable sums of money in developing each of these programs, but it cannot market them to other hospitals, other clubs, or other newspapers, he pointed out.

But competitive non-CPA EDP firms can develop such "dedicated" services and market them to as many customers as they can find.

Mr. Boyle said that he wasn't suggesting altering the CPA code of ethics to permit solicitation, because he felt that would be too harmful to the CPA's professional stature and image.

"My point is," he said, "that the conduct of a broad computer practice within the code of ethics is difficult where one has his hands tied by his sides. Therefore, we must evaluate whether or not our individual practices justify heavy involvement in the computer industry, or possibly a more limited relationship."

Mr. Boyle said that if he were considering computer involvement today for the first time he would try first of all to determine the degree of involvement.

"If immediate cash requirements were no particular problem, I would then try to evaluate how large a captive market I might have within my own clientele to support computer operation," he said. "For example, I might be a specialist in hospital accounting and thereby have a large potential market built in. . .

"But if I satisfied these two requirements, money and market, I then would have to weigh the relative advantages of in-house capabilities versus access to large CPUs [central processing units] that seem to me inevitable in the near future."

CPAs without either sufficient capital or a captive market, Mr. Boyle said, should probably forego complete involvement in the hardware side of computers. But that would not be a reason to preclude their involvement with applications as they related to their clients. And they should have sufficient knowledge of both the hardware and software technology to be able to audit clients' records with confidence.

Remote terminals are rapidly becoming feasible, Mr. Boyle pointed out, so that accountants may very soon have input and output stations right in their own offices, tied into central computers where not only their own proprietary programs but those of service bureaus as well would be available to service clients' needs.

The CPA should be involved with computers, heavily involved, Mr. Boyle concluded. But this need not necessarily encompass the ownership or control of the hardware.

Mr. Murrell and Mr. Lindorf both flatly disagreed with Mr. Boyle. Mr. Lindorf said that within the last five years his Southern California firm had grown by 80 per cent, and that much of this expansion could be attributed to the increased prestige the firm gained through its EDP expertise. After some unfortunate equipment experiments, the firm had settled for an RPC-4000, with paper tape input and output, that cost less than $25,000. On this equipment, Joseph Bentley & Co. carry over 100 write-up accounts, and do some specialized payrolls and job costs for clients, as well as all their own internal work, accounts receivable, work-in-process, and overhead analysis. They have hired no outside EDP personnel, and they have managed to rent their machine at night to another organization.

"I agree with Ed [Boyle] that no CPA should even consider going into EDP as far as becoming a service bureau is concerned," Mr. Lindorf stated. "I don't agree that if a CPA is doing any write-up work and wants to do any special work for the client based on the premise that the computer is just a tool, like a pencil, an adding machine, or a calculator, he shouldn't have his own equipment. I think the main difference lies in the answer when I asked Ed what he was spending per month for equipment rental. He stated $26,000. We didn't even pay this much for our total set-up."

Mr. Murrell also was enthusiastic about his firm's "in-house" computer. "By having our own in-house-type operations, we have been able to utilize our computer center for experimental-type system design, thus educating ourselves, as well as offer our clients

The first part of this report, which appeared in the September-October issue, had two errors: The cost of the AICPA video-tape computer course presentation is $300 per participant per course; John W. Wagner, identified as associate professor of accounting at the University of California at Los Angeles, is actually at the University of Southern California at Los Angeles.

a customized computer service unequalled by another CPA firm or service-bureau-type firm in this area. We have on hand approximately 850 different program applications which we have developed," he said.

"Our clients do not want to go to one place for their auditing, another place for their computer service, another for their management advisory services, and still another for their tax services. They would rather deal with our firm, one that is familiar with their overall operation and one that can give them more value for their dollars spent.

"In broadening the services offered to our clients, we have been able to enlarge our audit, tax, and M. S. divisions by utilizing our own computer in these areas.

"Finally, by purchasing our computer rather than leasing, we have been able to generate an additional $250,000 profit to the firm as projected over a ten-year period, our estimated period for use of the equipment."

Major commitment needed

Mr. Nadel in summarizing, said that every CPA contemplating the use of or involvement in EDP must be prepared to spend considerable time in the effort. The rate of change in the EDP field is so rapid and the implications for the client are so great that a CPA cannot look upon an EDP endeavor as merely a sideline to be dealt with as time permits, he continued. The practitioner who cannot devote such time must be prepared to rely on outside consulting advice, he said, but even here he must learn enough about the field so that he can select the right consultant and then evaluate his work.

"The most important reason for the CPA to have an intimate involvement with EDP is not for the EDP processing services he can directly offer his client," he said. "More important is the fact that there is no better way for the CPA to gain the expertise necessary to offer the client professional consulting advice regarding EPD problems."

Gordon Davis, professor of accounting, University of Minnesota, and director of its information processing center, discussing "Selecting A Service Center," defined a data processing service center as any organization that provides data processing services to outside clients on a fee basis. There are now between 1200 and 1800 such organizations in the country, he said.

His talk, he went on, was designed to assist potential users of such centers to:

1. Locate the most suitable service center for their needs,
2. Prepare a request form to use in obtaining proposals from service centers,
3. Evaluate such proposals,
4. Negotiate a contract,
5. Implement the decision to use a service center.

Service centers fall into three main categories, he said: those owned and run by computer manufacturers, those independently owned and operated, and those run by companies with their own computer facilities which are leasing time on their equipment. Subcategories are universities with data processing facilities and CPAs with EDP equipment, he said.

The typical service bureau is organized to carry out three major functions, he went on: sales, consulting and programing, and production.

Characteristics of a data processing application that might well be turned over to a service bureau are:

1. A very large number of records to be processed,
2. Considerable computation required for those records,
3. The necessity to rearrange data in several different ways to obtain different tabulations or to perform different computations,
4. Applications so large that the time available for processing is too short to be handled by the regular in-house staff,

Mr. Nadel said that every CPA contemplating the use of EDP must be prepared to spend considerable time in the effort. The rate of change in the EDP field is so rapid and the implications for the client are so great that a CPA cannot look upon an EDP endeavor as merely a sideline to be dealt with as time permits . . .

5. Specialized knowledge in the data center that is not available in-house.

As guides to locating accessible data centers, he suggested:

1. Local classified telephone directories under "Data Processing Services"
2. The Directory of the Association of Data Processing Organizations (He pointed out that the ADAPSO Directory lists only its own members, all of whom are subject to strict rules so that such a listing is in effect at least some guarantee of the ethics and financial stability of the data centers listed)
3. Magazine listings of such centers (Mr. Davis recommended particularly the list published each July by *Systems* magazine)
4. Computer manufacturers who can give information either on their own centers or on centers using their equipment.

Clients using service centers may either keep their own records, transporting them to the center only when processing is necessary, or let the service center keep their records, Professor Davis said. Obviously, the client's security-consciousness and the precautions observed at the center will be the determining factor in making this decision. But he observed that, at a minimum, any user should assure himself that a service center has adequate fireproof storage facilities, that access to records and files is strictly controlled by stringent procedures, and that the center has enough insurance to compensate for any losses to the user's property while it is on the premises.

Back-up facilities

Another thing to watch out for in a service center, he warned, is to ensure that it has adequate back-up facilities in case any malfunction or downtime on its own equipment should interrupt service to the client.

In requesting proposals from service centers the client should spell out his requirements in some detail, Professor Davis said, even if he must call in professional help to do it. He should list:

The number of his records that will have to be processed and the frequency with which they will have to be processed,

The manner in which he wants exceptions handled,

His specifications for timeliness,

Complete description of the final reports he will expect from the data center as well as their format if that is important,

Copies of the input documents he will furnish to the center.

In evaluating the proposals from potential centers, Professor Davis said, the leading contenders should be listed and then compared on each of the factors the client thinks important. It is a good idea to visit each of the leading contenders personally, he suggested, to evaluate their approach to operations and their apparent efficiency.

When a tentative selection has finally been made, a written agreement should be prepared either by the client or the service bureau, he said. He cautioned that before any final ironbound agreement is made, a sample run of the work to be processed should be handled by the data center.

The session devoted to accountants already involved in EDP, entitled "Synergistics," held simultaneously with the program designed for those considering such involvement, opened with a discussion of auditing service bureau output by Arnold Schneidman, Seymour Schneidman & Associates, and W. Thomas Porter, professor of accounting, University of Washington. Checking service bureau production is vital, Professor Porter warned the group, citing instances where neither the service bureau nor the client had used batch control for punched card records. Mr. Schneidman suggested that all present report any difficulty they had had with service bureaus so that these data may be analyzed by appropriate Institute committees.

Donald Adams and Nicholas Baumkirschner, Peat, Marwick, Mitchell & Co., opened the second half of the program, a discussion of putting time sharing to work, with an outline of how Peat, Marwick is using time sharing now. The firm has experienced difficulties in reconciling an ITT time sharing print line with a Teletype print line, but is working that out and is currently using time sharing for field work throughout its offices, Mr. Adams said.

Jerome Farmer, J. K. Lasser & Co., who was moderating the discussion, suggested that a time sharing application could cut costs to a minimum by keypunching the necessary information for the computer in advance, and transmitting the data in the punched card electronically. This would save both computer time and transmission time.

Use in debugging

A speaker from the floor suggested that a time sharing application which can prepare mortgage amortization tables for any conceivable set of circumstances allows the CPA to awe a client by the speed with which he can produce such tables.

Mr. Adams said through use of COBOL (Common Business Oriented Language) time sharing could also be used to debug programs written for any computer accepting COBOL. One can assemble, test, and debug entire programs through the terminal in his office, he said.

Following a coffee break the separate audiences for the two discussions met again for a talk on "Management Science Applications—What You Can Do" by Paul Heit, Lybrand, Ross Bros. & Montgomery. Time sharing opens all kinds of opportunities for sophisticated problem solving, he pointed out. A company president, through simulating situations and conditions on a computer, can afford to "be wrong thousands of times" without

harm to the company. Regression analysis can measure the relationship between company sales and outside events that are apparently unrelated.

His own firm, he answered in reply to a question from the floor, has already developed a budgeting model, a marketing model, and a forecasting model for use in such simulation studies. In answer to another question, he said that he knew of only one CPA firm not in the "Big Eight" that had created such models, but that with time sharing there was no reason any CPA firm, whatever its size, should be forestalled from such work.

The final Tuesday session was devoted to a discussion of "Evaluation and Selection of EDP Equipment and Software" by John R. Hillegass and J. Burt Totaro, president and vice president respectively of Computer Conversions, Inc. Mr. Hillegass's talk, which dealt with fairly precise measurements of various computers' capacities that could be used as standards of comparison for several alternative machines, has already been printed in its entirety in MANAGEMENT SERVICES. (See "Systematic Techniques for Computer Evaluation and Selection," July-August '69, p. 35.) Mr. Totaro reviewed the in-company work that must precede any computer selection. A thorough study of the company work load, not only at present but for the foreseeable future, is the first basic step in any computer program, he said, a study that covers all applications that are to be put on the computer. Then top management and all key department heads must be thoroughly interviewed to ensure that all work routines they envision for the computer have been taken into account.

When all this has been done, the consultant is ready to prepare technical specifications for each of the programs that is to be run, Mr. Totaro continued.

When the technical specifications have been completed, requests for proposals can be prepared and circulated. Such requests should certainly include the specifications prepared in the previous stage and should also request the prospective vendor's system concept, his equipment, his software, and, last but not least, his price structure.

Weighing proposals

When the proposals come in from the various manufacturers being considered, each should be judged as to whether it is complete, whether it is accurate, and whether it meets all the requirements set by the prospective buyer. Then the purchaser can also prepare any further questions he wants to ask in a face-to-face interview.

At the personal interviews with the prospective vendors the purchaser should clear up any questions that have occurred to him during the review phase, and he should make certain that the vendor is encouraged to speak freely after the questions have been answered. The vendor may not have exactly what the purchaser wants, but he might be able to suggest something better.

After the interviews, the prospects are narrowed down to one or two, all those whose equipment is obviously inadequate or overadequate being weeded out.

Now one or more of the scientific evaluation techniques previously described by Mr. Hillegass should be used to make the final selection from the one or two vendors who have survived all the earlier eliminations, Mr. Totaro said.

He added that all prospective purchasers should make it a point to visit the facilities of the vendors at some stage so they can form their own impressions of the manufacturing resources and, above all, of the support the company can give its customers.

As a final point, he said the purchaser should always negotiate the best possible equipment contract. He may be dealing with two manufacturers whose equipment seems in every way equally suitable to him. Then he has a bargaining position, since he can equally well choose either vendor. Negotiation is important enough to merit the purchaser's getting legal assistance, Mr. Totaro said.

The contract should always specify in the most concrete terms:

1. Hardware and software delivery dates,
2. Purchaser's option to delay delivery if he should wish,
3. Free debugging time for the purchaser's system to be perfected on the equipment.

Tuesday evening was devoted to concurrent orientation sessions for CPAs just considering EDP activities as well as those currently involved in such activities. Here participants had the opportunity of exchanging ideas and information and benefiting from each other's experience.

Quality control analyzed

Wednesday, the final day of the conference, opened with a panel discussion on quality control in various computer environments. The panel, moderated by Philip Scallon, Arthur Young & Co., had as speakers Audrey Kleinschmidt, Smith & Gesteland, discussing small in-house equipment; Nicholas Baumkirchner, Peat, Marwick, Mitchell & Co., speaking on large in-house equipment; Robert F. White, Robert F. White & Co., talking on outside data processing centers; and William Hawkins, United Computing Systems, Inc., handling time sharing.

Mr. Kleinschmidt said that his firm owns a computer center jointly with another CPA firm. Thus, both organizations were forced from the very beginning of their association to create a fairly detailed philosophy of how the center was to be operated. To ensure quality of output, they trained their own personnel to run the center on block time programs at another installation. They made each of their systems conform to those in use by their clients rather than trying to force all clients into a mold estab-

lished by them. Their center has a control secretary who has a list of control specifications for each job that is run. This is reviewed as each job is run just as an airplane pilot must review his check list each time he takes off. Finally, the entire output for each job is reviewed by a member of the CPA staff before the results are sent to the client.

Top-quality personnel are essential to a good data center, and almost as important is good communication between the CPAs and the data processing technicians. This is one of the weakest areas in most data centers run by CPA firms, Mr. Kleinschmidt said.

As safeguards to ensure a good quality control program he said that first of all, of course, it is necessary to ensure that input data are valid. Then the three guarantees of good quality are:

1. Top-grade personnel,
2. High performance standards,
3. Good communications.

Mr. Baumkirchner echoed Mr. Kleinschmidt's emphasis on the necessity for finding the best possible personnel. He suggested that the CPA firm might be best advised to train its own people through intensive electronic data processing courses. This is especially wise in a tight labor market, he asserted, as is insistence on the most rigorous standards.

Documentation vital

Proper documentation is also essential to a good quality control program, he said, and its importance increases as the labor market increases personnel turnover. Such documentation should include at least:

1. The original request for a program,
2. The flow charts diagramming the program,
3. The actual numerical program,
4. The testing and debugging operations used when the program was first developed.

One also needs good control over files and adequate back-up for the files, he said.

The typical data processing staff in a CPA firm, he continued, should have three distinct groups, a systems group, a programing group, and the machine operators. The systems group will probably have several different projects going at any given time, so strict, well observed time controls are essential if chaos is to be avoided. Programers should have standard instructions to follow, and standard subroutines to work with. There must be complete procedures for testing and debugging, and operations should be so arranged that testing and debugging is always performed by someone other than the programer who created the program.

The machine operators should be nothing more than "button pushers," he continued. They should be guided every step of the way by detailed instructions, with nothing left to the imagination.

Mr. White said that commercial data processing centers are extremely sensitive to the problems of quality control even though there is a feeling among many CPAs that they are not. He said that in his view the only sure path to good quality control in an independent data processing center is specialization in one particular area. He advised the client wishing to use a data center to search out one specializing in the particular type of work he wants done.

Quality control in a time shared program offers special problems, Mr. Hawkins asserted. The number of clients using the system at any given time can vary sharply, and the number of customers unknown to each other doing unknown operations frightens many potential clients.

So the main quality control problem in time sharing is a question of security of the user's files, he maintained. The system must be so designed that the computer has a means of recognizing the individual user when he gets in touch with it. Each user is, of course, given a number for identification purposes, but Mr. Hawkins also recommended that he be given a password to use in "talking" with the computer.

He pointed out that the particular terminal being used can be identified by the distant computer but the person who is using it cannot. A password gets past this difficulty and can be easily changed if there is any reason to think it has been compromised.

Guarding client files

The customer's files should also be given complete protection; if an outsider is given access to them it should be on a "Read Only" instruction to the computer, so there is no danger of any unauthorized person's manipulating file data. Files should also be duplicated at some location away from the computer, perhaps a data processing center, so they can be recreated if by any chance the tapes or discs at the computer are damaged.

The second session of the final day was devoted to approaches to the auditing of EDP and was conducted by a panel moderated by W. Thomas Porter, Jr., professor of accounting, University of Washington. Panelists were Richard Webb, Alexander Grant & Co.; Joseph D. Wesselkamper, Haskins & Sells; Stanley Halper, S. D. Leidesdorf & Co.; and Geoffrey Horwitz, Lybrand, Ross Bros. & Montgomery.

A distinction was made at the start of the meeting between the auditing of records maintained by computer and a review of the computer system itself. This session was concerned only with auditing of records maintained by the computer, and all panel members had agreed that their discussions would be based on the assumption that the computer system producing the records had already been audited and proved valid.

Mr. Wesselkamper led off the discussion with a description of Auditape, a set of generalized audit routines developed by Haskins &

Sells. Auditape is not an overall solution to the problems of auditing client records, he said, but it does meet Haskins & Sells' primary objectives for it, that it be:

1. Usable by staff accountants with a minimum of EDP training,
2. Usable on any computer so the client's equipment could be used,
3. Machine readable.

Auditape has a modular construction, Mr. Wesselkamper said, and each module has these characteristics:

1. It has a routine that puts every record in a standard format.
2. It has an include-exclude routine that is able to select only those items that the CPA wants to review.
3. It has a mathematical routine to permit simple calculations with the records.
4. It has a summarize routine to write summary data for each field used.

Auditape is now available for IBM 1400 tape systems (this tape can also be used on IBM 360 units), for Honeywell 200 series, and for the IBM 360. It is currently being adapted for use with RCA Spectra 70 equipment.

Two other systems outlined

Mr. Webb displayed via slides some of the abilities of Alexander Grant's AUDASSIST, a computer audit program analagous to Auditape, which is, however, used in Alexander Grant data centers rather than on the client's own computer. The auditor in the field determines what his audit objectives are, codes his instructions, and then sends client records and instructions to the data center where the actual audit work is performed.

Mr. Horwitz, who also used slides, described Lybrand, Ross' Auditpak, a system written in COBOL that can extend, foot, select, count, and match data from client records. Since it is written in COBOL, it can be used on the client's computer if he has one.

The final speaker of the session was Stanley Halper, who said his firm uses generalized routines. He said that Leidesdorf feels the auditor's function is to audit, that he should not become directly involved with the computer. Leidesdorf believes that the auditor should say what it is he wants; then the firm's own technical staff and the client's employees get it for him. His firm uses its clients' programs in most instances, modifying them to meet the auditors' particular needs by use of generalized audit modules. The generalized audit modules are themselves broken into small modules so the module will work in conjunction with the client's system.

Leadership role urged

The last speaker of the morning, James Kobak, of J. K. Lasser & Co., brought a quick change of pace to the program. His talk, entitled "You Have Ruined My Nice, Comfortable Happy Life and I Hate You All—A Rebuttal to the Rest of the Program by a Real Accountant," posed the fateful question:

"What have computers done about generally accepted accounting principles?"

In a slightly more serious vein, he said that accountants were the most logical people to run computers but that they still lack EDP knowledge to an abysmal degree.

"It is up to you people here at this computer conference to communicate with other accountants," he said. "There's still too much jargon, too much mystique about the whole field of computers. The rest of the accounting profession wants to know about computers, but it's up to the leaders in this field (like those at this conference) to act as interpreters."

The accounting profession has been expanding faster than the total economy, and will continue to do so in the years ahead, Ralph Kent, Arthur Young & Company, and at that time president of the AICPA, said at the concluding conference luncheon session.

Although the profession is still growing at a more rapid pace than the gross national output, and has a tremendous potential for even further growth, Mr. Kent said, it does face serious problems. Perhaps the most serious of these is the shortage of personnel; there is a grossly inadequate supply of accounting graduates to meet recruitment needs.

Also, such graduates receive broader-type education, as recommended in the Ford and Carnegie Foundation reports of ten years ago, and consequently are not as fully trained in technical detail as they have been in the past. While the broader-type education is desirable, the decrease in technical training leads to an enlarged professional development requirement.

Management services practices by CPAs must be established on a fully professional basis and additional standards are needed, he said. To date, the management services committee of the AICPA had issued only two formal statements [the third, just approved, appears in this issue of M/S] on the practice of management services by CPAs. Also the existence of non-CPAs at work in the management services departments of CPA firms causes problems, perhaps requiring a re-examination of the proposal to grant associate membership to such personnel.

Still, with all these problems, the future of the profession is bright, he reported. But more segments of the accounting profession are obliged to learn to handle EDP problems, if they are to stay with the leaders in the profession. "Auditors can't really meet their own standards today, unless they can work with EDP controls and understand them," he said. The auditor must also understand what makes "good management sense" in all computer applications.

It was announced at the meeting that the next conference will be held in San Francisco May 18-20, 1970.

Statement on Management Advisory Services Number 3 by the AICPA Committee on Management Services

ROLE IN ADVISORY MANAGEMENT SERVICES

INTRODUCTION

1. The purpose of this Statement is to consider the role of the member in the practice of management advisory services. Role is significant not only because of its effect on the success of management advisory services engagements, but because of its bearing on all aspects of the member's relationship with his client.

2. Statement on Management Advisory Services No. 1 states in part:

> The role of an independent accounting firm in performing management advisory services is to provide advice and technical assistance, and should provide for client participation in the analytical approach and process. Specifying this as the proper role recognizes both the appropriate place of management advisory services and the realities of practice. This is the only basis on which the work should be done and it is the only basis on which responsible management should permit it to be done.

The Committee considers it desirable to amplify the application of this Statement in order to provide guidance to the member whereby, in the exercise of his judgment, he may determine his appropriate role in particular management advisory services engagements.

3. Role implies posture and actions in a given situation or relationship; in this case, that involving the member as a consultant with client management and personnel. In considering this relationship, therefore, both consultant and client roles must be identified. Pervading all aspects of the consultant's role is his posture as an objective advisor.

4. Further, the matter of appropriate role in a professional relationship with a client depends on the nature and objectives of the professional service to be provided. The Committee, therefore, considers it important to first describe the nature and objectives of management advisory services as a basis for defining the role that should be assumed in the various types and phases of management advisory services engagements.

BACKGROUND

5. Statement on Management Advisory Services No. 1 generally describes these services as ". . . the function of providing professional advisory (consulting) services, the primary purpose of which is to improve the client's use of its capabilities and resources to achieve the objectives of the organization. . . .

6. "In providing this advisory service the independent accounting firm applies an analytical approach and process which typically involve:

- Ascertaining the pertinent facts and circumstances
- Seeking and identifying objectives
- Defining the problem or opportunity for improvement
- Evaluating and determining possible solutions, and
- Presenting findings and recommendations,

and following the client's decisions

to proceed, the accounting firm may also be involved in:

- Planning and scheduling actions to achieve the desired results, and
- Advising and providing technical assistance in implementing. . . ."

7. These activities usually involve a written statement of the scope and objectives of the engagement, a work program related to the statement of scope and objectives, and the preparation of a written report or other form of documentation to be submitted to the client when the engagement is completed.

8. The execution of an assignment involving some or all of these phases is likely to result in a formal, structured relationship with the client. Structured management consulting can be described as consisting of one or more of three broad stages of effort—analysis, design, and implementation. The analysis stage consists of ascertaining the pertinent facts and circumstances, seeking and identifying objectives, and defining the problem or opportunity for improvement. The design stage consists of evaluating and determining possible solutions and presenting findings and recommendations. The implementation stage includes planning and scheduling actions to achieve the desired results, as well as advising and providing technical assistance.

9. The member may be called upon to provide services in some or all of the foregoing stages. While it is impossible to fit all management services engagements into a few clearly identified categories, it is pertinent to identify the various roles assumed by considering the consultant's role in engagements involving all steps in the analytical approach and process along with some discussion of services in which only a portion of the analytical approach and process is involved. These illustrations are offered as a basis for determination of role in the various situations that may be encountered in practice.

10. This Statement deals only with management advisory services as defined in paragraphs 5 through 8. Services which members might be called upon to render other than those of an advisory nature as defined in paragraphs 5 through 8 are excluded from the scope of this statement.

STATEMENT

Role in Full-Scope Engagements

11. In many management advisory services engagements, particularly where implementation of a solution is dependent on a new or revised system, the first five study phases outlined in paragraph 6 that bring a matter to the point of recommendation for management decision are but the preliminary areas of service, and participation by the member is expected to continue through complete implementation. The objective is to supplement management's capability by providing an objective point of view, a consideration of alternate courses of action, a broader perspective from experience in analogous situations, and technical assistance.

12. Effective participation by the member in this role requires the appropriate composition of management participants. Client representation should include both working level and decision level participants who are representative of the functions particularly affected by the matter.

13. This may be accomplished by organizing a team drawn from each of the functions concerned (plus those client staff technicians who can make a contribution), to work directly on the problem, together with a senior client management group whose responsibility is to make decisions and monitor and approve programs and results. The consultant makes his contribution by: advising on the overall program and the organization and composition of the participating groups, providing technical assistance at the working level, and monitoring progress and reporting on this and other important matters to the senior management group. To the latter end, the consultant should maintain a degree of participation during the engagement that permits him to be informed as to what is occurring and that will provide a basis for applying his professional judgment to what he observes.

14. The further the member's participation extends from initial fact finding through implementation, the greater the importance of client involvement. When implementation is concluded, the member's participation is also concluded, and only client personnel remain to carry on the solution. Therefore, the member should adjust his level of participation throughout all phases of the assignment so that he eventually completes his part of the assignment, leaving a complement of client personnel possessing the qualifications to proceed on their own.

15. The propriety of this role of advisor is clear if one considers that a consultant is not in a position to carry out his recommendations since he has no authority to marshall client resources or to make management decisions. Should he attempt to do so and allow himself to be placed in such a role, he ceases to be a consultant and exercises management prerogatives—with consequent loss of the essential consulting requisites of impartiality and objectivity.

Role in Special Study Engagements

16. In some types of engagements, the client seeks only an impartial and objective study of a matter and the resulting recommendations. This may be to obtain confirmation or denial of a judgment client management has already tentatively reached or to obtain a marshalling of pertinent facts and views on a matter not previously studied. For example, such studies may relate to areas of management concern embracing a review of facts and conclusions on the selection of EDP equipment or the applicabil-

ity of inventory control decision rules.

17. The nature and objectives in such engagements are analogous to audit services in the sense that an impartial, objective judgment is being sought by the client. The role of the member in these engagements is to proceed through the first five steps of the analytical approach and process outlined in paragraph 6, to apply objective judgment to the facts, and to present findings and recommendations to the client for decision and further action. The client's role in this process is primarily to supply pertinent information and subsequently, of course, to make the decision on the matter. In such circumstances, the client does not seek the member's assistance in achieving the desired result but only his professional judgment. The effective action beyond the point of decision is solely the responsibility of the client.

18. The Committee believes that a sound client-consultant relationship in these situations depends upon the client's disposition to obtain the consultant's impartial and objective point of view and the consultant's disposition to so respond. A relationship based on any other premise serves only for the member to lend his name to a predetermined course of action—hardly an acceptable professional posture for the independent CPA to assume. The member should therefore avoid accepting an engagement in which he is expected merely to carry out the client's dictates.

Implications of Limited Client Participation

19. Occasionally, clients seek to engage the independent accounting firm to provide solutions and results on a basis wherein the client expects to be involved only to a limited extent, if at all. The member should carefully consider the implications of such an exclusive role—particularly the degree of responsibility inherent in such an arrangement. Since the member cannot be responsible for continuing operations, he places himself and his client in a difficult position if he has had the sole responsibility for design and installation of changes with which he subsequently has no further involvement. Only client management is in a position to assume responsibility for all aspects of change (including operations) and, therefore, ultimate success is most likely to be achieved when both consultant and client management recognize this fact and arrange their roles accordingly.

20. An additional, and often related, problem arises when there is a tendency or disposition to apply a packaged solution indiscriminately. Such approaches can inhibit client participation, underestimate the individuality of each situation, and bypass the analytical process. This increases the likelihood of the development of solutions that do not meet actual needs.

21. The appropriate response to the above situations is to fully inform the client of the limitations and risks inherent in such an undertaking and to establish a balanced client-consultant relationship that the member believes can lead to a successful result. Failing this, he may find himself acting in a position inconsistent with his objective advisory role and, accordingly, may deem it appropriate to withdraw from the engagement.

22. There are degrees of technical assistance that may be provided depending upon knowledge and experience available in the client organization. The Committee believes, however, that a member should not undertake an engagement that includes implementation unless:

1. The client understands the nature and implications of the recommended course of action.
2. Client management has made a firm decision to proceed with implementation based on this understanding and consideration of alternatives.
3. Client management accepts overall responsibility for implementation of the chosen course of action.
4. Sufficient expertise will be available in the client organization to fully comprehend the significance of the changes being made during implementation.
5. When the changes have been fully implemented, client personnel have the knowledge and ability to adequately maintain and operate such systems as may be involved.

23. The measure of ultimate contribution by the consultant is the effectiveness with which management acts on a sound recommendation and the degree to which, at the conclusion of the consultant's participation, the client's personnel have acquired the capability to continue at a higher level of effectiveness in the future.

Informal Advice

24. During the course of providing any type of service, independent accounting firms are called upon to give informal advice on many diverse questions. Clients seek these opinions from the representatives of an independent accounting firm in view of their knowledge of the particular client's affairs and their broad exposure to other situations. This type of service differs from the structured approach to management advisory services, as described in Statement on Management Advisory Services No. 1, in that the nature of such services is informal and therefore no presumption should exist that an extensive study has been performed to identify and consider pertinent facts and alternatives. Further, no responsibility is assumed for seeking to achieve client action or for seeking to assure that any ensuing action will be effective. Here, the appropriate role is simply to respond as practicable at the moment and to express the basis for the response so that such informal advice

is offered and accepted for what it is.

25. The Committee believes, however, that while there may not be any presumption on the part of the member that pertinent facts and alternatives have been identified and considered, he should be aware that such qualifications may not be fully appreciated by the client and should govern his discussion accordingly.

Consulting Role and Independence

26. Statement on Management Advisory Services No. 1 states:

> When the services to a client also include expression of an opinion on the fairness of financial statements, the matter of role has special signifiance, since it also relates to the independence of the accounting firm. Opinion 12 of the American Institute of Certified Public Accountants' Committee on Professional Ethics is explicit on this point. The accounting firm's role is to provide advice and technical assistance and to avoid making management decisions or taking positions that might impair the firm's objectivity.

27. The Committee believes that the objective, advisory posture that has been advocated in the previous paragraphs of this Statement on Role is the most effective form of consulting and the one most likely to produce lasting benefits to the client. The Committee also believes that when the member as a consultant assumes this objective, advisory role, he places himself in a posture that complies with the admonition to avoid making management decisions or taking positions that might impair the firm's objectivity.

28. The compelling need for independence in the attest function is such, however, that these principles must be carefully followed in actual practice. For example, in some cases management may indicate a willingness to abdicate its role as decision maker and the member will need to insist on a proper arrangement of roles. Failing in this, he may need to decline the engagement.

29. This posture seems clear because the member in the role of objective advisor is not in a position to make management decisions. The ultimate choice of any course of action must be made by management because as a consultant, the member cannot command the resources necessary to implement that decision.

30. The Committee also believes that the objective advisory role that has been described places the member in a position that will not impair his objectivity in his other relationships with his client. He should, however, always be alert to the way his role may be viewed by others and not permit himself to be placed in a posture inconsistent with this Statement that could cause serious question regarding his objectivity and independence.

SUMMARY

31. The Committee on Management Services suggests that each member carefully assess the principles set forth in this Statement to determine the appropriate role to assume in providing these services in any given opportunity for an engagement. In undertaking any management advisory services engagement, the member must understand the nature and objectives of the service he proposes to perform, and the related role and responsibility inherent in that undertaking.

32. Throughout this Statement emphasis has been given to the importance of an objective consulting role in providing management advisory services. This role is advocated essentially because such a posture is the most effective, responsible, and professional form of management advisory service. It is also a role that is consistent with a member's obligation to be independent and objective in all aspects of his relationship with his client.

what people are writing about

BOOKS

The Economy of Cities by JANE JACOBS, Random House, Inc., 1969, 168 pages, $5.95.

The perennial gadfly of the urban planners now takes on economists and archaeologists, among others, in another defense of the cities she loves so well.

In *The Death and Life of Great American Cities* Jane Jacobs spoke up fervently on behalf of the crowded, anarchic, unmanageable cities that urbanologists now view with such alarm. Her defense in that book was based on human values; in this volume she shifts to an economic front. Since Mrs. Jacobs is no more a trained economist than she is a sociologist, this book, too, will undoubtedly draw storms of protest from the professionals. But for the layman her thesis is both provocative and appealing.

Mrs. Jacobs feels that we must look to the city rather than to the giant corporation or the government for the sources of our future economic growth. Indeed, she argues that cities are, and always have been, primary economic organs.

Challenging the general assumption that cities are built upon a rural economic base, Mrs. Jacobs goes back to prehistoric times to argue the reverse—that cities did not arise after nomadic hunters had taken up agriculture but rather that agriculture itself originated in early cities, out of the storage and then cultivation of food, and was farmed out to the rural areas when the cities became too crowded to accommodate it. This theory, she claims, is consistent with recent archaeological findings, and she invents a city, New Obsidian (based on the trade of a raw material needed by hunters), to show how every significant economic ac-

tivity could have originated there.

Darting through history with examples that range from overspecialization in the production of pottery and unspoked wheels in two prehistoric Indian cities to the invention of the modern brassiere in New York City in the early 1920s, Mrs. Jacobs shows how cities grow by adding new work to old work and decline by ceasing to innovate.

A city usually starts, she says, by exporting one or more items (either as trader or producer) for income used to pay for its imports. When the city begins to replace its imports with local production, it usually grows explosively because the import replacement both leads to new exports and creates new work that is strictly local in nature.

This analysis, if valid, has significance for the development of underdeveloped economies, where, Mrs. Jacobs seems to feel, the addition of giant mass production industries from above is not going to spark local economic development unless local innovative talent is already primed to take advantage of it.

This gives Mrs. Jacobs a chance to take a jab at the current popular emphasis on population planning: "If it is true that poverty is indeed caused by overpopulation, then it follows that poor people ought to prosper whenever populations decline appreciably." Actually, of course, this is not true. Nor is it true that thinly populated areas are necessarily prosperous. "Countries that have always been thinly populated, and have rich resources besides, are quite as liable to poverty as heavily populated countries. . . Birth control has much to recommend it. . . but birth control as a prescription for overcoming intellectual stagnation and poverty is nonsense."

Indeed, says Mrs. Jacobs, to seek causes of poverty is to enter an intellectual dead end because "poverty has no causes. Only prosperity has causes." Just as cold is merely the absence of heat, poverty is "merely the absence of economic development" and "can be overcome only if the relevant economic processes are in motion. These processes are all rooted . . . in the development work that goes on in impractical cities where one kind of work leads inefficiently to another."

Cities must be inefficient, Mrs. Jacobs argues, because new work cannot develop freely in efficient organizations; such organizations will develop only work that is logical for their customers and hence for the organization as a whole. The disorderliness of cities is a virtue and should not be tampered with by overzoning, large-scale planning, union restrictions, or racial and class discrimination.

The city of tomorrow, Mrs. Jacobs forecasts, "will not be smaller, simpler, or more specialized than today but more intricate, more comprehensive, more diversified, and larger." She is less specific about the sources of future growth. She does predict that, just as manufacturing replaced trading as the dominant economic activity, so manufacturing will be replaced by services, and she suggests that waste recycling is a fruitful area for development. Nor does she pinpoint the cities that will grow, beyond specifying that they will be cities that have managed to evade the bureaucratic simplification "so dear to present-day city planners and urban designers."

Those who are caught up in the current urban planning wave would do well to give at least some consideration to Mrs. Jacobs' views. Even those who have no interest in or responsibility for the future shape of urban development should find her ideas fascinating.

Moving Mountains or The Art and Craft of Letting Others See Things Your Way by HENRY M. BOETTINGER, The MacMillan Company, New York, 1969, 329 pages, $7.95.

This book on the art of persuasion has much to say that is of value to consultants, businessmen, and others who have occasion to sell ideas—although its style can become somewhat wearing after a few hundred pages.

The author of this book, rather surprisingly the assistant comptroller in charge of management sciences for American Telephone & Telegraph Corporation, says it is for "those who have something to say, but who are dissatisfied or irritated by their inability to present their thoughts to others." In it he explains how to make presentations; handle discussions; and prepare speeches, memos, and reports in such a way as to influence others.

Mr. Boettinger's writing style, variously described on the book jacket as urbane, witty, lively, and imaginative, is all of that, as a sample listing of his chapter headings will indicate:

"Presentations Are Performances or Why There's No Business Without Show Business," "How to Get and Hold Attention or Creating Sleeplessness," "Matching Style to Material or Don't Cut Meat with Scissors," "Some Psychological Hints or What Every Police Lieutenant, Bartender, Reporter, Dog Walker, and Shopkeeper Knows," "How to Use—and Abuse—Visual Aids 'For They Have Eyes and See Not,'" "Building to a Strong Finish or A Cathedral Is More Than a Pile of Bricks," "Coping with Special Knowledge and Its Jargon or Undermining the Tower of Babel," and "Sources of Ideas or Hunting, Fishing, and Trapping in the Country of the Mind."

As is probably evident, Mr. Boettinger's wit verges, on preciosity, and his book is hard to take in large doses. There is, however, absolutely nothing wrong with the content, which, as Peter F. Drucker points out on the book jacket, goes beyond the title to become a "highly practical treatise both on how one thinks and how one presents thinking." No accountant, consultant, or staff executive should fail to read it.

Briefly listed

Retirement — A Time to Live Anew by HARRY W. HEPNER, McGraw-Hill Book Company, New York, 1969, 298 pages, $6.95.

As the title suggests, the emphasis is psychological—even inspirational—but there are sections on choosing a place to live; possible purposeful projects, hobbies, and volunteer activities; and information and services available to retirees.

Operation Breakthrough: An Approach to Hotel/Motel Operations in 1978 by Booz Allen & Hamilton, American Hotel & Motel Association, New York, 1968, 174 pages, $25 (to nonmembers), spiralbound.

This forecast of trends affecting the lodging industry is primarily of interest to those concerned with the hotel, motel, travel, and transportation businesses.

MAGAZINES

Will Your Computer Pay Its Way? by JOHN PLUMMER, *Business Horizons*, April, 1969.

To determine the profitability of the computer as a business investment, management should employ the traditional approach used in any capital investment program—the project approach. This will take the mystique out of computer planning.

Many uses can be made of a computer. Too often, this article points out, a computer is evaluated on the basis of whether it can be applied rather than whether it should be applied. Management should use a project approach to the planning and control of computer development activities.

The key to this approach is the project description. Intensive effort by both operating and computer management should be given to the development of the description. The description should cover the objective, expected benefits, costs, and inputs and outputs of the application, and the description should include a summary project evaluation.

Defining objectives

The objective of the computer project is the improvement that will result from its completion. The author feels that in most cases the dollar benefits can be ascertained, but only the operating management can really do it. Where the benefits are difficult to determine, experimentation may supply the needed answers. An example is given of a marketing manager who felt the computer could help him improve advertising effectiveness. He randomly selected market areas for testing. As a result of these tests, a concept of "advertising fatigue" was hypothesized, and a computer-based sales forecast application was developed to relate levels of advertising expenditures to sales and profits generated in an attempt to maximize the return from advertising dollars.

Opportunity costs, as well as direct costs, should be considered. Available personnel may have the competence to develop a computer application, but, if they so utilize their time, they may be unable to develop another application that would be more profitable.

Agreement essential

The author says that there must be complete understanding between operating and computer personnel as to the necessary inputs and outputs of the application being considered. Otherwise, the benefits estimated by operating personnel may be based on inputs and outputs that differ from those anticipated by computer personnel in their cost estimates, leading to an inaccurate estimate of the profitability of the investment.

The project summary should be developed to let top management know what is being considered. Otherwise, an extensive project may be undertaken when top management is developing plans that would make the application useless. The project summary should include not only the anticipated costs, benefits, and return on investment but also an assessment of the technical and operational risks. Technical risk refers to the likelihood that the desired computer output cannot be achieved. Operational risk refers to the danger that an application will prove not to be feasible. An application that requires several hundred people to perform their jobs in different and unfamiliar ways carries a higher operational risk than an application designed to help an eager production manager improve his approach to production-line scheduling.

Choice of applications

Once the project plans are developed, management must decide which applications should be attempted. The author gives some criteria to guide top management in setting priorities for the projects. The most important criterion is return on investment. Other criteria that should be considered are the distribution of benefits and risk, the balance of risk, personnel interests and capabilities, and departmental priorities.

Secondary criteria

It may be desirable to distribute the benefits among operating managers either for political reasons or to broaden awareness of the computer's capabilities. The probability of achieving benefits is often significantly higher if several projects are under way simultaneously rather than if available resources are tied up in one or two major projects. It may be possible to break down major projects into several sub-projects, each with its own benefits, to satisfy this criterion.

High benefits often reflect high risk, and it may be desirable to balance high- and low-risk appli-

cations. The author suggests that no project be undertaken unless the user department is prepared to commit needed resources.

The last point made by the author is that to obtain the stated objective of any project the project must be controlled. The appropriate control device, whether it be PERT or a Gantt chart, depends on the size and type of the project. Two aspects of control that are often ignored are these: (1) The control system should relate directly to the planning system, and (2) the control of the project should be continued after it is in operation.

Much of the value of the project approach, according to the author, is its familiarity to management. It is, in principle, like the traditional approach to the appraisal of any capital investment. "It takes the mystique out of computer planning. Most important, it puts the focus of management attention where it belongs—on the profitability of the computer as a business investment."

BRADLEY J. SCHWIEGER
Indiana University

Managing Technical-Intellectual Resources by ALBERT SHAPERO, *Business Horizons*, April, 1969.

Management scientists have almost succeeded in mastering the management of the routine, the repeatable, and the specifiable. Our managerial problems, however, have become more complex. Our available body of knowledge appears inadequate and may even be detrimental when applied to the management of one-of-a-kind endeavors. Solution of these more complex problems requires large amounts of technical and intellectual resources. The demand for such resources is high, and the supply is relatively inelastic. Thus, the management of these resources needs greater attention. This attention should take the form of concern with new kinds of goal statements; with manpower and information; and with recruiting, retaining, and motivating a high level of talent.

Since 1900 the United States has made remarkable advances in supplying a sizable portion of the world's demands and in becoming the world's major supplier of management knowledge. This management knowledge has been massively transfused to Europe and is still being supplied to underdeveloped countries as part of our aid programs. Our ability to manage the routine, the repeatable, and the specifiable has reached the stage where we can automate almost anything we can specify.

Shift of emphasis

As a result, the emphasis of our concern has shifted to more complex problems. Such problems generally involve numerous and noncommensurate variables. The solution of the complex problems facing today's managers requires large amounts of technical and intellectual resources—scientists, engineers, planners, etc., and the information they generate and use.

The techniques used to manage the routine and specifiable normally are not effective and may even be harmful in the management of technical and intellectual resources. That is, we typically design a job specifying the sequence of work to be performed in detail. We then "human engineer" the job so that the "typical" human will be able to perform the job accurately and rapidly. Then we hire people to meet the job specification and train them to perform the task. Finally, we try to motivate employees to perform their jobs accurately and rapidly.

Old techniques inapplicable

With one-of-a-kind problems, however, we typically cannot design the job in detail. Furthermore, in such kinds of work as R & D we cannot predict what the individual will be doing in six months or a year. And, if we need several individuals, the first one hired may change the characteristics required of the next one hired. Thus, the techniques used in managing the routine and specifiable are not appropriate to the management of technical and intellectual resources.

New science needed

We need to develop a new body of knowledge relevant to the management of activities that are

1. "relatively unspecifiable and non-repeatable"
2. "primarily dependent upon creative human outputs. . ."
3. "dependent on the quality and quantity of available information. . ."
4. dependent on economically and politically scarce resources
5. dependent on the voluntary efforts of men who have many alternative choices.

Keeping these characteristics in mind, we can speculate as to the elements that should be included in an appropriate body of knowledge. Such a body of knowledge should explicitly take into account the uncertainties involved in formulating organizational goal statements. In addition, manpower and information should command primary attention, with all other organizational aspects taking supporting roles. Thus, this new body of knowledge would depend heavily upon the behavioral and information sciences.

Organizational goals

Organizational objectives should be stated in terms of the organization's capability for goal seeking, problem identifying, problem structuring and solving, and self-renewal. Such goals might be stated in terms of achieving a higher probability of relevant and successful outputs over a given number of years without falling below the threshold necessary for survival. Goals of this kind call for a differ-

ent style of management and new kinds of measures of management innovations. For example, measurement of the success of recruitment should emphasize retention and subsequent performance of people hired as well as the number of people hired. Thus, some form of manpower budget should be developed so that managers can be held responsible for excessive turnover. In addition, managers should be concerned with incentive programs geared to the retention, motivation, and education of their creative personnel, particularly of those people most likely to continue to work for the organization. Another area of efficient use of creative manpower is the effective use of the professional hour. Sufficient support facilities, such as secretaries and libraries, should be provided to permit the time of professionals to be spent effectively.

Although much has been said about information collection and retrieval, there should be more emphasis on the information-using habits of scientists and engineers. It does not make much sense to pay a scientist $25,000 per year and then require him to obtain approval to purchase a $10 or $15 book or magazine subscription. If such a publication fits the individual's information-using habits, it may save him time in writing a report or it may help improve the quality of the report. Such publications should not need to be approved by anyone.

CARL G. KRETSCHMAR
Indiana University

Automated Retrieval of Legal Information: State of the Art by STEPHEN E. FURTH, *Computers and Automation,* December, 1968.

An IBM marketing man reports on some aspects of computerized legal search systems.

Documentary information retrieval by computer is being applied to existing and proposed statutes by Federal, state, and city governments and by attorneys. The entire U.S. code and the statutes of a number of states now have been incorporated into computer memories by various organizations.

This author has something to say about computerized document retrieval—although it is not quite what the title of his article implies. He does not offer a comprehensive survey of existing applications, nor does he review the capabilities and limitations of technically feasible systems—two possible interpretations of the term used in the title, "state of the art."

Instead, he concentrates on a description of an IBM program package called the System/360 Document Processing System. It is usable for textual information storage and retrieval.

Those who are deeply interested in specific information retrieval systems will want to read this thinly disguised sales presentation. Those interested in the overall technical state of the art or the extent to which computerized legal search facilities are available must look elsewhere.

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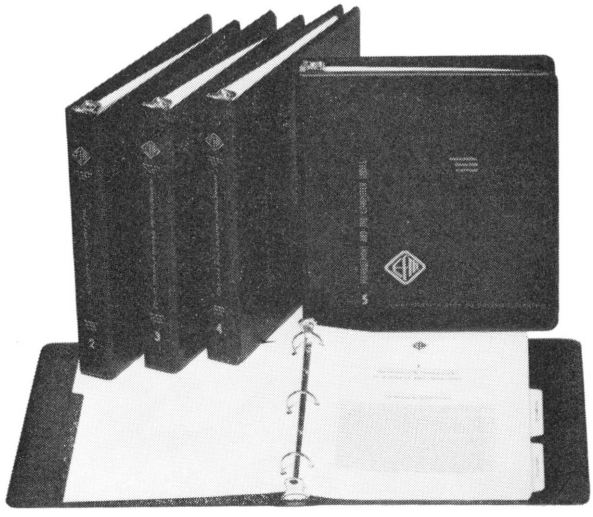

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