AUTOMATIC DATA-PROCESSING SYSTEMS--PERFORMANCE VERSUS PROMISES

12 January 1959

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NOTE: This document is a sequel to and complements the material in Mr. Phillip's 1958 lecture, L58-96. The 1958 lecture developed the principles and techniques of ADPS, whereas, this 1959 lecture, L59-86, provides background material on the application and use of Data Processing Systems in military management and an over-view of the current Department of Defense programs for their use.

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INDUSTRIAL COLLEGE OF THE ARMED FORCES

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AUTOMATIC DATA-PROCESSING MACHINES-PERFORMANCE VERSUS PROMISES

12 January 1959

COLONEL DAVIS: General Mundy, Gentlemen: The management problems in the military services during the past 10 years have reached full-grown proportions. The shrinking dollar, reduced forces, complex weapons and operations in space all have resulted in increased needs for communication and volumes of information and data, speed and a requirement for accuracy as well as speed in responsiveness to control management. Managers need methods and tools that can make their activities result in better responsiveness in their control.

One such method is the automatic processing of information and data. During the past five years industry, Government and particularly the military have all adopted and are now using various forms of automatic data systems.

We have with us this morning the man from the Department of Defense who has been more closely associated with the military's activities in this field during the past 10 years than any other individual. He is going to discuss with us today these automatic data systems. He is going to evaluate how we, the military, have done during the past few years in getting the best from these systems and tell us something about how we can improve the utilization of this tool in order that managers can better manage.

It's a pleasure for me to introduce to you Mr. Charles Phillips, from the Office of the Secretary of Defense (Comptroller), who is Director of the Data Systems Research Staff.

MR. PHILLIPS: Thank you, Colonel Davis.

Secretary Jackson, General Mundy, Admiral Clark, Students of the College, Distinguished Guests: In January of last year I had the pleasure of appearing here at the Industrial College as a member of a Department of Defense panel discussion of automatic data processing. My part of the program last year consisted of a nontechnical description of what data-processing systems are, what they can do, something of their capabilities and limitations, the management considerations in the use of these new tools, the areas in which they may be effectively employed, and the questions to be resolved in determining the feasibility

of an automatic data-processing system and preparing for its installation. I was honored by having my talk published by the College. Following my introductory talk, my colleagues from the Army, Navy, and Air Force gave a comprehensive presentation of the data-processing programs of their respective departments, after which we had the usual question-and-answer period in which, as chairman of the panel, I could answer the easy ones and pass the tough ones to my colleagues.

I'm sure you know that an engagement to speak to this group isn't generally considered to be a relaxing way to spend the morning, but in retrospect my last year's appearance here was a breeze compared to the situation today. During this past year I'm sure that everyone has become very thoroughly familiar with computers. Seriously, though, I do think there are quite a few of you who have a better technical knowledge of computers than I do. More important, though, there is no one sharing the platform with me today to whom I can pass the tough questions.

This morning I propose, within the framework of my assigned subject of "Data-Processing Systems--Performance versus Promise," to avoid the technical aspects completely and tell you, first, as a background, a brief history of the Defense ADPS program over the last few years and our efforts to develop policy guidance and management concepts; second, where we stand today in ADPS and something of our plans for the future; and, last and the meat of the cocoanut, what we have done and propose to do in evaluating ADPS performance and comparing it to the promises, or, more accurately, to the expectations.

You will note that I have used the term "automatic data-processing systems" and the letters "ADPS." We elected to use this term and these letters for our Defense program rather than the more popular "EDPM," which stands for "electronic data-processing machines," not because the latter is usually associated with the equipment of a particular company, but because we think that the automatic characteristic is much more important than the electronic. In fact, we would be just as interested in new methods if they were performed by chemical, photographic, mechanical, or any other means. We also think the word "systems" is much more descriptive of our interest than the word "machines." Thus "ADPS," rather than "EDPM," and most Government agencies now prefer this term.

The data-processing equipment that we are mainly concerned with is the electronic digital computers now quite widely used in business systems.

You are probably all aware that through military-sponsored research in World War II our first all-electric computer, the ENIAC, (which stands for Electronic Numerical Integrator and Calculator), was born. Most of the "one-of-a-kind" scientific computers, such as the NORC, the JOHNNIAC, and the RAYDAC, at military installations or Defense contractors' laboratories, with their high speeds and capacities, were financially supported under military contracts and are the progenitors of today's advanced design digital computers.

It would be hard to assess and give credit to the part that computers have played in our tremendous technological developments over the past 10 years, but in my opinion they have contributed substantially to the size, scope, and character of our Defense effort.

In Defense we have another large and unique area of computer application, outside the scope of my responsibilities and firsthand knowledge, which I think should be accorded recognition as separate and distinct from scientific and management applications and which I call "military operational applications." These include, in addition to the airborne computers and those used for navigation, bombing, fire control, etc., the powerful "SAGE" computers and the tremendous batteries of computers at Cape Canaveral, Huntsville, White Sands, Point Mugu, and Offutt Air Force Base, which are engaged in tracking, control and evaluation of missiles and other weapons systems. Such systems are designed to provide ground-controlled interception, guidance, and control of missiles, air traffic control and automatic landing systems.

With this computer group I would include the current Army development of a family of mobile field computers to be used for tactical purposes. I don't want to get into the need for and use of these computers in Defense operations, but there is no doubt that they will have an important long-range effect on the state of the computer art. The specifications for these equipments reach new and higher levels for ruggedness, dependability, compact size, and minimal power and maintenance characteristics, and I think we can reasonably expect that the influence of these computers will be felt in the design of general-purpose commercially available computers within the next five years or less.

Through the early scientific and research uses of computers, in the late 1940's and early 1950's, Defense gained firsthand knowledge of their speed, storage capacity and other characteristics and an insight into their potentials for management purposes. Defense problems in the business management area are huge. In fact, I believe it is well accepted that they are unique and have no counterpart in business today.

We are continuously in search of ways and means for improving our business management in Defense, but when we get down to fundamentals, we usually find only two basic approaches:

1. through a better thought or idea--which is an extremely scarce article, or

2. through a better tool, which we now appear to have in automatic data processing, if it lives up to its promises. It was quite natural, therefore, that we should turn to this new tool for whatever help it can give.

By late 1953 all three of the military departments had plans for the limited use of computers in supply operations. These differed quite radically. One department planned to use a commercially available computer which was designed for scientific purposes for stock control and requirements determination. Another department had contracted for the design and construction of a special-purpose large-scale machine for the same supply function. The third department had a research and development contract for equipment suitable for local-level supply operations.

These plans, and particularly the differences in approach, came to the attention of the Advisory Committee on Fiscal Organization and Procedure. This Committee, making a study of Defense business activities in 1953 and 1954, recommended to Secretary Wilson that OSD (his office) recognize the potentials of computers in business operations, take action to exploit them, give guidance in their use, and, at the same time, and I quote the language, "assure the most prudent use of funds in the utilization of electronic computers for business purposes in Defense."

Secretary Wilson assigned responsibility for action on the committee's recommendation to my boss, Assistant Secretary McNeil, the Comptroller. Thus was born our Defense program. Since the child had been found crawling about in the supply field, responsibility for its care and feeding was assigned (as an additional duty) to the person in the Comptroller's shop then responsible for supply accounting systems, who admitted a long acquaintance with one of its alleged parents--EAM--Electric Accounting Machines--and was even suspected of knowing the child. I was that person and I'll confess that I didn't even know which end to take hold of when it was given into my care.

Although you are marked as an "old-timer" in the ADPS business if your experience dates back five years, I'm sure that most of you will recall when computers were being hailed in 1954 as the quick and ready answer to all of our management problems by many of the same periodicals and writers who shook a warning finger and urged the cautious

approach in 1957 and 1958. You may also remember that lots of computers were ordered, quickly followed by the usual publicity and ribbon--or tape-cutting ceremonies, but with tangible accomplishments painfully slow in realization. We even detected a rush to be first in several elements of Defense.

In an effort to get a fix on our position, and at the same time to establish what appeared to be needed controls, we did two things in July of 1954:

First, we took an inventory of all data processing equipment installed or on order for use in business-type operations.

Second, we set up a requirement that the military departments obtain advance approval of the Assistant Secretary of Defense (Comptroller) before installing new automatic data processing systems. This requirement is still in effect today.

In 1954 we had very little to guide us except past experience in related or similar fields, plus some basic management concepts. The proliferation of today's books on data processing had not yet been written and there was little being offered then in the way of courses, seminars or symposia. This meant that we had to "fly by the seat of our pants" so to speak and develop our policies, principles, concepts and objectives as we went along.

After operating on this basis for a short time, it was decided that we should call in the best-qualified people we could find to review what was being done and to recommend a future course of action. Dr. Mervin J. Kelly, then president of Bell Telephone Laboratories, was asked to select the membership and to chair an advisory committee for this purpose. Dr. Kelly selected an extremely knowledgeable group with a collectively broad professional background on both the technology of computers and the principles and techniques of applications. The Kelly committee had its first meeting in January 1955 and submitted a report to Assistant Secretary McNeil five months later after extensive briefings, on-site inspections of installations, informal discussions and the review of very substantial amounts of written back-up material.

The Kelly committee confined itself to broad, objective, Defense-wide viewpoints and it made no evaluation of computer applications. I think you will be interested in some of their observations and recommendations.

First, they were impressed with the tremendous potentials for automatic data-processing techniques due to the size, the range and the complexity of our operations. They expressed strong disappointment with the stage of systems development for most effective use of ADP considered in relation to its benefits.

Second, the committee was impressed by the wide difference in approach, used by the three departments, to identical or similar problems. Some of these variances are due to differences in basic management concepts, which in turn, are due to differences in mission. They concluded, however, that many of the variances were influenced by arbitrary choice, organizational structure, or historical background, rather than real difference in the basic problem.

Third, as might be expected, they found in all three departments a tendency to underestimate the size of the job in preparing for ADP. They noted that some groups confused the acquisition of hardware with the end product of productive operations. They gained the impression that many installations avoided the difficult and arduous application study by the simple expedient of converting present punched-card procedures to the new electronic equipment. They expressed the view that this short-cut approach might gain some benefits, more quickly, but would fail to realize the full potentials of computers.

Fourth, the committee reviewed the controls that had been imposed by the Office of the Secretary in July 1954 and found that under such controls new computer installations had been approved on a showing of four things:

1. that the problem or work area to which the equipment was to be applied had been adequately defined;

2. that typical problems had been programed for the equipment, that is, that detailed instructions had been written in machine language; or, that an adequate programing effort was in progress and would be scheduled for completion by the time the hardware was delivered;

3. that there was a matching of the work requirements with the capabilities of the hardware; and,

4. that the funds and personnel required would be available.

The Kelly committee expressed the belief that the criteria for approval was the minimum that should be demanded by prudent management.

They further expressed the view that there had been no unduly restrictive curbs upon the development of the program although quite possibly additional equipment would have been ordered had the controls not been in effect.

The Committee recommended that Defense take immediate action to establish a Defensewide major program for the exploitation of automatic data-processing systems. They further recommended that this program have the support of all echelons of top management, that it be given organizational recognition and stature at the various management levels and that a full-time staff group be established in the Office of the Secretary of Defense and in each military department.

One of the Kelly committee's recommendations impressed me particularly because of the difficulty of its achievement. It pointed out that systems studies looking to the installation of ADP may often reveal differences of policy in subject matter areas which must be resolved if the success of the installation is to be assured. In other words, ADP becomes the catalyst and forces the resolution of policy differences. The Committee recommended that the ADPS staff in the Office of the Secretary become the focal point in resolving these differences and at the appropriate time, give guidance in developing standards for program codes, data codes and computer routines and develop standards of uniformity or compatibility between equipment or systems if and when such compatibility was required. To carry out this assignment would require the agility of a tight-rope performer and the diplomacy of a Foreign Service first secretary.

The Kelly committee recommended the continuation of controls by OSD with a gradual relinquishment or delegation to the military departments. Several other recommendations, which time will not permit me to discuss, related to the organizational location and various other aspects.

The report was immediately accepted and, since 1955, has provided basic terms of reference for most of our program action. OSD recognized the ADPS management function and added it as additional responsibility to an organizational group in the OASD (Comptroller) office with one more full-time staff member. Each of the military departments followed suit. Army set up a Data Processing Branch in the Army Comptroller's Office. Navy assigned the function to the Navy Management Office where a Data Processing Division was established. Air Force assigned the function to the Statistical Services Division of the Air Force Comptroller's Office. Each of these offices at the departmental

level has a relatively small staff which performs the management function for its department and reviews new installation proposals before they are forwarded for approval by the Office of the Secretary of Defense.

Below the departmental level there are management groups at the technical service, the bureau, or the command level which vary in size dependent upon the ADPS activity in their particular organizational unit. In total I would estimate that there are probably about 400 persons engaged in ADPS management, as distinguished from operation and supervision, in which we have about 8,000 throughout the Defense establishment today.

In the year following the committee report the interest in ADPS increased by leaps and bounds and we found ourselves hard pressed to keep abreast of the work in reviewing and approving new installations. Also, as recommended by the committee, we began a program of information exchange and cross-fertilization, including frequent seminars on equipment and systems developments, which we are still conducting. We also began to develop some basic policy, criteria, and standards in collaboration with the military department which could be used as guidelines in the conduct of feasibility studies, systems analysis and design, equipment selection, programing, installation, and operation.

During 1956 other elements of OSD had added staff groups to work with us in the review and approval of new ADPS installations relating to their particular functional responsibility. One of these groups advocated a radically different approach than the one that had been developed and was being followed by the Comptroller. Therefore, late in 1956, the Deputy Secretary instigated a management survey to identify the problems, resolve the differences and set a course for OSD leadership and assistance in the application of ADPS to business procedures in Defense.

The study was completed in 1956 and in January 1957 the Deputy Secretary issued a directive which assigned responsibility in Defense for application of ADPS to business procedures and provided a means for fostering the development of common policies and joint programs. This directive recognized the basic responsibility of each military department to maintain overall direction of the development of management information systems and the procurement, installation, and use of data-processing equipment within the respective departments but in accordance with overall Defense policies and criteria.

The directive also established a "Data System Policy Council" to formulate sound policies to guide the ADP program in the Department of Defense. The Council was composed of seven members--a chairman selected by the Deputy Secretary, a senior policy official from each military department and a representative of the Assistant Secretary of Defense (Comptroller), the Assistant Secretary of Defense (Supply and Logistics), and the Assistant Secretary of Defense (Manpower, Personnel, and Reserve).

Simultaneously with establishment of the Policy Council, the Data Systems Research Staff was set up in the Office of the Secretary of Defense and I was appointed the Director. The staff is attached to the Office of the Assistant Secretary of Defense (Comptroller) and assists him in the discharge of his continuing responsibility of assuring the most prudent use of funds for computers. The Director of the Staff was designated as Executive Secretary to the Policy Council with responsibility for preparing agenda for Council meetings and developing background material for Council consideration in the formulation of policies. In addition the Staff was charged with the conduct of research into techniques, equipment and applications.

I am sure you will all agree with me that this was a very broad charter and that in relation thereto our staff is quite small. In addition to the Director there are three professional civilian staff assistants, one senior military officer and two administrative assistants.

The first action of the Policy Council was to identify six general problem areas, set up projects for each, approve a working procedure and assign priorities. The projects in their order of assigned priority were:

1. Criteria Governing the Selection of Equipment for Specific Installations.

2. Criteria Governing Justification of ADPS Installations.

3. Policies Concerning Selection and Training of Management and Operating ADPS Personnel.

4. Policies Concerning: Common Use Facilities and Equipment; Provision of Standby Capacity; and, Protection Against Vulnerability.

5. Coordination of Department of Defense Interests in the Development and Testing of ADPS Equipment, and,

6. Policies Concerning Joint ADPS Research projects.

I think the title of each of the six projects suggests its scope.

As you can see these projects are a little overwhelming, particularly with our small staff, and as a consequence, we have much unfinished work. We have given very little staff attention in OSD to the last three projects relating to common use facilities, standby capacity and protection against vulnerability, but, I hasten to assure you that they have had attention at the military department levels.

At the direction of the Council we gave immediate attention to the question of rental versus purchase and within a few months we reached some conclusions and recommendations. These were generally made effective by the military departments in dealing with this problem although no formal DOD policy or criterion was promulgated.

A real accomplishment of the Policy Council and the Staff was the publication in May of last year of a Department of Defense directive, signed by Secretary McElroy, setting forth basic criteria for the justification of new ADPS installations. This directive also announced a new Defense policy under which the responsibility for approving specific ADPS projects would be delegated to the military departments after such projects have been included in departmental programs that have been reviewed and approved by the Office of the Secretary of Defense.

In my opinion the change to a basis where departmental programs rather than individual projects are approved by OSD is a real step forward. This does not represent a discontinuance or a relaxation of the control process which I think has substantially raised the quality of the results obtained in our ADPS installations. Instead, we are shifting responsibility for the detailed review and approval to the military departments under uniform justification criteria. To provide these criteria the directive requires that each department issue comprehensive regulations on ADPS management in conformity with the basic policy set forth in the directive and subject to prior review in the Office of the Secretary of Defense.

During the last few years each of the military departments has promulgated from time to time, quite complete instructions or regulations on various management aspects of the ADPS program. In 1957 the Data Systems Research Staff put together, from these different publications, plus some original material, a draft of proposed DOD policy guidance and criteria on the acquisition, use and evaluation of automatic data-processing systems. This quite comprehensive document was approved in principle by the Council and the Assistant Secretary (Comptroller) has indicated that it should be used by the departments as guidance in the development of the regulations required by the directive. This

should assure some consistency in scope and coverage and a reasonable degree of uniformity between the regulations of the military departments. We have the Navy Regulation in our office now for review and the Army and Air Force Regulations should be submitted soon for the formal action required by the Directive.

As a part of the recent reorganization of Defense operations, and to speed up policy decisions, Secretary McElroy ordered the discontinuance of all committees whose functions included the formulation of policy. You may recall my earlier statement that this was the purpose for which the Data Systems Policy Council was originally established; so the Council was discontinued effective 1 July 1958. The responsibility for policy formulation was transferred as a staff function to the Assistant Secretary (Comptroller) where the development work will be performed by the Data Systems Research Staff.

This concludes the brief historical background portion of my talk and puts us chronologically at about October 1958 when we began the transition to the so-called "program basis."

Before I tell you about our current program let's take a look at our present ADPS installation status throughout the Department of Defense as shown on this chart.

Chart 1, page 12.--You will see that the left-hand column indicated five general types of management use, however, some installations counted in one category may have applications in other areas as well. For each military department and the total Department of Defense there are two columns. The first one showing the number of installations by category that were installed or approved for installation as of 30 June 1958; the second column indicating the number for each category that had been approved or submitted to OSD for approval by the end of Calendar Year 1958.

As you see the largest area of application is that of material management. By this we mean stock control and distribution, requirements determination, cataloging, and the other related functions needed to procure, store and issue supplies and spare parts. Here you will see that we had a DOD total of 55 medium and 16 large computers installed or approved as of last June 30 with an additional 14 medium and 9 large computers approved or planned.

CHART 1

AUTOMATIC DATA PROCESSING SYSTEMS IN THE DEPARTMENT OF DEFENSE

BUSINESS MANAGEMENT USE	ARMY				NAVY				AIR FORCE				DOD - TOTAL			
	INSTALLED OR APPROVED END FY 1958		APPROVED OR PLANNED FOR FY 1959		INSTALLED OR APPROVED END FY 1958		APPROVED OR PLANNED FOR FY 1959		INSTALLED OR APPROVED END FY 1958		APPROVED OR PLANNED FOR FY 1959		INSTALLED OR APPROVED END FY 1958		APPROVED OR PLANNED FOR FY 1959	
	MED	LGE	MED	LGE	MED	LGE	MED	LGE	MED	LGE	MED	LGE	MED	LGE	MED	LGE
MATERIAL MANAGEMENT	16	3	9	1	10	4	3	1	29	9	2	7	55	16	14	9
PERSONNEL MANAGEMENT	0	1	0	0	4	1	2	0	0	1	0	0	4	3	2	0
FINANCE, STATISTICAL AND FISCAL OPERATIONS	1	0	0	0	5	0	0	1	1	2	2	0	7	2	2	1
INTEGRATED OPERATIONS	0	0	1	0	1	2	2	0	9	1	47	0	10	3	50	0
MISCELLANEOUS	1	0	0	0	4	2	0	0	1	1	0	0	6	3	0	0
TOTAL	18	4	10	1	24	9	7	2	40	14	51	7	82	27	68	10

The second largest area of application is in the field of personnel information. Private industry has only a limited need for this type of application while there is probably no other area in which Defense has a greater need for complete, appropriate, timely and accurate information. We have had excellent high-level interest in this area right from the start. When fully operational our personnel information system will provide extensive information on the skills of our personnel, their present status and distribution, projected gains and losses, and other data needed to manage our manpower resources. Here you will note that we have a total of four medium and three large equipments installed or approved at the end of the fiscal year with an additional two medium system approved since then.

The third area of application is fiscal, statistical services, and payroll. In industry, payroll is probably the primary reason for most applications. In Defense we don't have a single instance where it has been the principal application. The reason for this difference is that our Defense payroll operation is generally less complex and expensive than industry's. However, there will be a substantial development in the fiscal and statistical area within the next few years to meet increasing requirements for better management information with which to establish realistic price tags for programs, introduce economic incentives and satisfy the needs of Congress. Here we see there were seven medium and two large computers installed or approved by 30 June 1958 with an additional two medium and one large approved or installed since then.

The fourth area we refer to here as "integrated operations." or, we could use the term "centralized operations" or "central services." In this category we have counted those installations which serve more than one functional area of management. Good examples are the Army Class I operation at Fort Meade, Maryland, and the Navy Mare Island Shipyard installation. Here we had 10 medium and 3 large systems installed or approved by last June 30 but with 50 more approved or planned. This promises to become one of the largest, if not the largest, categories because of the potential for more fully utilizing computer capabilities.

Under the miscellaneous category we have grouped the six medium and three large computers which just didn't fit in the other slots, such as Air Weather Service, Traffic Management, etc.

When we refer to ADPS programs in the recent DOD Directive 5105.14, (attached) we call them "support programs" and define them as "plans and schedules for the use of ADPS within a military department in the support of business-type operations." Throughout this directive, and our

other written statements, we have emphasized the importance of the system aspects and the management objective in the use of ADPS and a subordination of the "hardware." We think that there is nothing inherent in an electronic computer which assures its effective use. We are also inclined to go along with Jay W. Forrester who says in a recent issue of the "Harvard Business Review" that "a computer is no more the focal point of the future management profession than a slide rule is the essence of engineering." We are interested in automatic data-processing equipment as a tool--a means to a desirable end--but not the end itself.

The directive provides that the Secretary of each military department designate a senior policy official to monitor and review the development and maintenance of data-processing support programs within each department and to monitor the presentation of such programs to the Assistant Secretary of Defense (Comptroller) for his review and approval. After program approval the Senior Policy Official is responsible for approval of specific projects, within such program, under criteria set forth in the directive.

Four categories for justification of ADPS projects were established by the directive which provides that each present or proposed ADPS project be placed in one or more of such categories. Three of these categories recognize the three basic approaches used to justify a computer installation:

1. the reduction of current direct costs of data-processing operations;

2. the prevention of major increases in costs of data-processing operations by reason of growth in volume, complexity, or other additional requirements; and,

3. to solve a major data-processing deficiency in present or projected business procedures. Frequently this requires an increase in costs which must be measured against the value in military effectiveness that will be derived from the desired management data.

It will be apparent that some projects may spread over more than one of these three categories in which case the category designation would be arbitrarily assigned.

A fourth category was provided for the conduct of experiments in the design of data-processing systems and equipment. Approval of projects in this category is required at the OSD level.

To provide the mechanics for transition to the new "program basis" Mr. McNeil, the Defense Comptroller, released in October, to the Secretaries of the Army, Navy, and Air Force, a "Call for Data Processing Support Programs and Projects." This call conforms to the provisions of the recent directive which charges him with responsibility for issuing such periodic calls, prescribing the form and content of the submission and reviewing and approving the data-processing support programs.

The written statements and forms, by which the support programs are to be submitted, are designed to present a blueprint of both tentative and firm plans for systems studies and the installation of automatic data-processing systems projected from one to three years into the future. The requirement for such a projection reflects our conviction that effective planning and management of ADPS must be based upon the establishment of clearly defined long- and short-range goals particularly with regard to the functional applications planned at the time phasing of their implementation.

The "pricing-out" of systems costs and benefits is required for only that part of the support program which falls within the time-frame of the ensuing budget year. This part is to be approved and returned with disapproved items deleted.

The information that is to be presented in the support programs represents a selection from the much larger body of information that will be necessary at the departmental levels of the Army, Navy, and Air Force to manage their respective programs effectively and to review and approve the specific projects set forth in the support programs.

The first data-processing support programs were received in OSD in December and are still under review. This review is being done collaboratively with all interested offices in OSD. Since this is our first experience in reviewing such a program we don't yet know how it will all come out.

I think you will be interested in the next chart (chart 2, page 17) which shows summary projections of ADPS installations through Fiscal Years 1960 and 1961. The first column indicates the number expected to be in operation at the end of Fiscal Year 1959. The next two columns show the number of additional installations planned for Fiscal Years 1960 and 1961. The totals are rather startling. To give you an idea of what Fical Year 1960 data processing support represent, in terms of

dollars, this next chart (chart 3, page 18) shows both equipment rental and related personnel costs as estimated for each department and the Defense total. You will see that we have added with this, however, EAM costs as well as ADPS costs to give the full picture of data processing costs.

The last part of my talk this morning is directed specifically to my assigned topic of evaluating the ADPS program or, to put it more succinctly, comparing performance with promises. From the viewpoint of the classical management cycle, of planning, execution, and evaluation, I consider that we are now entering the evaluation stage of our DOD program and that we must take stock of our situation before we repeat the cycle on the new "program basis." The first two parts of my talk give you a background against which you can better understand the problems of evaluation.

When I talked with Colonel Davis, several months ago, about today's program I was very confident that I would be in a position today to give you some case histories of ADPS performance based upon on-site performance reviews of operating installations made by members of my staff. DOD Directive 5105.14 of 6 May 1958, to which I have been referring, imposes a requirement on my office to conduct such on-site performance reviews of ADPS installations and to make recommendations with respect to the future operations of these installations. Several such performance reviews were tentatively scheduled for the last part of 1958 and I expected to have a few case studies by early January to cite as evidence of the success or the failure of ADPS. For several reasons we didn't make it; in fact, it was just last week that we released to the departments an outline of the procedure that we plan to follow in making the performance evaluation reviews. We are scheduling the on-site fact-gathering phase for three prototype cases for January and February and we hope to complete our first evaluation reports in March. Following the prototype performance reviews we will then set up some review patterns or standards and then schedule the on-site performance reviews, for all ADPS installations, as rapidly as we can cover them. I guess you can chalk this up as one instance in which performance didn't measure up to promise or at least to my expectation.

CHART 2

AUTOMATIC DATA PROCESSING SYSTEMS IN THE DEPARTMENT OF DEFENSE

(Projected through FY 1961 from Departmental Programs)

	INSTALLED AS OF 30 June 1958	ADDITIONAL ADPS FY 1959	FY 1960	FY 1961	TOTAL END OF FY 1961*
ARMY	17	22	50	35	124
NAVY	24	21	9	12	66
AIR FORCE	55	47	56	12	170
OSD	1	0	1	0	2
TOTALS	97	90	116	59	362

*Totals are overstated since some new ADPS will replace existing systems.

CHART 3
DEFENSE DATA PROCESSING COSTS
(Estimated - In Millions of Dollars)

			FY 1959	FY 1960
ARMY	Equipment Rental	ADPS	7.7	17.0
		EAM	12.0	11.8
		Subtotal	19.7	28.8
	Personnel & Supplies	ADPS	8.0	17.0
		EAM	48.0	48.0
		Subtotal	56.0	65.0
		ARMY TOTALS	75.7	93.8
NAVY	Equipment Rental	ADPS	13.3	18.5
		EAM	5.7	5.9
		Subtotal	19.0	24.4
	Personnel & Supplies	ADPS	13.0	18.0
		EAM	23.0	23.0
		Subtotal	36.0	41.0
		NAVY TOTALS	55.0	65.4
AIR FORCE	Equipment Rental	ADPS	22.4	40.1
		EAM	22.8	21.7
		Subtotal	45.2	61.8
	Personnel & Supplies	ADPS	22.4	40.1
		EAM	91.2	84.8
		Subtotal	113.6	124.9
		AIR FORCE TOTALS	158.8	186.7
		DEFENSE TOTALS	289.5	345.9

We believe that making these performance reviews of individual installations, which will be made with personnel from the military departments, is the best way to measure the actual effectiveness of an ADP system and to guide our future actions. Expenditures for ADPS are very substantial. To justify such costs these systems should be able to produce some significant advances in fundamental management effectiveness through better data information systems. If it cannot be proven that the ADP system results in improved military effectiveness then it must produce identifiable dollar economies without any curtailment of the effective management support of our military programs. Ideally an ADP system should produce both of these benefits; and we generally find that the initial proposals for such systems promise both reduced costs in data-processing and improved management effectiveness.

In our prototype reviews we intend to cover the following six points as a minimum: (However, we can't just compare performance with promises--we must also consider the changes in circumstances that have occurred).

1. What advances in management effectiveness have been produced resulting either directly or indirectly in better management support for the military program?

2. What specific dollar and manpower economies in the data-processing area have been realized without jeopardy to the military program?

3. To what extent have initial goals (both management and economic) been realized and what reasons can be attributed to exceeding or failing to meet these goals? (Incidentally, we also need to take a look at the reasonableness of the objectives and the budgets that were initially established).

4. What specific planning has been undertaken to insure the continuance of the information systems in time of emergency?

5. In light of the current status of ADPS operation, what are the future prospects? Are there new goals within reach, and, if so, what are they?

6. What specific operating problems were encountered which were particularly difficult to overcome and what steps were necessary to meet these problems?

In addition to these six general questions, we also expect to gather considerable data on the planning, programing conversion and operating phases which should help us and the military departments in the consideration of proposals for new ADPS projects and programs.

Although I cannot, at this time, give you a firsthand report on performance reviews of specific installations, I can give you what I believe to be some very reliable reports on ADPS performance in general and a few specifics.

In June of 1958 the General Accounting Office released to the Congress a special report on a survey made during 1957 and 1958 on the use of automatic data processing in the business and management control systems of the Federal Government. This comprehensive survey specifically excluded the scientific, engineering, intelligence and military operational uses of computers, but covered over 120 Federal Government business-type systems in operation at the end of 1957. In addition, the report identified over 150 automatic data-processing systems in the approved or advanced planning stages. At the local installation level the GAO survey delved into the chronological aspects of planning, feasibility studies, systems analysis and integration, programing, site preparation, installation and conversion, operational experience, evaluation, and the planning for additional applications. At the higher organizational levels, the survey dealt with such things as: the support of top management; the development of master plans for integrated systems; trends toward centralized data processing; the effect of ADPS on efficiency and economy; the effect of the new systems on management control, auditing and personnel; development of criteria and policies for the management and control of data-processing programs; and, the degree to which future potentials were recognized and planned for.

In this GAO survey we find, in effect, the same critical review and agonizing self-appraisal of "office automation" on the part of the Federal Government that has been contained in the recent rash of articles appearing in leading periodicals such as "Fortune," "Harvard Business Review," "Dun's Review," and others over the past year and a half. These articles attempted to compare the promises or expectations, in data-processing programs of business and industry, to realization and actual experience and to analyze the reasons for failures or successes. There is a remarkable similarity in the conclusions of the GAO report and the current articles. Both Government and business appear frequently to have underestimated the problems, the time involved and the cost of installing these new systems and, conversely, overestimated the immediate benefits and savings.

John Diebold says in his recent article, in "Dun's Review" for August 1958, that 33 percent of the large computers fell short of hopes and that 44 percent of the medium computers fell short. On the other hand Diebold's survey indicates that: 94 percent of the installations meet or exceed expectations for improved accuracy; 91 percent meet expectations for the new analysis of existing data; 81 percent meet or exceed expectations for faster preparation of reports; and that, in only one area--improvement in employee morale--did the results fall under 50 percent of expectations.

Diebold's article indicated clearly that many of these failures, to meet a high percentage of expectations, were due to failure on the part of the installation involved to observe some of the principles and criteria that have been prescribed for some time in DOD Directives. So far as we know Mr. Diebold's figures do not include any Defense experience. Diebold says further that industry's attitude today is somewhat like Damon Runyon's character "Harry the Horse" when he went out to the track. He said: "I hope I can break even today. I need the money."

Before I forget it there was a very good article by Philip Gustafson, in the November 1958 issue of "Nation's Business," titled "What Management is Learning From Computer." The article is based upon the experience of a number of companies and deals mainly with three aspects of computer use: effect upon organizational structure; effect upon the functions of middle management; and, the change in status of rank and file workers.

Although quite critical of some aspects of the Government's data-processing operations the GAO report was very objective. It evidenced a good understanding of the complex problems which have accompanied the development of this new art. Fortunately, since the report was not written for sale, it did not need to resort to the exaggerations and advertising-type rhetoric which characterized many of the magazine articles.

In Defense we feel that the report's criticism is constructive since it will help us focus our attention on the problem areas that have been clearly identified. The report is particularly significant to us in Defense since over two-thirds of the total Governmentwide ADPS applications are in the military departments. Also, the major plans for expansion of data-processing systems are principally in Defense activities. We take some satisfaction in the report's statement that many of the most significant problems and advances are in Defense and that, through ADPS, we have made important advances in achieving more effective

and more efficient management control over major phases of our operation.

At the request of the House Government Operations Committee the GAO extended their survey in October 1958 to see what effect this new technique has had and is having on some of our long-time logistics problems, and as: cataloging; inter-service supply support; and, the reduction and disposal of surplus property. There is a good chance that this may result in a congressional hearing in the spring.

Let's take a look at the kinds of benefits or savings that might reasonably be expected from an ADPS installation. They may all be classified under the following four combinations: They may be direct and tangible, such as personnel reductions in the data-processing function; or, they may be direct but intangible, such as more timely reports. On the indirect side: they may be indirect and tangible, such as inventory reductions; or they may be indirect and intangible, such as improved responsiveness to demands -for instance, benefits to the customer from a high fill-rate on supply requisitions.

A brief review of the departmental data-processing support programs indicates that operational improvement is the primary category in motivating the move toward ADPS in Defense. The Magazine articles that I have referred to, as well as the GAO survey report, also indicate that both industry and the Government are, in general, finding the real benefits in management improvement rather than reduced costs. There are exceptions, of course, to any generalization. Insurance and utility companies have reported substantial cost reductions through ADPS and we also have many instances of cost reduction reported in Defense.

Now I would like to cite some specifics in the area of management improvement.

Army reports that the Richmond Quartermaster Depot has: cut their processing time generally; reduced extracts from requisitions on other depots from 20 percent to 4 percent; increased availability by as much as 6 percent; and, at the same time reduced inventories of general supplies, subsistence and petroleum in excess of $54 million. ADPS is credited with having contributed substantially to these improvements.

Navy reports that, at the Aviation Supply Office, they are now applying the principle of management by exception (which is talked about a lot but seldom used) and that a stock analyst who formerly managed

370 stock items now manages 550 items because ADPS performs the routine clerical tasks.

Air Force reports the establishment on ADPS at the Oklahoma City Air Materiel Area of a Worldwide perpetual inventory, by a serial number, covering over 100,000 jet engines. On an exception basis this inventory is updated daily by airmail, wire, or radio reports from over 900 stations from all over the world. The Air Force has found that when the pipeline time on engines was cut from four and a half months to three months the number of engines required as spares for a given operation could be reduced by one-third. In other words every day cut off the pipeline will literally save millions of dollars.

Although I could cite a large number of reports on management improvement these three are typical and I would like to move on to the economics of ADPS. There have been many articles, and even books, written on this subject but I will confine myself to the problem in the Defense ADPS program.

As I mentioned earlier the current ADPS support programs of the military departments have classified most of the present and proposed installations under the justification category that rests on improved management. When we checked our files on some of these installations, we found they were originally submitted for OSD review and approval on the justification basis of reduced cost of data processing. This isn't surprising. When you spin your prayer wheel for the Comptroller you make the dollar sign show if you can and the approval responsibility has been in the Comptroller's Office. Let's be realistic. You would naturally expect more favorable consideration from Comptroller types for a proposal that anticipates a reduction in cost than from one that indicates a cost increase. Although I haven't checked this out I would estimate that a great majority of the proposals submitted for our review and approval were justified on the basis of a reduction in direct operating cost or the prevention of a cost increase.

When we approved a proposal for a new ADP installation, justified on this basis, we have furnished our OSD Budget Division with a memo which identified the installation, the appropriation and project account under which it is to be financed, the amount of the anticipated cost reduction, and the fiscal year in which it is expected to be realized. We have followed this practice for the past couple of years and the Budget Division has been tucking these memos away in a "promissory note" file.

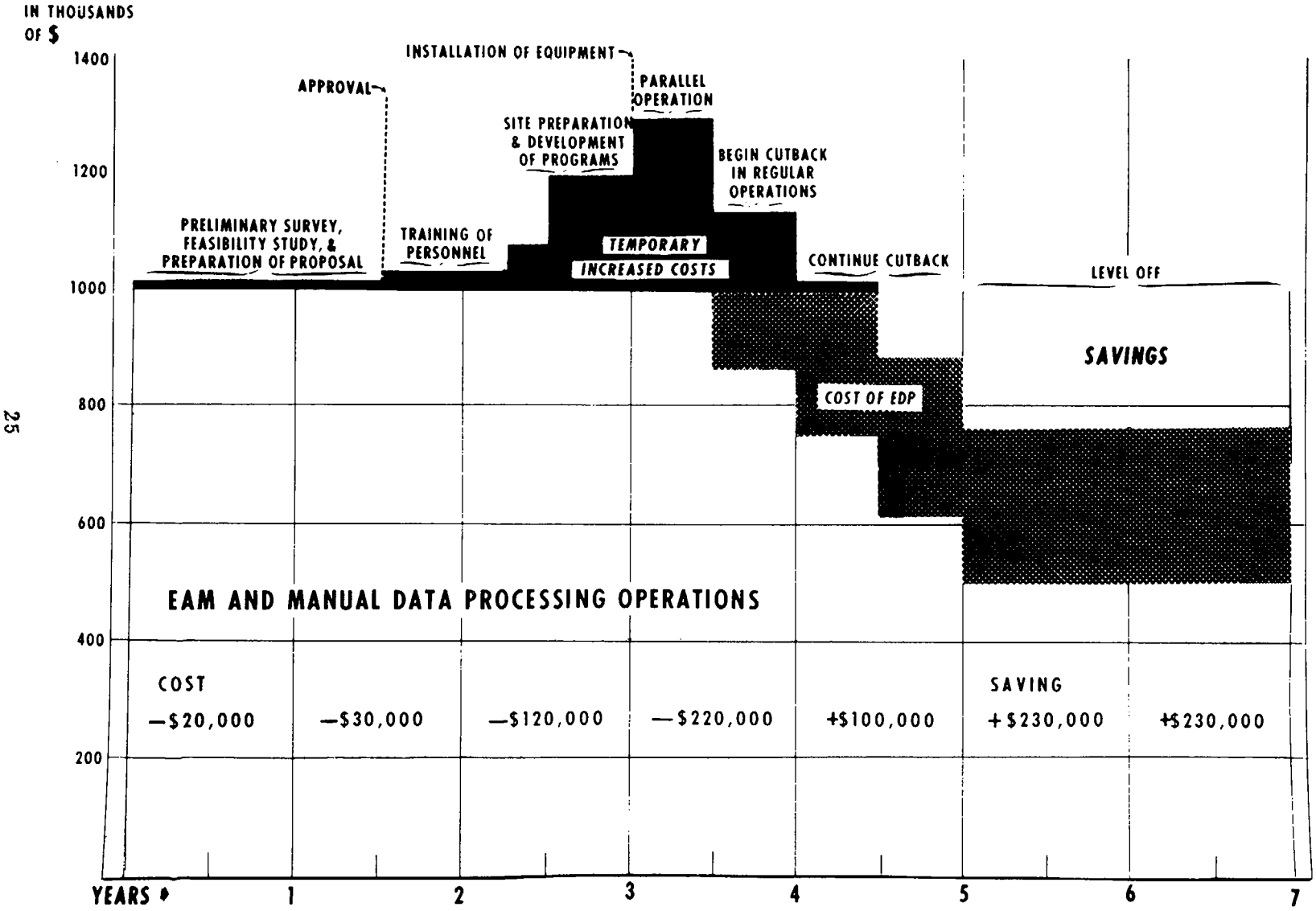
When the budget hearings were being held last fall, the Budget examiners "pulled" the notes for 1960 and presented them for "collection" by asking the military departments to show how these promised reductions in cost had been given effect in the budget estimates. I understand that all three departments told our Budget Division that ADPS wasn't saving money but was costing money. On the face of it this would appear to be in direct conflict with the previous estimates of cost reductions which were made by responsible officials and checked out as to reasonableness at several levels, including my own staff. An explanation of this apparent conflict must be made before we move ahead to be sure we are not continuing our program under false assumptions.

Now I believe that the best way to get the real facts on the question, of whether the performance is equaling the promise, is through the individual on-site performance reviews that we are inaugurating this month. I think it quite probable that we may find that the installations have actually reduced the data-processing costs, in other words, that there is no real conflict between the statement made to the Budget Division, that ADPS is costing more money, and the realization of promised cost reductions in data-processing at the local level. Let me show you my reasoning.

This chart (chart 4, page 25), developed by one of the military departments, is a cost profile on a hypothetical ADPS installation. This is a sizable operation where the EAM and manual data processing costs were running at about $1 million per year. You will note that the increased costs, for the feasibility survey, the training of personnel, site preparation and development of programs, go up to a rate of $200,000 per year, for the 6 months prior to equipment installation, above the previous level. At time of installation, the parallel operations and conversion costs make another substantial jump and then begin to cut back about 6 months after installation. As the different applications are phased in, the additional costs drop off to the point that costs go below the original levels about 18 months after installation and then level off at around 23 percent below the original data-processing costs.

CHART 4

ECONOMIC ASPECT OF AN EDP SYSTEM INSTALLATION



On the basis shown here the savings would amortize the additional temporary increased costs in less than four years and, presumably, would continue at the reduced level. We have checked this cost profile with the limited information available to date in both business and Goverment and think it is "in the ball park," for large-scale equipment, but needs some verification. Our Defense criteria, established in DOD Directive 5105.14, sets the period for amortization of one-time additional costs at not more than five years.

As portrayed on the chart cost reductions are not anticipated until the equipment has been operational for about 18 months. This conforms quite generally with the estimates in the proposals we have approved. Therefore, installations which should begin to show cost reductions in fiscal year 1960 will usually have been installed by the end of calendar year 1957. From the previous charts you will recall the substantial increase in the number of new and approved applications during the last calendar year. The large number of these new installations, with their temporary increased costs, will more than offset any reduced cost that might be realized by the installations that were operational by the end of 1957. This means that while there may be reductions in data-processing costs at the installational level by the early starters, as promised in their original proposals, they will be offset by the increased costs for surveys, training, programing, site preparation and conversion of the late starters in the last calendar year with a net increase in overall costs reflected at the appropriation level. Therefore, although performance may equal promise for the early starters, the additional temporary costs of the late starters absorb this cost reduction and actually show an increase in cost at the project and appropriation levels.

The foregoing rationale contains an assumption that reductions in cost of the data-processing function at the installation level would be directly reflected in reductions of the total local installation costs. I hasten to assure you that I am not so naive as to think this could happen under currently accepted management philosophies. For example, under the Army's command management philosophy, if the commander should save $200,000 in data-processing costs he can spend it to paint the warehouses. On the other hand, he may have to save the $200,000 needed for feasibility studies, site preparation and programing by letting the warehouses go unpainted for two or three years. Let me give you some examples, not in the Army, of how these cost reductions in data-processing can be absorbed right at the installation level.

The Ships Parts Control Center at Mechanicsburg, Pennsylvania, established a target of 64 personnel space reductions in the data-processing function within a year from installation of the "hardware." They met this objective--in fact, they later exceeded it--but what happened to the spaces? They were transferred, with approval of the Bureau of Supplies and Accounts, to the cataloging function and to a new function--the development of a consolidated ships parts allowance lists--both long recognized needs for which personnel had not previously been available. There was no reduction in the total personnel complement at SPCC, Mechanicsburg; in fact, the overall costs increased by reason of a 10 percent raise in salaries and additional equiment rental needed for the new function.

The Air Force reports that, although there was no overall reduction in the appropriation, the installation of 26 IBM Card 650's at air materiel areas and depots resulted in a net reduction of 577 personnel spaces in the data-processing function and that the extension of this program to tape-operated equipment eliminated an additional 517 spaces and promises a further reduction of 683 spaces.

This just about concludes what I have to say on comparing performance with promises. The Navy contends that it is too early to check performance against promise on any installation whose promise was more than a direct saving in data processing and that an evaluation of improved management effectiveness, which is the true goal, will take up to five years. I don't know whether we can wait that long for results, but if I'm still in business a year from now, I'll be glad to report on what we find in our performance reviews.

A story in the Washington Post of 24 December 1958, with a Moscow dateline gives me hope that we are on the right track and ahead of the Soviets in at least one area. The story quotes a Soviet official, Mr. A. Senin, a budget committee chairman, who said that 200,000 Soviet Government workers could be doing something else if the Finance Ministry would use electronic calculating machines instead of the ancient abacus. He further complained that the number of Government accountants and bookkeepers had increased by 4 percent in the past two years.

It is my personal belief that we will find, as the result of a thorough and objective analysis, that computers are highly efficient and effective management tools where they are properly employed and that, with careful preparation, their performance will satisfy all reasonable objectives. I think the key to a successful installation of ADPS is in the preparation for its use and I like the analogy of Mr. Frank M. Knox, president of a management consultant firm bearing his name,

on this point. He says that a man thinking about office automation is a little like a man thinking about climbing a pyramid. It is obvious that the pyramid rests on a solid base and rises to a sharp point. From the solid foundation it rises in fairly straight progression--to the pinnacle, and the only really practical way to reach the top is to start at the bottom and climb. You know it will probably be a long and tiresome climb.

Some executives don't see this pyramidal aspect and don't realize that there is a starting point and an end objective or that there is a logical progression from the bottom to the top or that it is an arduous job. Being direct-action people they try to avoid the sweat, toil, and tears and hire an airplane, get a parachute and try to crash-land at the top. They will probably slip on the narrow pinnacle, fall or roll to the bottom, and then, nursing their bruises and pretending not to notice the loss of prestige, do what they should have done in the first place and climb laboriously back to the top.

If any of you are now or in the future should be involved in automatic data-processing or office automation, please think of the pyramid. Thank you very much.

COLONEL DAVIS: Mr. Phillips is ready for your questions.

QUESTION: On the bottom of one of your charts you have listed "data not otherwise available" and another term you used was "management by exception." My brief experience in this field leads me to believe that one of the biggest problems is that people can, with this automatic data processing, get information that they could not get before simply because it's available and that, therefore, there is more of a tendency for more detailed information to go higher. Just what can we do to prevent that from becoming somewhat of a monstrosity?

MR. PHILLIPS: I quite agree that this is a real problem and one that we have to be continually alert to prevent. My boss, Secretary McNeil, made a talk a couple of years ago before a supply management group in which he made reference to this very problem and said that he liked a term, that had grown up in a scientific use, of "data reduction." He thought we should attempt to apply that same expression in the management field and see what we could do to cut down the amount of data that comes forward.

Actually you can drown management with too much information as he expressed in his talk. He thinks we should take steps to reduce this flood of information to a controlled flow of significant facts on which

management decisions can be made. It's very easy, since machines will turn this stuff out in most any quantity that you wish, to get "report happy" and call for things that you can't use, or that management can't understand.

QUESTION: Early in your talk you mentioned that the Kelly Report recommended a gradual turning back to the military departments of responsibility in data-processing. What has been accomplished along that line?

MR. PHILLIPS: We have just moved into what we call our program base. The services each submitted to us in December their data-processing support programs, which we are now reviewing. We are doing this review in collaboration with the officer of the Assistant Secretary for Manpower Personnel and Reserve and such other elements of OSD as have an interest.

We will, at the conclusion of this review period, return the approved programs to the departments and then the individual projects will be approved within the programs by the senior policy official in the departments. This in effect relinquishes or delegates to the services the responsibility for the detailed continuing review of proposals for individual installations of data-processing equipment.

Does that answer your question?

STUDENT: In part.

MR. PHILLIPS: What's the rest of it?

STUDENT: This really hasn't turned much back?

MR. PHILLIPS: No. Not yet. We are still in the transition period. We actually don't know how it's going to work. We're in the process of trying it out, and we think it will be effective.

QUESTION: Mr. Phillips, do you have any problems in these records that you put in the computer files being acceptable to the audit agency? Are they legal records in their present form?

MR. PHILLIPS: Yes. This question has received attention by public accountants and has also been considered in the General Accounting Office. I don't know of a specific test case that has been submitted to the courts or to GAO.

I think that public accountants are generally accepting these records. The New York Insurance Commission is accepting magnetic tape records for their insurance record purposes. I know this to be true and I think that they are being accepted in court although I don't know of a specific court case in which they have been accepted as legal records.

This reminds me of a story that I heard the other day. I was telling a friend in the Army about the newspaper article on the Russian officials comment on the abacus and he told me a true story. He said that he was in Japan in 1949 and 1950 stationed at Osaka in the finance group of the 25th Division. They were working in marble office buildings, with plenty of office equipment, typewriters, adding machines, calculating machines, and addressographs. They also had a few indigenous help, some Japanese boys who wouldn't use an adding machine or calculator but who would always pull their abacus out and use it. He said he had one young chap there who was so proficient that he could just hold his hand up in the air and work it as though he were on the beads and come up with the answer.

They moved out when the Korean War hit and when they set up shop in some rice paddy in Korea and uncrated their office equipment they found that the Japanese had packed it in green lumber and that it was rusted tight. There wasn't a piece of office equipment that they could use at all. So they had to resort to ball point pens and flat rocks. Some of the boys had, during the soft period in Japan, learned to use the abacus quite well. In fact it became a matter of "face" to be able to do it as well as your buddy. Some of them even had an abacus with them. Those that didn't have one went out in the Korean economy and picked up some abacuses. Before too long the office staff was going at a great rate, with the boys all doing their calculating on the abacus.

Everything went fine until an inspector general showed up. The inspector came in took a look at the office saw all the boys working their beads and he said: "What's all this monkey business with the abacus?" "You're disbursing public funds. You haven't any tapes to verify, you will have to get adding machines."

Did I answer your question satisfactorily? I believe there is no question being raised by our own internal audit groups on the acceptability of these records.

QUESTION: In your comment about the Army's command management system I seemed to get an implied criticism of the fact that the

commander would expect to spend savings from one part of his program in another. Looking back about 10 or 12 years in the Defense Department, it seems to me that the military people were sold the fiscal system on the basis that it gave them flexibility that they didn't have before in, say, supply item accountability and so forth. These don't seem to jibe just right--going first to one side and then the other.

MR. PHILLIPS: I realize that it may have sounded that way. I had no intention, however, of casting any aspersions on the Army's command management system. And I realize that what you say is true. I think the Secretary of Defense has asked Congress at times to give him authority to shift money between budget activities within an appropriation. If he asks for such authority at that level, I think it quite reasonable that a commander might have authority to shift funds between different types of expense accounts at the local activity level. I had no intention of criticizing it. I believe that it's accepted management philosophy now.

I just wanted to point out that if he saves money in the data-processing function it seldom will make its way up above the installation level. If it gets above the installation level, it will seldom make its way above the command level or bureau level. I don't think there's ever a chance of its getting up to the appropriation level unless there is some means designed of capturing it. I don't know how to do it.

QUESTION: Mr. Phillips, it is my observation that the success of a large computer installation is directly related to the availability of topflight classification and programing people to operate it. Four or five years ago I know these people were in extremely short supply. I wonder if anything is being done, at the college level or Department of Defense level to do something about increasing the pool or source of these personnel.

MR. PHILLIPS: Yes, sir. This opens up a subject thats good for a couple of hours, but I'll try to just limit it to a minute or two.

Training programers is a really tough job and recruiting good qualified people for this field is difficult. There was a general impression several years back that in order to do programing it was necessary that a person have a degree in mathematics. This just isn't true. We found that, in the management field, people who are acquainted with the supply function or the personnel function or the fiscal function--people who know the subject matter to which the equipment is to be applied--are the best programers. They can be taught how to reduce those things that they know need to be done in the subject matter field into

machine language. It's principally a matter of teaching them the machine language. So we have turned quite generally to that approach. This isn't true, of course, in the scientific or engineering applications where they of necessity have to be an engineer or a mathematician in order to develop computer programs.

We have had a fair degree of success in Defense in our computer programing. We have not lost as many as we thought we would. There was a time when we were losing programers and operators much faster than we are now. I think we've been able to get our grade levels and our pay levels, up a bit. Our most serious turnover problem is now with operators and in a few cities the Civil Service Commission has authorized having new operators at rates above the minimum of the grade. Civil Service has shown a recognition of the problem. They have published classification and qualification standards for Analysts, Programers, Console Operators and Peripheral Equipment Operators. These standards have helped us.

The picture is a little brighter than it was. In fact, turnover and staffing was regarded as such a serious problem that the Bureau of the Budget undertook a Governmentwide survey of the personnel problems. The report actually has not been released yet. The fact-gathering was done back in the middle of calendar year 1958. The management consulting firm that was doing the job for them hasn't yet submitted its report. But it is due this month. Any of you who are interested in this aspect of it, the personnel aspect, might like to see this report which projects the training problems and the recruiting problems and the numbers in each of the major categories. This information I don't have this morning, but I will have it within a week or two, and I will be glad to furnish it to any of you who are interested and want to follow it up.

QUESTION: Mr. Phillips, I have heard that we are away ahead of the Russians in number of reports. But we have over a third of a billion dollars tied up in this automatic data-processing and, of interest to me was the fact that you're going to go into this performance evaluation in June. Now, that does not, by the title itself, indicate that you will actually get into the source data. My point is that with all of this expensive machinery, if the data we get at the roots is not accurate, then all we get is a more rapid transmission of erroneous data. I wonder if that's going to be covered at all in your survey.

MR. PHILLIPS: Yes, sir. Actually this is a subject to which the internal audit teams of our three departments are turning their attention.

They have made a number of rather critical audits of installations using this equipment, they and the General Accounting Office, and have pointed out the fact that you can't put in garbage and expect to get out salad--it still comes out garbage.

We have recognized this as a really tough problem of purifying data and have attempted to emphasize it in our criteria. I think all three of the departments have emphasized it in the regulations they have issued. This problem has always been with us, but it is accentuated under ADP. Under ADP it's called to your attention a little more quickly.

I think that this has a good effect, however, in that you just can't operate these systems with bad information. It makes it essential that we clean it up and purify it.

QUESTION: In some cities I have noticed that there are businesses where they have a lot of electronic data processing equipment and will sell time on their equipment. Many of our installations do not have a load which would warrant purchasing such equipment. Has there been any contracting for these services by some of the Department of Defense activities?

MR. PHILLIPS: Yes, sir. There is right here in Washington a firm called CEIR, or Corporation for Economic and Industrial Research, which sells time on an IBM 704 and 709--I think they have both of them, and I think they have some other equipment as well. Also Ernie Blanche and Associates is another data-processing group here who have access to a Univac. They also will do programing or your complete data-processing job. The IBM people have a Service Bureau Corporation which does data-processing on contract.

We use these services although I think there are certain restrictions upon them. I don't think we are authorized to use them for a continuing job that we normally should have an in-house capability to perform. I know that several years back the Army Engineers at Columbus contracted to have some of their punched card work done by a contractor and the General Accounting Office threatened to disallow the whole payment, unless they discontinued it, on the basis that this was an effort to avoid personnel ceilings and have a contractor do a job that they should have a capability of doing in-house.

We have similar problems, of course, right now. In fact one of the services is considering a contract for the design, installation, and operation of a system. I don't know whether there is a legal question there or

not. But, to handle peak loads, to help in conversion, to do small jobs for which there is no continuing requirement, it's quite customary to contract and there are facilities for this throughout the country.

Also there has been an effort by the Bureau of the Budget to get some of the smaller civilian agencies to work out some plan whereby there can be a common-use facility set up, maybe in the Bureau of Standards, that would sell time or have time available on a sale basis to other Government departments that don't have ADP equipment.

We in the military departments generally have equipment of our own that could serve other areas. In Washington right now we have three service centers. The Air Force has a service center which will do data-processing work for any element of their headquarters. The Army has recently established such a service center also available for any element of the Army. The Navy, in the Executive Office of the Secretary, has a small unit which does the same thing for Navy Bureaus.

So we follow this concept right through the military departments. Some of these things are so close to home that you almost forget about them.

QUESTION: Mr. Phillips, you limited your discussion, I gathered, to the fiscal management of supply installations in your review of new equipment.

MR. PHILLIPS: No, sir. To anything in the business management field.

QUESTION: You haven't gone into R&D?

MR. PHILLIPS: No, sir. We haven't gotten into the use of computers for scientific research and engineering calculations.

QUESTION: Have you any feeling for how large, as compared to this increment that you have here, this other field is?

MR. PHILLIPS: It will be a little hard for me to even make an estimate on it because in that field the equipment is usually purchased and in the business management field we ordinarily rent it. You would have to equate the rentals with the purchase figures. So I would be reluctant to even hazard a guess on it.

COLONEL DAVIS: Mr. Phillips, thank you very much for the evaluation you have given us here. The facts that you called to our attention in evaluating and adopting any new management system I think have really been most worthwhile.

Thank you.

1 Attachment:
DOD Directive 5105.14

(28 April 1959--4, 300) B/bn:pc

May 6, 1958
NUMBER 5105.14

ASD(Comp)

Department of Defense Directive

SUBJECT Policies Governing the Justification of Automatic Data Processing Equipment Applications to Business Procedures

Reference: (a) DOD Directive 5105.11, Responsibility for Application of Automatic Data Processing Systems to Business Procedures

I. PURPOSE

A. This Directive specifies the planning, review and approval practices which shall be adopted by each military department and by appropriate offices in the Office of the Secretary of Defense to assure proper justification for each installation of automatic data processing systems as defined in above reference for business-type operations.

B. This Directive does not apply to equipment used (1) exclusively for intelligence, scientific, or engineering applications; (2) in weapons fire control systems; and (3) in tactical military field operations of the armed forces.

C. This Directive defines (1) criteria to be met by the military departments in the development of data processing programs and projects; (2) justification categories for ADPS projects; and (3) responsibilities for the review and approval of ADPS programs and projects.

II. DEFINITIONS

As used herein, the following terms are defined as follows:

A. Feasibility Study - A study of the information requirements and data processing needs of an organization to determine what advantages, if any, would result from the use of automatic data processing equipment. A feasibility study represents a determination of need and desirability for use of ADP equipment for stated applications.

B. Applications Study - The detailed process of analyzing existing procedures and mission requirements and designing a system or set of procedures for using electronic digital computers for a definite function or operation and establishing specifications for equipment suitable to the specific needs.

C. Data Processing Support Program - A plan and schedule for the use of ADPS within a military department in the support of business-type operations.

D. ADPS Installation Project - A segment of a data processing support program that identifies an ADPS or proposed ADPS at a specific location.

E. Readiness Survey - A review by a responsible higher authority of the adequacy of preparation for equipment installation and its effective utilization.

III. BACKGROUND

A. Department of Defense experience with ADPS has demonstrated the need for top management evaluation of the proposed equipment installation well in advance of action to acquire such equipment. Usually one or more years of preparatory and planning work have been spent in determining the feasibility of applying ADPS and designing a system responsive to the needs before specific equipment can be selected. Thus, meaningful supervision of the application of ADPS equipment requires that top management evaluate proposed applications on the basis of "data processing support programs" which present a blueprint of both tentative and firm plans for specific installations projected from one to five years into the future.

B. In view of the extended preparation time and the high cost of renting or purchasing ADPS equipment, it is essential that each data processing support program be subjected to searching evaluation before equipment is ordered in order to avoid the wastes which result from applying these complex equipments to applications which should be handled by conventional means as well as from installing equipments prematurely, before adequate planning and testing of new procedures has been completed.

IV. CRITERIA TO BE MET BY ADPS PROGRAMS AND PROJECTS

A. Each military department shall develop and maintain its own long-range management information system plans and implementing data processing support programs.

1. Data processing support programs shall be developed and maintained by functional areas or major budget program.

2. Each data processing support program will include among other things a statement of the principal problems and deficiencies in present data processing systems which it is hoped to overcome; a timetable for systems studies and equipment installations (where justified) by organizational element and geographic location; a summary of current evidence based on studies completed and operating installations in use which demonstrate the feasibility and benefits of the proposed applications; and evidence that the program gives major emphasis to improving the entire system and recognizes technological change, both in systems and equipments.

B. Within data processing support programs individual installation projects will be established. Each project will be assigned to a justification category and submitted to evaluation and review as provided herein.

C. Regardless of the justification category assigned, both direct operating costs and one-time non-recurring costs for each ADPS installation project shall be estimated and considered in the review process. Both advance estimates and maintenance of expenditure records shall be required for at least the following elements of costs:

Recurring Direct Operating Costs (such as)	One-Time Costs (such as)
Personnel	Applications studies and systems design for a specific project
Equipment rental	Programming initial applications (and program "debugging")
Maintenance of purchased equipment	Training programmers and operators
Supplies	New forms and supplies (including purchase of magnetic tapes)

One-Time Costs (Cont'd)

Site preparation, installation and related costs

Extra cost of parallel operations during conversion

Purchase of equipment

In addition to the estimates and records of recurring direct operating costs and one-time costs, estimates and records shall be provided for tangible indirect savings such as inventory reductions.

V. JUSTIFICATION CATEGORIES FOR ADPS INSTALLATIONS

Each present or proposed ADPS project shall be placed in one or more of the following four categories:

Category A-1 - To Reduce Current Direct Costs

To qualify in Category A-1, an ADPS project must be able to show within one year after the equipment is installed a positive indication of substantial cost reduction below the direct operating costs of present data processing methods, and shall, within not more than five years, offset the one-time costs. Category A-1 installations will normally be found in standardized operations with anticipated stability in workload.

Category A-2 - To Prevent Major Cost Increases

To qualify in Category A-2, an ADPS project must show that within two years direct operating costs under present methods would substantially exceed the direct operating costs of the ADPS installation and shall, within not more than five years, offset the one-time costs. Category A-2 installations will normally be found in operations experiencing growth in volume and complexity of data processing requirements.

Category A-3 - To Solve a Major Data Processing Deficiency in Present or Projected Business Procedures

Category A-3 projects are those where direct cost reductions are not the controlling factor, but where

recognized defects in, or lack of, desired management information can be corrected by the ADPS. Category A-3 installations may be found where a definite improvement in military effectiveness can be shown and the additional costs, if any, can be justified.

Category B - To Conduct Experiments in the Design of Data Processing Systems and Equipment

Category B projects will be limited to planned experimental projects whose purpose is to explore and test new ideas and techniques. The number of Category B installations will be closely restricted and the justification for their continuation will be reassessed at least annually. Category B installations must serve the interests of a wide range of users within an individual military department, and wherever possible, in other departments as well.

VI. RESPONSIBILITY FOR REVIEW AND APPROVAL OF ADPS PROGRAMS AND PROJECTS

A. All data processing support programs and those ADPS projects in Category B shall require the approval of the Assistant Secretary of Defense (Comptroller). In conducting the review preceding approval action, the Assistant Secretary of Defense (Comptroller) will obtain the recommendations of other Assistant Secretaries of Defense who are concerned with policies governing the systems and procedures to which the data processing equipment is being applied. Submission of programs and projects to the Assistant Secretary of Defense (Comptroller) shall be in accordance with periodic requirement calls issued by his office.

B. The Secretary of each military department shall designate a senior policy official to monitor and review the development and maintenance of data processing support programs within the department and to monitor the presentation of such programs to the Assistant Secretary of Defense (Comptroller). The senior policy official shall approve all ADPS projects in Categories A-1, A-2, A-3 as defined above which have been specifically identified in an approved program and shall recommend Category B projects to the Assistant Secretary of Defense (Comptroller) for his approval.

C. Within one year following an installation, a representative of the senior policy official within the department, and a representative of the Assistant Secretary of Defense (Comptroller) or other Assistant Secretary of Defense concerned shall conduct an on-site performance review of the installation to verify the benefits being obtained and submit a recommendation with respect to subsequent performance reviews of the installation or other action.

VII. IMPLEMENTATION

A. Each military department shall issue instructions to give effect to the provisions of this Directive. Such instructions shall provide that each ADPS support program shall include for each project (as appropriate) a time-phased schedule of the four stages outlined below:

1. Feasibility study

2. Applications study

3. Equipment selection

4. Readiness survey

Provision shall be made for review and approval by higher authority as appropriate for each stage.

B. Within sixty days from the date of this Directive, each military department shall submit for advance approval of the Assistant Secretary of Defense (Comptroller) implementing instructions to give effect to the provisions set forth above.

VIII. EFFECTIVE DATE

This Directive is effective immediately.

Secretary of Defense