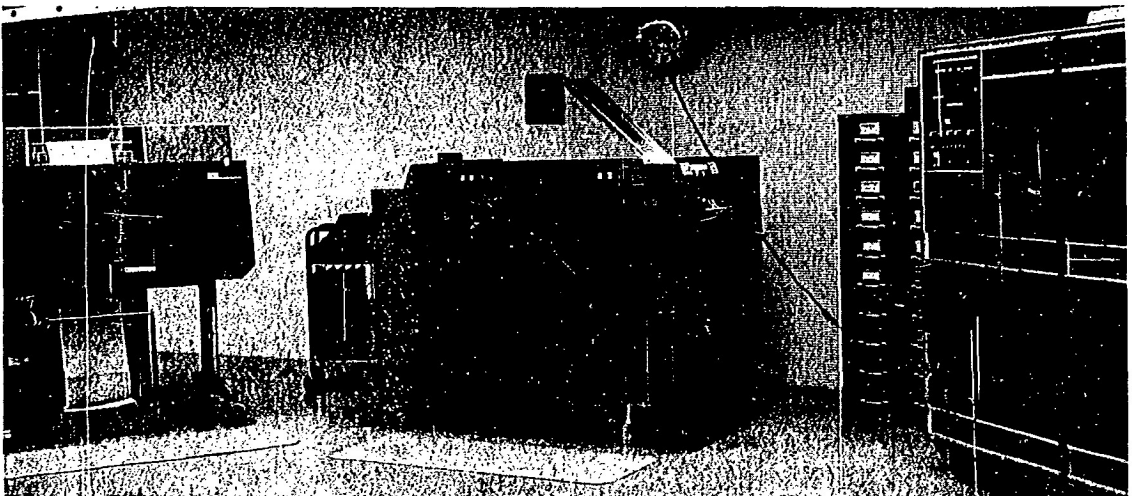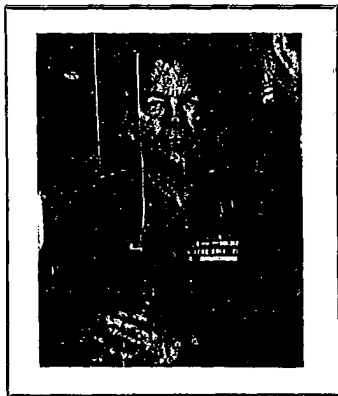# MARINE CORPS
COMMAND and MANAGEMENT
SYSTEMS
DEVELOPMENT

AN OVERVIEW

By LtGen L. F. Chapman, Jr.

The revolution currently underway in the Marine Corps is concerned not so much with the machinery of war as with the application of new techniques of command and control.

WHILE we are heavily committed in the conflict in Southeast Asia, elsewhere we have plunged deeply into preparation for the mounting professional requirements of the future. The events of Viet-Nam tend to dominate our thinking and consume our time; yet, it is imperative that the future receive our equally keen attention.

Mindful, then, of the Southeast Asia situation, this report on Marine Corps Command and Management Systems development—coupled with the subsequent articles of this series—is intended as one more means for increasing awareness of the gross changes which lie before us; few Marines are fully aware of the mammoth changes already underway.

The Revolution—Its Nature, Root, History, Effect

The main thrust of this revolution does not lie in changes of major lethal equipment; indeed, for the foreseeable future, our strength will continue to center on the infantryman with his rifle, backed by tanks, artillery, naval gun fire, and air; serviced and supported in much the same basic way that we now know and possessing swift mobility by sea, by land, by air.

Remarkable changes, though, in the techniques which we use to manage, commit, command and control that strength are imminent. The adequate Command and Management Systems of today are very soon to become outdated; improvements are mandatory if we are to maintain our professional stature in a surging environment.

This situation is the direct result of the unprecedented technological change going on about us in the application of newly available automation and communication means. Imposing developments in those areas are the source of, the opportunity for, unusually significant improvement in the responsiveness of the Marine Corps. In fact, the potential contributions of advances in computer capabilities and communication means,

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as well as advances in techniques which exploit their use, are, at this time, immeasurable; and so, too, is their eventual effect upon the Corps and upon the individual professional Marine.

For some time, now, the first phase of the automated era has been behind us. It included our automated supply and personnel accounting systems. The Marine Corps' use of emerging equipment and techniques during the first phase compares favorably with those of other Services and of industry. However, we have long realized that the "Ready" Service of the immediate and distant future will be the one which, among other things, has broadened its outlook from simple applications to encompass and exploit the panorama of man-computer-weapons complexes, or SYSTEMS, and their application to information flow, to command and control.

Accordingly, the Marine Corps has become progressively more involved in systems development over the past five years. We are seeking to take the lead by exploiting, to the full, the potential of computer and communications systems. The effect of this modernization will be felt at every echelon from the Marine rifleman to the Commandant. We expect our Corps will become more efficient, will provide significantly more rapid response than our nation has ever expected of us and will place demands for automated systems operation upon officers and non-commissioned officers far beyond anything we have ever known.

In the final analysis, the root sources of this revolution are "third-generation" computers and the Department of Defense's Automatic Digital Network (most commonly referred to by its acronymn, AUTODIN). A brief review of the capabilities of present-day computers and AUTODIN is in order.

3d Generation Computers and AUTODIN

The designation of current computers as "third-generation" is an industrial technique intended to imply significant gains in computer technology and capability through two other phases of computer history. The comparison is well-founded.

In the late 1940s, bulky, "first generation" machines could handle or manipulate only a few characters of data or information; additionally, those embryons could store only a limited amount of data for automatic recall. "First generation" equipment was characterized by those limited properties as well as by relatively slow processing time and inability to be programmed for direct communication with other computers.

In the 1950s, "second generation" computers were transistorized and their available memory was increased into the millions of characters. These were great improvements, but the computers of that era still possessed relatively slow puters of that era still possessed relatively slow

recall of information from their large memory devices and they possessed extremely limited capability for handling more than one program, or job, concurrently. Although their processing speed had improved, their abilities to communicate with one another were limited.

Now, in the '60s, "third generation" computer systems have further miniaturized parts and this miniaturization makes memory available in terms of billions of characters of data. Processing speeds have so increased as virtually to levy a requirement for multi-programming or multi-processing of jobs in order to achieve efficient utilization of these "third generation" computers; and nearing perfection, now, are tele-processing techniques which permit the direct automatic communication of data or information *between computers* at distances of thousands of miles, if necessary.

Tele-processing requires some means for digital communications; for that reason, among others, commercial and Defense Agencies have combined their talents to develop AUTODIN.

AUTODIN is designed to be a world-wide, automatic, secure, high-speed, digital network, intended to serve as the primary record communication system for the Department of Defense and its components. It is record communication—it has no capability for voice transmission and it is not a facet of data processing, *per se*. It is intended to replace existing, "common user" teletypewriter systems, such as the Navy's teletypewriter exchange, and most of the present manual data transmission networks, such as the Marine Corps transceiver nets which are used by our supply, personnel, and fiscal systems.

Security is attained through automatic, instantaneous, "on-line" encryption devices; "on-line," here, means constantly connected and operating automatically as part of the overall system. All traffic, regardless of its classification, is automatically encrypted for transmission over each link of the network; it is decrypted at the receiving point.

The heart of the network is a series of automatic electronic switching centers; Figure 1 shows the actual, or planned, switches. The switching center is capable of automatically receiving, storing, routing, and transmitting messages. It recognizes precedence, and handles messages in proper sequence. The switching center, which is, itself, essentially a giant computer, performs these functions electronically.

The switching centers are interconnected by high-quality, high-capacity trunk circuits. Over these trunks, messages are transmitted between the centers at a rate equivalent to 3,200 words per minute; by the way of comparison, our field teletypewriters of recent experience operate at 60 to 100 words per minute.

Our new systems now embrace, or will embrace, all the types of service that AUTODIN provides, to include:

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• A low-speed, teletypewriter communication which produces narrative or written page copy,

• Message transmission using the machine record, or punched card, as input and/or output media,

• Message transmission using magnetic tape as input and/or output media,

• Fast, sophisticated, direct transmission of data or information between computers at the rate equivalent to 3200 words per minute, or

• Any combination of the foregoing methods——for example, card and magnetic tape terminal direct to a computer at the other end.

The marriage of new computer capabilities, then, with emerging digital transmission media has finally provided us with the opportunity to achieve "real-time" systems. "Real-time," by the way, is not necessarily synonymous with "instantaneous," as one frequently hears; rather, as well defined in our official processing glossary which is that of the U.S. Bureau of Budget, a "real time system" is a system which provides for "the processing of information or data in a sufficiently rapid manner so that the results of the processing are available in time to influence the process being monitored or controlled." In other words, "real time" is having the information when it is needed—not necessarily instantaneously.

For example, during an early probe to Mars, conducted by the National Space Agency, it became known almost immediately after rocket launch that an in-flight change of course would be required; yet, according to news releases, the change of course was executed approximately six months later. By definition, the "real-time" for this information requirement in the instance of a rocket probe to Mars may have been something on the order of six months.

Except for such techniques as arm and hand signals, "real-time" capabilities are not now found often enough in our Command and Management Systems. Recognizing a need for achieving truly responsive systems at all levels, provided with the means for combining the ,amazing capabilities of today's computer with those of digital transmission media, and aware, therefore, of a definite challenge to our Corps, a Marine can logically ask: What are we doing about it, and what is our approach?
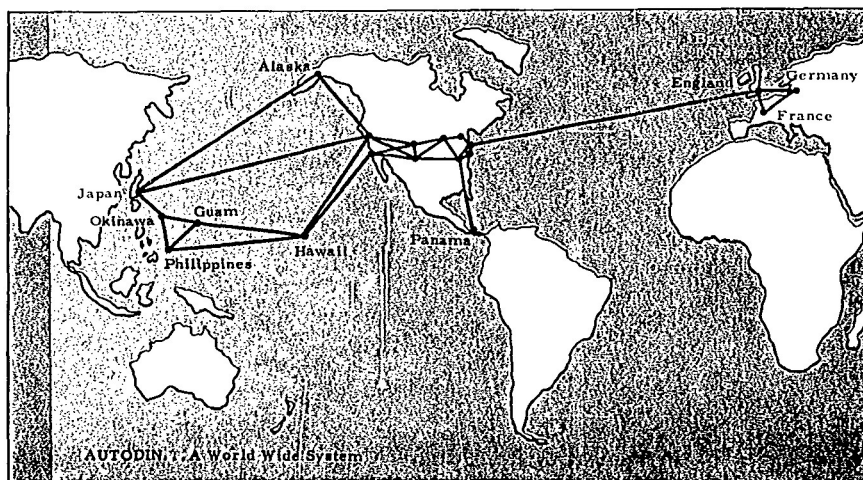
The Elements of Our Approach

Command and Control, as stated in publications of the Joint Chiefs of Staff, is "an arrangement of personnel, facilities, and the means for information acquisition, processing and dissemination employed by a commander in planning, directing, and controlling operations." In part, this translates to ". . . planning, directing, and controlling resources (men, money, and materiel) in achieving desired results."

More simply, Command and Control is "running the show"——a responsibility of Marine officers and non-commissioned officers since 1775. Yet, three matters should be emphasized in the application of the formal definition of Command and Control in a search for a Systems approach in today's automated era:

First, it should be noted that the phrase " . . . the means for information acquisition, processing, and dissemination . . ." is given equal billing with "personnel and facilities." This is necessary; every command is based, in part, on all information that has ascended from below and descended from above. Over-emphasis of the importance of the information exchange process is impossible.

Second, "operations," or actions, are of two kinds—tactical and administrative. Tactical actions are those familiar operations executed by our Fleet Marine Forces at any level, and, as one type of system, *we must have those Systems which execute Tactical Command and Control*. Admin-

New systems will embrace all the types of service provided by AUTODIN.

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istrative actions are those actions executed at all levels from the rifleman to the Commandant in order to assure a capability to perform tactical actions. The squad leader commands, "Redistribute your ammo" and, thus, he triggers administrative activity; the Commandant, for example, orders a proper rotation of personnel throughout the Marine Corps. As a second type, developed along functional lines, *we must have Systems which execute Administrative Command and Control.*

Third, beyond directing and controlling resources which may be on hand, "planning" includes a need for "real time" knowledge of the deficiencies of the command, decisions as to necessary future achievements, and accurate and timely acquisition of resources (men, money, facilities, material), to make good the present shortages and realize the new goals. As a third, and final, type of System, therefore, *we must have one which facilitates the overall acquisition-of-resources process.* As this process cuts across all functional lines, so, too, will its implementing System.

Having identified the elements of our basic Systems needs, this report can turn, now, to the approach.

Our Approach

In order to meet the challenge of the future, we have undertaken three distinct types of Systems. Perhaps the best foundation for understanding the entire effort is to review their formal definitions:
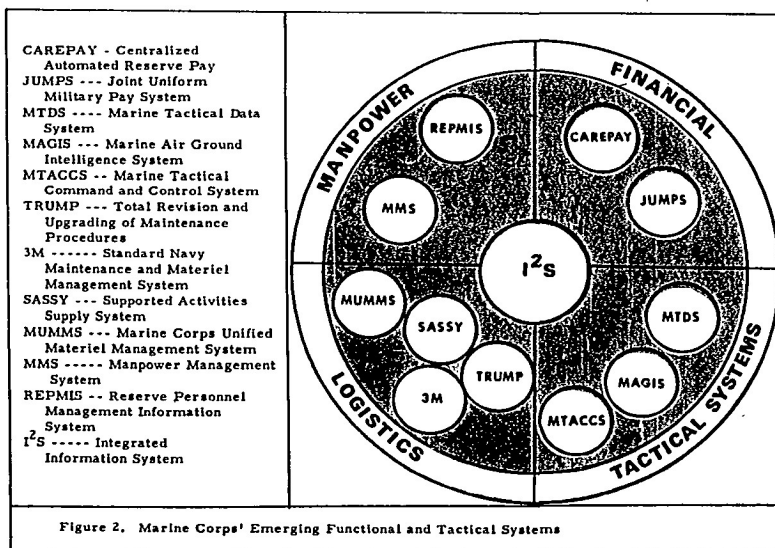
• *Functional Systems* are those Systems designed primarily to execute the administrative command and control · of the basic resources (men, money or materiel) within a general area

of mission responsibility; they secondarily accumulate data and generate information used to support decisions and actions in their respective areas. Functional Systems of the past are exemplified by the Personnel Accounting System (PAS); those of the future, by the Marine Corps Unified Materiel Management System (MUMMS).

• *Tactical Systems* are those Systems designed to execute the tactical command and control of forces (to include weapons) in a hostile, or potentially hostile, environment. A Tactical System can have elements which are exclusive to itself, but it will also embrace or interface with many elements of functional Systems using hardware (computers and communications devices) specifically intended to withstand the trials of the combat environment.

• *Information Systems* are those Systems designed to complement their own data base by selecting data from the various Functional and Tactical Systems for the purpose of generating and displaying integrated information. The information thus generated is primarily for the purpose of assisting commanders in the acquisition (as opposed to management or command and control) of resources. One important component of an Information System is an organizational status (readiness) evaluation, both current and projected. One important function of an Information System is the passing of data and/or information between or among the functional and tactical Systems.

As can be seen from these basic definitions, our Systems development has recognized an interrelationship of all Systems, management and command, tactical and non-tactical. The development of each Marine Corps System, then, is to some degree interwoven with all of the others. The

CAREPAY - Centralized Automated Reserve Pay
JUMPS --- Joint Uniform Military Pay System
MTDS ---- Marine Tactical Data System
MAGIS --- Marine Air Ground Intelligence System
MTACCS -- Marine Tactical Command and Control System
TRUMP --- Total Revision and Upgrading of Maintenance Procedures
3M ------ Standard Navy Maintenance and Materiel Management System
SASSY --- Supported Activities Supply System
MUMMS --- Marine Corps Unified Materiel Management System
MMS ----- Manpower Management System
REPMIS -- Reserve Personnel Management Information System
I²S ----- Integrated Information System

Figure 2. Marine Corps' Emerging Functional and Tactical Systems

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command, control, management, and administration of the Marine Corps can, therefore, be modelled by interconnecting senior and subordinate commands with a pipeline network which permits flow not only up and down, but also laterally. One way to summarize our developing functional, tactical, and information systems, then, is to visualize a typical cross-section of such a pipeline; this may appear as shown in Figure 2.

All of the Systems of Figure 2 will use the oncoming transmission facilities of AUTODIN and connect them with the latest model computers.

Now, for background, let's look in limited detail at the various Functional and Tactical Systems; their complete presentation will occur in the subsequent articles of this series. Later, this report dwells at some length on our Integrated Information System.

Functional Systems—Personnel and Disbursing

We will centralize, on a single master third generation computer complex at Kansas City, all personnel administration and pay, regular, retired, reserve and civilian. AUTODIN will provide the link to all Marine Corps Commands, regular and reserve. A single entry anywhere in the system will update a Marine's personnel record as well as his pay account; for example, when Cpl Jones is promoted to sergeant, his command will need only to feed the fact and date of the promotion into AUTODIN for transmission to Kansas City, where his new pay rate is automatically computed in one subsystem and his new rank inserted in another. The one entry serves all purposes. When Sgt Jones leaves active duty and joins the 2nd Battalion, 24th Marines, 4th Marine Division, in an organized reserve drill pay status, his personnel and pay records simply transfer to another subsystem on the same computer. When he is mobilized, his records return to the active duty subsystem. When he retires, it moves to a third subsystem still on the same computer.

The advantages and economy of this future master system are obvious. One entry of a single event, such as a promotion, serves all purposes, in contrast to the current multiple entries to several systems. Laborious transfers from one category to another are no longer necessary.

The new system will replace the present personnel accounting system and disbursing system, which are several years old and use second generation machines.

The Reserve Subsystems are already in operation on a third-generation computer at Kansas City: the Centralized Automated Reserve Pay System (CAREPAY), which began operations in April 1966, and the Reserve Personnel Management System (REPMIS), which began operations in May 1966. They are the forerunners of the remaining subsystems expected to be in operation on 1 July 1969. The first of these is the new Manpower Management System (MMS) for our active duty, retired, and civilian personnel, and the Joint Uniform Military Pay System (JUMPS).

Supply

First, we have developed an on-line, real-time, totally integrated, world wide, automated supply system which became operational in May of this year. It is formally known as the *Marine Corps Unified Materiel Management Systems* (MUMMS). It manages the acquisition and flow of supplies down to Division/Wing level in the Fleet Marines (including the 4th Division/Wing Team) and to units of the Supporting Establishment. Supplies are stocked in eight Remote Storage Areas, four on the West Coast
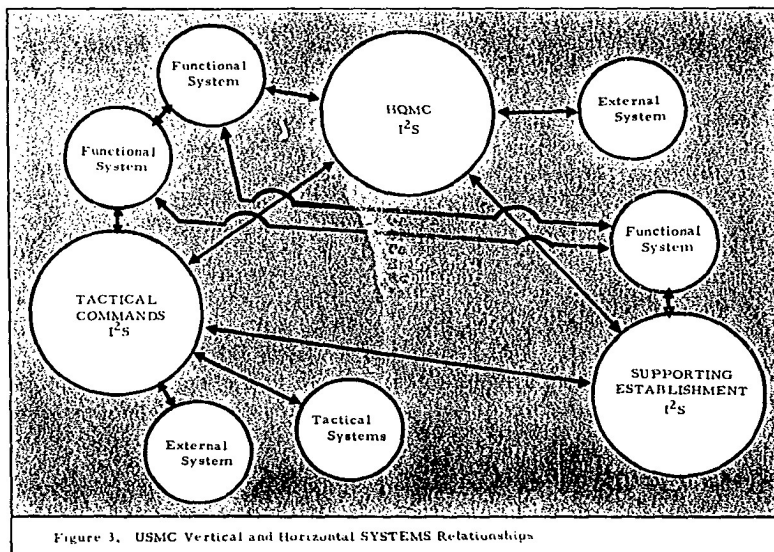

Figure 3. USMC Vertical and Horizontal SYSTEMS Relationships

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and four on the East. Centralized computer control is provided by the Inventory Control Point at Philadelphia. Should the Philadelphia facility be unable to function, the alternate Inventory Control Point at Albany, Georgia assumes control. This System makes full use of AUTODIN to connect the latest computing equipment with the requisitioners and the RSAs.

Within the Divisions, Wings, and other major commands, the second supply system, the *Support Activities Supply System* (SASSY), will take over where the Marine Corps Unified Materiel Management System (MUMMS) leaves off. This System is yet in the design stage; it will be a small, centralized, automated supply management system which will function within each major command. It will centrally control and manage the computation of needs, the placement of demands on MUMMS, and the rapid and reliable flow of supplies down to the combat or other unit. A primary benefit will be the large reduction in supply accounting and requirements computation now accomplished manually at those tactical units; the commanding officer will continue to be fully responsible for both—but SASSY will greatly relieve the manual burden of discharging this responsibility. Implementation of this System will be incremental starting with units in the Western Pacific area during CY 1968.

Maintenance

In maintenance, there are two Systems to be reported. First, the 3M System—that is, the *Standard Navy Maintenance and Materiel Management System.* This system was recently developed and has been implemented in all Marine Aircraft Wings. It standardizes all maintenance procedures for aircraft and aircraft associated equipment. On the one hand, 3M significantly reduces the administrative time required in maintenance procedures while, on the other, it provides for generation, collection, analysis, storage and automated retrieval of data relevant to aircraft maintenance. We have found this automatic data system reduces the downtime of equipment through improved scheduling techniques, and less administrative lost time; it thereby increases the operational availability of Marine aircraft.

For ground equipment, we are developing a second computer based maintenance System. The development effort is entitled *"Total Revision and Upgrading of Maintenance Procedures (TRUMP)."* We haven't yet selected a name for the new system itself. Marine Equipment Maintenance System (MEMS) is one possibility. This maintenance System will be responsive to both preventive and corrective maintenance requirements, in the field or in garrison. It will apply to all ground equipment, tactical and administra-

tive, held by all elements of the Marine Corps. This System will be implemented in 1970.

The objective of TRUMP is to carefully examine and upgrade all existing policies and procedures in the field of maintenance. It will upgrade or revise as required all of the component parts of our maintenance system to include technical publications and training concepts. Data will be collected at all levels on selected items. All tables of organization and equipment will be studied to insure that Marines, tools, and repair parts are allocated in the proper numbers—and fiscal data will be collected for the purpose of determining life-cycle costs. Why worry about life-cycle costs? The answer, of course, is that the item of least initial cost may well prove to be the most expensive over the years because of maintenance. The System will tell us which item is least expensive in terms of total life span.

Naturally, the new System which TRUMP produces will employ data processing equipment. With it we will have fewer Marines, spending less time, with better tools, replacing longer lasting parts on the least expensive, but most effective, equipment.

Tactical Systems

The first of three computer-based tactical Systems is the *Marine Tactical Data System (MTDS)*. This is a mobile, real-time, automated, air command and control system. It is compatible with the Navy's Tactical Data System and the Airborne Tactical Data System. Early this year, final operational testing of the major component, the Tactical Air Operations Center, was completed with satisfactory results. The first Tactical Air Operation Center, equipped with its new components, deployed to the 1st Marine Aircraft Wing at Danang during May of this year.

A second tactical System, the *Marine Air Ground Intelligence System (MAGIS)*, will use computers to process and interpret all forms of intelligence information. It is planned that components will be employed at the level of the Marine Expeditionary Force, the Marine Aircraft Wing, and the Marine Division in the 1970-75 time frame. This System will be compatible with the Navy Integrated Operations Intelligence Center and automated Systems of the other Services. It is being developed in a Joint Management Systems Program Office under Air Force Executive management.

The third tactical System is the *Marine Tactical Command and Control System (MTCCS)*. It will be a real-time, automated, mobile system that will integrate all command and control functions at the Division, Wing, and Marine Expeditionary Force levels. It is intended that this System will be compatible with other Services' Systems for joint or combined operations. It will be available in the 1975-1985 time frame.

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So much for the Functional and Tactical Systems. To repeat, each will be described in detail in succeeding issues of the GAZETTE. Let's turn now to I²S, The Marine Corps Integrated Information System.

By definition, the Tactical and Functional Systems will primarily support the Commandant and his commanders in their command, control, and resource-directing roles. It is true that they will possess a capability for projecting *some* short-range resource requirements, but, generally, within those Systems, this process will be dictated by specific interests of each respective functional area. The complete resource-securing effort, though, needs far more vision that is available in the views of an isolated functional area or tactical situation. The process must consider the assigned missions of the organization, as a whole, and cut across all functional lines to answer such questions as these:

• *Readiness*

What is the current and projected readiness of subordinate commands, singularly and collectively?

What alternatives will achieve maximum readiness—that is, cure all defects? What will each cost?

With fixed resources, how can the greatest readiness be achieved?

• *Capabilities*

What resources are required for each new capability or function directed or desired, and what are the costs in dollars, men, materials, facilities, and time?

• *Performance*

How does performance compare with predictions?

What caused the failure of the performance and what corrective action should be taken?

The Past and Present

To answer these kinds of questions—surely very large ones—to meet the requirements of the "How are we doing?" What do we need? How much will it cost?" process, the Marine Corps turns to its future Integrated Information System. We've had our information System since 10 November 1775, and it's been a good one, evolving as necessary over the decades. But, nearly 192 years later, in the environment of today's dynamic world, our manual Information System has become burdensome; it promises to become more and more obsolescent as each of the Functional and Tactical Systems commences to function.

The Future—Integrated Information System

Our full attention was attracted to this problem about five years ago. Since that time, in order to meet the requirements of the environment in which we will have to operate, we have undertak-

en what is proving to be a revolutionary improvement of our Central Information System. That improvement will embrace, in addition to the valid parts of our current System, all the quantitative techniques for assisting Command and Management that are appropriate for Marine Corps use; it will also include the tools of automation and automatic digital transmission, where appropriate.

To indicate the scope of this project, we have named its impending product the *Marine Corps Integrated Information System*. This is commonly referred to as I²S (pronounced: eye-squared-ess), and within our pipeline cross-section, it fits as shown in figure 2 (page 24). I²S is, by far, the most ambitious of our new Systems.

No limitations have been placed upon I²S concept development other than these:
• It must be technically feasible,
• It must be economically practical, and, most important of all,
• It must be professionally sound.

In non-technical terms, our Integrated Information System will simply tie together all Marine Corps information requirements; collect, generate, and/or store answers to those requirements; and furnish this information as required to commanders and their staff sections at all levels on demand. It will do those things as expeditiously as is required.

I²S Functions

The ease of listing the major functions of I²S tends to conceal the difficulty of their execution. Basically, I²S will:
• *Select* the data/information the Commander needs from the various functional and tactical Systems. By prior programming of predetermined needs, it will also pass information to a functional, tactical, or external System—this, then, is a *coordination of flow* of information.
• Contain in its own data base necessary information not in the other Systems.
• Bring together the selected data/information from the separate Systems, *assimilate,* and *analyze* it, to produce, for example, reports on current situations.
• Contain some storage capability in order to avoid time and money expense of recomputation, although it will rely heavily upon those portions of functional and tactical Systems' data banks which are predefined as common.
• Most important of all, I²S must abound in *projections* for the mid and distant future in order to lend maximum assistance to the commander. It must project future resource needs of our current actions and it must also define the resources of our future requirements.
• Possess the complete spectrum of display, to include computer generated visual display and audio response.

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- Assure availability of information—and, here, the meaning is *retrieval*—it will assure availability to those who have need, and it must deny information to those who do not have need.

The Contributors

In addition to the major contributions to be made by the functional and tactical Systems to I²S, its own components make an imposing list. We expect the list to become more lengthy as our experience in development enlarges. For example, resident in I²S will be:
- Cost Model for the Marine Corps,
- Quantitative Readiness Evaluation Model for the Marine Corps,
- Marine Elements of the Five Year Defense Program
  - Marine Corps Long-Range Plan,
  - Contingency Plans, and
  - Mobilization Plans

Coherence of the System will be achieved by appropriate use of:
- Systems Analysis Techniques, to include:
  √ Statistical Analysis,
  √ Gaming Theory
  √ Simulation
- All Information Sciences
- Current Technology
  √ Advanced Computer Processing
  √ Advanced Retrieval and Input Devices
  √ Rapid, Computerized Communications

The Bigger Picture

Perhaps it is best now to observe that Figure 2 gives only a two-dimensional view of I²S relationship with other Marine Corps Systems. It does not reflect the fact that I²S will have a vertical dimension, nor does it suggest interface with Systems external to the Marine Corps. Figure 3 (page 25) gives this perspective: each subordinate commander will indeed have available to him some version of I²S, and the Integrated System will provide the Marine Corps interface with Systems of agencies external to it.
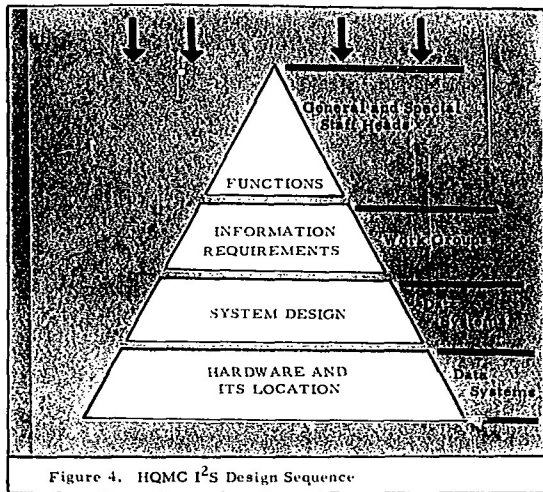
The object of the System is to tie together data and information-generating functions so that Commanders/Managers at all levels are able to draw upon an integrated data bank to assist in the decisions which they have to make. It will exist at Headquarters, Marine Corps and in all of the Supporting Commands, the Reserve Establishment and the Fleet Marine Forces, both Air and Ground. Recruit Depots, Marine Corps Bases, Supply Centers, Air Stations, Marine Corps Schools, Fleet Marine Force Headquarters, Marine Divisions, Marine Aircraft Wings, Force Troops, and Force Service Regiments. Each will possess a version of I²S; all will be tied together by automatic digital transmission.

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Some Little and Big Examples

A Marine aircraft lost in Viet-Nam means different things to different people. To the local Marine Air Commander, it means replacement of a weapons System—man and equipment—and, thus, he inputs necessary data to the Systems. To the Fleet Marine Force Commander it means possible reallocation of an airplane and pilot. At Headquarters Marine Corps, it means casualty notifications and replacement of the pilot to the Director of Personnel; it means a check against planned aircraft attrition rates and pilot training projections by the Deputy Chief of Staff (Air). By single input of data at the source, by the use of I²S, each interested commander or staff officer will be able to gain the information required to perform his part of the overall mission; this, opposed to the redundancy of input frequently required today.

As another example, suppose all of our new Systems are functioning. Imagine we are preparing at HQMC proposed changes to the Five Year Defense Program. Much information for the preparation of those changes is required from all Systems. I²S programming recognizes this and pulls the necessary information concerning troop and organization, research and development, manpower, installations, materiel, and aviation programs from the proper Systems. I²S combines these data with its own long-range data, and projects a new Marine Corps Five Year Program, including all resulting resource requirements; that is, the additional Marines, barracks, equipment, training, parts, dollars, etc., required. It can also project just what effect the disapproval of a Research and Development project, or the disapproval of an adequate number of Marines, would have on our capability to accomplish our mission. After changes to the Five Year Defense Program are approved, the information required by the functional area managers to monitor their cognizant parts of the Program will be available in the I²S data bank as needed. Policies, plans, and programs of all the functional areas will be revised, if necessary, to support the approved Program by the use of the I²S programmed projections.

Let's imagine, as a specific example, that the Commandant is considering increasing the average recruit load by 2,000 per month. I²S will, by consultation (if I may use the word) with MMS and the I²S of Parris Island, San Diego, Camp Pendleton, and Camp Lejeune, compute, almost instantaneously, what additional barracks, DIs, recruiters, ITR ranges, classrooms, 782 equipment, dollars, etc., would be required. Should the new loads be approved, the Quartermaster General, The Director of Personnel, and the various Commanding Generals would have precise knowledge of the measures they must execute to implement the decision.

Figure 4. HQMC I²S Design Sequence

Or, as another example, in Viet-Nam, the I²S of the 1st Marine Division will project for the Commanding General, and keep continuously current, his O&M dollar requirements to continue fighting at his current level, or at any higher level he specifies. Similarly, the Commanding General of the 2d Marine Division at Camp Lejeune is considering another RLT exercise at Vieques. His I²S will project for him the costs in equipment wear and replacement, maintenance, fuel, rations, sandbags, and other consumables, and advise him whether his remaining dollars are sufficient, and, if not, the amount of the deficiency and possible ways of reducing it.

Yet, I²S is not designed to help only higher level organizations. The advantages for Marines down through the battalion and squadron commanders to their administrative clerks will accrue, too.

For example, Readiness Reporting, *per se,* won't be required at all. Automatically, after a single input of basic data, Readiness Information will be available throughout the network. This one small example, alone, promises to save the preparation of an estimated 75,000 reports a year which the battalion and squadron commanders and their clerks are now preparing.

The Implementation Process

Our method for Systems implementation has matured significantly. Figure 4 will be used to explain the implementation technique for I²S at HQMC. A similar pattern will be followed by all Marine Commanders when the time comes, and as directed by the Commandant.

Our first need was to define the functions which we desired I²S to perform. This has required three redefinitions of the problem, but the product is now relatively firm, and, it can be added, impressive. What is meant by a function? Here's an example: Project the number of Mental Group

I Marines the Corps will need to recruit in 1970, to meet schooling requirements for the hard-skilled MOSs such as electronic technicians.

Next, the spade-work really begins. We have tasked Work Groups, composed of representatives of "interested" staff agencies, supported by adequate technical capability and led by the staff agency primarily concerned. We currently have work groups organized to re-examine the information we need in each broad area of staff responsibility—operations, logistics, finance, manpower—for Headquarters, Marine Corps, as well as the Department of Navy and Department of Defense. These work groups assemble the details of the elements of data which will lead to the satisfaction of the information requirements generated by the initial listing of functions. We have found this to be time-consuming, laborious work, the product of which is physically large. Continuing the previous example of projecting Mental Group I recruits needed in 1970, the information requirements would include a listing of the hard-skill MOSs, current population by rank, projected promotions, length of each school, number of classes per year, student attrition, reenlistment rates, MOS increases due to introduction of new equipment, and the like. By properly programming such information, the projection needed can be readily made.

As the details of the required data, to include their source, are identified, the specifications are furnished to the design team and the leadership shifts to the Data Systems Director at Headquarters, Marine Corps. This is not to suggest that the user's work is finished; quite the contrary, we expect his active participation with the design team during the entire development of the System, and the molding of the sub-system will, in large part, be in his hands.

Eventually, we must determine hardware needed, and the effort takes on the classic programming, testing, debugging, conversion, and iterative polishing aspects.

In the manpower and financial subsystems, we are currently shifting emphasis at HQMC to design; the information requirement of our coordinated data base—for *all* Marine Corps Systems—has been substantially completed.

And Eventually

We expect to have our I²S functioning fully, Marine Corps-wide, in three to five years. Then, we expect to perform constant, iterative polishing. I²S is a major undertaking. It promises major benefits for the Corps. But it will need the understanding and support of all Marines, not only to complete it, but even more to exploit its potential. It encourage all Marine Officers and Staff NCOs to seize every opportunity to become knowledgeable about and assist this important endeavor. US ⚓ MC

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