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From: Martin E. Johnson <Initials>

Subject: DM&S Medical Information Systems:  
Recent History and Recommended Course of Action

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This is in response to your request for an identification of the events leading to the success of MUMPS installations in Veterans Administration Medical Centers (VAMCs), as well as the circumstances surrounding the current disposition of the DEC PDP 11/34 and 11/70 minicomputers purchased in FY 78. My account follows.

### Background

In an April 15, 1976 memorandum to the then VA Chief Medical Director, Dr. John D. Chase, an assistant, Mr. Warren MacDonald, enthusiastically recommended that the VA investigate using the MUMPS computer language and operating system in one or more VA hospital-based ADP programs. He cited technical information provided by Mr. Joseph T. ("Ted") O'Neill of the National Bureau of Standards (NBS). O'Neill is a founding member of the international World Association for Medical Informatics. As the principal NBS investigator on an HEW contract lasting much of the early 1970s, O'Neill was instrumental in shaping HEW policy and its program for substantially reducing hospital information system costs through the widespread replication of public domain software. Because much of this software was written in dialects of the MUMPS language, O'Neill instituted the successful MUMPS language standardization project, culminating in an American National Standard in 1977.

Standard techniques, such as the ANS MUMPS (X11.1-1977) programming language, are used to promote rapid development and to achieve program transportability. MUMPS is an interpreted language specifically designed to address medical textual applications. Of the five American National Standard programming languages, MUMPS is the only one having an inherent data base management capability. Because medical textual applications, both clinical and administrative, require a substantial database, ANS MUMPS provides the only currently available means by which all of the application coding can be restricted to a standard high level programming language. High level languages contribute to effective hardware competition by eliminating software conversion costs otherwise encountered when transferring application programs from the equipment of one manufacturer to that of another.

Major Medical Information System Acquisition --  
The Methodology of Brooks, Chase and O'Neill

Cooperative Field/Central Office planning of medical information systems began in late August 1977, when O'Neill left NBS to head the recently established DM&S Computer Assisted Systems Staff (CASS). O'Neill began to put into practice the professional consensus that the design and development of medical information systems must be conducted through extensive testing in the actual health care setting, with the clinicians and medical administrators actively participating as system designers. While drafting successive versions of a Mission Need Statement in late 1977 and the first six months of 1978, O'Neill began to develop a program plan and acquisition strategy that would not only meet the mission needs of DM&S but would also achieve the intended goals of the Commission on Government Procurement, through the policy framework of OMB Circular A-109. Under O'Neill's direction, the CASS office followed the methodology outlined by Dr. John D. Chase before the Senate Veterans Affairs Committee in his testimony on the National Academy of Sciences study. This methodology was fully compliant with the approach advocated by Congressman Jack Brooks' House Government Operations Committee (HGOC) in a March 28, 1979 staff report severely criticizing the DoD TRIMIS program. The approach followed by Dr. Chase and Mr. O'Neill conformed exactly to the norms established in the HGOC report, the details of which are not included here. The contrast between the approach stipulated in the HGOC report and that demanded by the VA's Office of Data Management and Telecommunications (ODM&T) is worth examining.

Requirement Specifications Derived Through Actual Field Experience

Requirement specifications can be derived effectively and quickly by developing a basic functioning system with the intended user, then further refining the system through user-suggested modifications. The resulting system, in daily use, will provide a much more complete and accurate reflection of user requirements than any narrative description of a system that has not been built. Moreover, by using available modern techniques, such as natural language application generators, database management systems and other software tools, fully operational prototype systems can usually be produced more rapidly than can paper descriptions thereof. Requirement specifications that are produced before any prototype testing activity has been undertaken are now recognized by most computer professionals as inadequate. ODM&T-imposed mandates requiring users to provide written specifications, but to have no opportunity to test prototype applications before developing voluminous paper studies, and to have no participation in system development, reflect a method used more than a decade ago and long abandoned by serious application developers. Integrated software development techniques, such as those embedded in the DM&S field-developed VA File Manager,

through which a basic version of an application can be made operational within days or weeks, have completely changed the processes of information system planning, development, operation and maintenance.

The March 28, 1979 House Government Operations Committee staff report provides an accurate assessment of the folly of conducting large scale information system development by relying solely upon written requirement documents and hypothetical studies of the cost benefit characteristics of systems that do not exist. Among the Brooks Committee observations: Plans must be simple, not complex; personnel within facilities must be propelled into early and intensive involvement; appropriate standard high-level languages must be used.

Current estimates for information system costs would assign 85% for application design, development, testing, documentation and maintenance and only 15% for equipment purchase and maintenance, with the software cost component continuing to rise and equipment costs to fall. Consequently, primary attention should be given to the means by which the application programs are coded, with the use of standard high-level languages ensuring that any manufacturer who chooses to can compete in an equipment acquisition. O'Neill was one of a very few individuals within the VA who understood what A-109 was about, and how to properly put it into effect in a program for a health care information system. The field prototype testing effort that he instituted follows the above-mentioned tenets in pursuing the only viable means of establishing requirement specifications for medical application software -- testing actual prototypes in the field in concert with the intended user.

#### Initial Assessment -- the Washington, D.C. Conference

O'Neill began by conducting an assessment and evaluation of the then current status of DM&S ADP support that had been provided almost entirely by the Office of Data Management and Telecommunications. He found that considerable internal documentation was readily available on automated health care applications in use at medical centers from the VA hardware inventory. An outside firm, Health Care Management Systems, had already been hired to survey available applications. A final draft report of this survey was submitted to the VA for review in September 1977.

In October 1977, O'Neill held a three-day meeting in Washington, D.C. in which he assembled specialized DM&S clinical and administrative staff, members of the DoD TRIMIS Program Office (TPO), HEW Public Health Service staff and nongovernmental experts who were established users of medical information systems. This meeting stimulated professional communication among DM&S, the TPO and the Public Health Service. The beginning of a cooperative

working relationship with TPO was established, which led within several weeks to the initial draft of a comprehensive interagency agreement between CASS and TPO.

The participants in the October 1997 meeting were to assess the current status of medical information systems in use in the VA and, attempting to make potential cost savings, determine which applications could possibly be transported to other VA Medical Centers. Development of the very few health care systems purchased by the VA had stagnated. The existing ones were obsolete, requiring excessive maintenance, and were not likely candidates for replication. At the time of this conference, the average age of computers throughout the VA was seventeen years. The participants concluded that very few VA medical applications approached the current professional norms of the relevant medical services. Other than some mental health applications that had been developed in VA Medical Centers by researchers, most did not show promise of providing any benefit or cost effectiveness through replication at other facilities.

Professional medical and administrative staff expressed dissatisfaction with the ADP support received from ODM&T. Less than ten percent of the 172 DM&S health care facilities had any on-site computers, other than in the Research and Nuclear Medicine Services, and ODM&T had nothing to do with these. Non-VA participants expressed dismay at this situation of many large, 500-1000 bed hospitals without so much as an admissions system. The Assistant Director of a VAMC in the northwest said, "You would cry if you were to visit our hospital, as the only computer we have is in the credit union." However, it was observed that, while many private hospitals were now in the process of updating or replacing older existing automated health care systems, the VA could at least look forward to installing a few modern systems into what was essentially a vacuum.

The most striking observation of the participants was that because the VA had the largest number of health care facilities under the aegis of a single administration, and the third largest budget of any U.S. Federal Agency, it should strive to take a position of leadership in the development of medical application software. Extravagant software maintenance costs charged by vendors would be eliminated by virtue of the VA producing and maintaining its own programs. (An April 30, 1976 memorandum from the VA Internal Audit Service to the Planning and Evaluation Office provides an historical account of how a vendor's 1969 unsolicited proposal for an initial "no cost" joint development venture eventually led to reliance upon a single manufacturer for equipment, operating systems and application software; after dependence was complete, quotes received for application software modifications of no more than several lines of code were on the order of thousands of dollars.)

Establishment of the Field Development Effort

O'Neill began to fill existing budgeted field positions, hiring qualified individuals to participate in cooperative prototype medical application development and testing. Fifteen professional medical information system developers, ranging in talent from very good to several of extraordinary ability, were hired from the private sector and placed at locations nationwide where DM&S administrative aptitude and long-term interest in automation, were high (Albany 1, Columbia, MO 1, Loma Linda 1, Memphis 1, Oklahoma City 3, Seattle 2, Salt Lake City 1, San Francisco 2 and Washington, D.C. 3). Six individuals of outstanding ability, identified at a number of medical centers, were also recruited for this effort (Albany 1, Bay Pines, FL 1, Birmingham 1, Columbia, SC 1, Lexington, KY 1 and Salt Lake City 1). These twenty-one individuals include one M.D. and six PhDs.

O'Neill was successful in forging an interagency agreement with the TRIMIS Program Office, a milestone in itself, which laid the basis for a cooperative venture between DoD and the VA and provided military hospital personnel with access to these development teams, their equipment and their products. The actions of the field development teams were structured by O'Neill to form a coherent A-109 program, with the prototype systems providing the only realistic way in which accurate functional specifications could be derived. Centralized guidance would be provided, thereby ensuring the standardization of data elements and codes for transportability and for the eventual integration of application modules into larger medical center and medical district systems.

Application programs would be designed and developed in the field and tested at other development sites before integration, providing independent testing, evaluation and adaptation of application modules. Replication costs would then be avoided because any programs developed at VA Medical Centers could be readily exchanged as a consequence of using standard high level programming languages and following VA-wide data and code conventions. The first of such conventions was established in December 1978 at a CASS-sponsored meeting of VA medical application software developers and users.

The Equipment and Operating System Purchases

Requests for approval of equipment purchases were received by the VA Central Office from these facilities during FY 1978. All of the equipment requests were independently developed at the requesting VAMCs, with Albany and the Bronx already having been tentatively approved, and two others, Salt Lake City and Loma Linda, having been developed before O'Neill was hired. The other FY 78 requests arrived independently, throughout the last six months of the fiscal year, citing combinations of local funding,

construction funds or funds provided by O'Neill's office for local purchase. Approval for all of this equipment was delayed until the last week of FY 78 (September 1978) because the Office of Data Management and Telecommunications (ODM&T, formerly the Department of Data Management, DDM), recommended disapproval of all of the requests. There exists a long history of such actions, based on ODM&T's own MP-6 policy manual, which was interpreted to mean that only ODM&T personnel are permitted to do any program coding. MP-6 represents an accumulation of obstacles inserted in the approval chain by ODM&T in an effort to thwart any acquisition of ADP equipment that would provide to other VA departments and offices having a service function an independent means for information processing.

All of the equipment requests were finally approved in the very last week of FY 78, incorrectly conveying the impression of a "VA year-end buy", but only after ODM&T's vehement objections were overruled by the Administrator's Office. All equipment was purchased off the then existing GSA Schedule 66 -- computer equipment for clinical and laboratory applications. Digital Equipment Corporation minicomputers were purchased in order to use the only operating system that was then available for supporting Standard (ANS) MUMPS (by 1980, there were over twenty alternative Standard MUMPS implementations in existence). This operating system was supplied by an independent software vendor, Interpretive Data Services. A total of ten of the larger PDP 11/70 and eight of the smaller PDP 11/34 minicomputers were purchased. PDP 11/70 costs ranged from approximately \$150,000 to \$165,000. The price of a PDP 11/34 with the larger RK07 disk drives was in the neighborhood of \$85,000 and considerably less for one with the smaller RL02 drives. The operating system cost was \$8,250, plus any travel costs for installation. Combined computer hardware and operating system costs at each installation were less than the \$175,000 limit for hardware alone, established by the Administrator of Veterans Affairs in a June 22, 1978 memorandum.

Stations Receiving Equipment for the Field Development Effort

Stations are listed below according to the type of equipment purchased.

PDP 11/34

Albany VAMC  
Bay Pines, FL (St. Petersburg OPC)  
Bronx VAMC  
Loma Linda VAMC (also see below)  
Omaha VAMC  
Seattle VAMC  
San Francisco (District 27 Headquarters)  
Washington, D.C. VAMC

PDP 11/70

Birmingham VAMC  
Columbia, MO VAMC  
Lexington, KY VAMC  
Loma Linda VAMC  
Martinez, CA VAMC  
Memphis VAMC  
Oklahoma City VAMC  
Palo Alto VAMC  
Richmond VAMC  
San Francisco VAMC

October-November 1978 Budget Review Problems

The FY 80 budget proposal for the major medical system, submitted by the VA to OMB in September 1978, was doomed for a number of reasons. It would serve no purpose in this discussion of current opportunities to elaborate upon this issue in detail. It is sufficient here to observe that the ODM&T budget plan did not conform to OMB Circular A-109 and did not fit the budget plan submitted by DM&S.

The Oklahoma City Conference

A CASS-sponsored four-day national conference of VA MUMPS medical system developers and users was held during December 1978 in Oklahoma City. This conference was attended by DM&S computer professionals, clinicians, bio-medical engineers, several VA Medical Center Directors, Chiefs of Staff, Assistant Directors and a half-dozen representatives from the TRIMIS Program Office, approximately seventy-five individuals in all. The purpose was to lay the groundwork for VA-wide conventions used by MUMPS application developers and to assign responsibility for specific application development areas, e.g., ADT, Scheduling, Dietetics,

Mental Health, etc., to VAMCs with programming staffs and equipment. The Admissions, Discharge and Transfer and the Scheduling modules would provide the basis for the initial patient record with which the other modules would interface and provide updates of patient information, following the flexible patient record schema derived at this conference. Because of the variation in VAMC missions (GM&S, Psychiatric, Outpatient Clinic, Extended Care Facility, Domiciliary, satellite, etc.), the facility Director and Chief of Staff would have the authority to choose which application modules were of highest priority, and to combine them into an individually tailored system for their facility.

#### The TRIMIS Program Office Reaction

The TRIMIS representatives were impressed. One commented, "We went to Oklahoma City to look under the hood and found a Volkswagen in there, already running." Under the existing interagency agreement, TPO would have available all of these applications, as well as participation in the testing of prototypes. A week after the Oklahoma City meeting, O'Neill and members of his staff were invited to give a full afternoon briefing to approximately twenty TPO staff and consultants. TPO was soon to be excoriated in a March 28, 1979 report of TRIMIS performance by the Committee on Government Operations, chaired by Mr. Brooks. TPO was also requested in a January 22, 1979 OASD(C) memorandum to choose between five alternative design approaches. One of the alternatives was to "Adopt the VA Approach".

#### Dismissal of O'Neill

A week after the TPO briefing, on December 27, 1978 (his forty-seventh birthday), O'Neill was dismissed as CASS Director and detailed to another task. A subsequent request to the VA from TPO as to progress of the VA development program provoked the response that the VA had no such program. The TRIMIS interagency agreement was never mentioned again, at least not officially. The carefully prepared Oklahoma Conference Proceedings, containing conventions to be used in application development, were not distributed by the VA.

During the next six months, DM&S and ODM&T jointly conducted a fact-gathering mission, with individual teams of three persons visiting each of the field development sites. A few of the site visit team reports observed instances requiring easy remedy. The final fact gathering mission report was firm in its support of the full field development program.

Several months later, five PDP 11/70 and three PDP 11/34 minicomputers were removed from the following stations:

- Columbia, MO
- Loma Linda (its PDP 11/70)
- Memphis
- Palo Alto
- Richmond
- Bronx
- Omaha
- Seattle

The staffs hired at Columbia, MO and Seattle had already begun application development; both were dismissed. In the case of Columbia, MO, the computer was a replacement for an older computer, owned and operated by the University of Missouri, supporting a MUMPS radiology system, which the VA Medical Center radiologists had relied upon for a number of years. The older program was converted to Standard MUMPS by the VAMC staff member, and was already in use on the new computer. The strongly resisted removal left the VA Radiology Service at this VAMC without even a manual system.

The removed equipment was crated and the majority of it was sent to ODM&T data processing centers where it has never been uncrated. The Richmond computer was sent to Washington, D. C. and the Loma Linda computer sent to Tucson. None of this equipment has ever been used by ODM&T.

#### DM&S Field-Developed Systems

In contrast, the stations which retained their staffs and continued development have produced in two years the following MUMPS applications which are actively used at one or more VA medical centers. Most of the health care applications now have substantial databases. All were developed "from scratch" at VA Medical Centers by hospital personnel since January, 1979, unless otherwise noted. The mental health Psychological Testing and Psychiatric Assessment systems were existing applications converted to MUMPS from former nontransportable code; they have undergone major enhancement in the process.

Patient Identification

- Admissions
- Gains and Losses
- Scheduling
- Patient Tracking
- Ward Census
- File Room Operations
- Cardiology Patient Registry
- Pacemaker Registry
- Hemodialysis Patient Registry
- Tumor Registry
- COSTAR (Imported, Public Domain)

Medical

Pharmacy

- Outpatient Pharmacy
- Research Pharmacy
- Patient Drug Profile
- Drug Inventory
- Formulary Manual
- Unit Dose Ward Usage
- Special Fluid Preparation Labeling

Laboratory

- Chemistry Lab Cumulative Reports
- Critical Care (18 tests)
- Blood Gas Results
- SMAC Results
- CBC Results
- Surgical Pathology Records
- Cytology Records
- Autopsy Reports
- Test Reports by Ward
- Microbiology Sample Tracking
- Laboratory Quality Control

Mental Health

- Psychological Testing
- Psychiatric Assessment
- Outpatient Mental Health Reporting
- Treatment Plan and Discharge Summary
- Vocational Interview

Dietetics

- Meal Planning
- Food and Nutrient Analysis

Radiology/Nuclear Medicine

- Radiology Scheduling and Reporting (Imported, Public Domain)
- Nuclear Medicine Record Reporting

Radioimmunoassay Trend Analysis

Pulmonary Function Testing

Physician Order Tracking

Occupational Health Information System (Imported)

Patient Teaching

    Cardiology Interview

Administrative

Regional and District Financial Systems

    Fee Basis Accounting

    VA Regional Fiscal Accounting

    District Management Information System

Hospital Financial Systems

    Research Accounting

    Purchase Orders

    Supply Expenditures

    External Laboratory Charge Tracking

Engineering Service

    Engineering Work Orders

    Equipment Preventive Maintenance

    Police Parking and Violations

Hospital Resources

    Space Allocation

Personnel

    Personnel Registry

    Nurse Registry

General Use

Word Processing (Purchased)

File Manager

Database Ad Hoc Inquiry System (Imported, Public Domain)

Programmer Aids

General Utilities

Automated Program Documentation

Security Sign On Monitor

Command Interpreter and Menu Driver

General Purpose Word Processor

Cross Assembler for Micro Computers

Computer-Aided Instruction for MUMPS (Imported, Public Domain)

The DM&S field-developed VA File Manager (see under General Use heading) is a natural language application generator and data base management system that has been used as the basis for three fourths of the above-listed applications, ranging in size from the smaller registries to very large systems, including Psychiatric Assessment and Outpatient Pharmacy. The development and widespread use of this generalized application generator is a major accomplishment of the cooperative field development effort, since it has fostered the generation of application modules incorporating common data elements and codes, thereby ensuring transportability and integration of modules into complete systems. The File Manager can be used by anyone, programmer and nonprogrammer alike, to develop information system modules for most hospital record keeping requirements and ensure consistent VA use of data codes and user interface protocols. A description of the File Manager and several of the application programs incorporating it have appeared in the medical computing literature.

In their earliest conversations, Dr. Chase and Mr. O'Neill discussed the possibility of making available VA-developed medical information systems on a nationwide basis. Some of the DM&S field-developed systems have now achieved not only national recognition but also international distribution through the MUMPS Users' Groups -- established and sponsored by HEW for MUMPS application program dissemination.

#### ODM&T

ODM&T is incapable of producing or managing contractor efforts for currently envisioned DM&S software needs, despite having over 2,000 employees (at an estimated average salary of \$20 thousand for ODM&T employees, this would be a \$40 million annual expenditure). Million-dollar contracts are issued for the development of a single application, followed by yet another contract for a second firm to monitor the activities of the first. Contrast this with the above-mentioned applications resulting from a two-year effort by a dozen or so individuals, produced at no more cost than that of their salaries.

What is all the more unfortunate is that ODM&T represents the entire VA on computer related issues before Congress, including requesting funds, presenting plans and accounting for program status. The very existence of the medical information systems that have been produced within the VA by individuals at Medical Centers is denied in order that there be no focus upon these extremely low cost VA-owned systems as possible solutions to pressing DM&S information processing needs, such as pharmacy operations and outpatient clinic scheduling.

ODM&T has confounded VA management for some time, pretending to have the expertise to address DM&S requirements in medical informatics. However, this is a field in which the development procedures, the skills of the developers, the techniques employed, the type of computer equipment used and the resulting on-line interactive medical information systems used by clinicians and medical administrators are completely different from routine ADP applications.

#### Fallout of O'Neill Dismissal

Although current DM&S leadership has postponed the major system acquisition of the VA Health Care Information System (HCIS), no recognition whatsoever has been given to the merit of the functioning MUMPS medical applications which are now emerging, as O'Neill intended, as a prototype HCIS, providing the capability element definitions for the solicitation of advanced technological systems support. The very existence of this medical application software has been denied in congressional testimony by ODM&T officials. All computers involved in the "FY 78 year-end buy" are incorrectly stated to be unused. Several Freedom of Information Act requests for one of the DM&S-developed subsystems have been rebuffed, official VA responses implying that the requested software does not exist. This software is an actual major Level I hospital information system that has been in use at the development site for over two years, and which has been demonstrated to more than a dozen other application software developers. The developer and his medical center now face the loss of the PDP 11/70 supporting this application. VA Medical Center directors have received telephone calls from Central Office officials demanding that the operation of application programs used daily at their hospitals be suspended. One of these systems shut down was an automated pharmacy information system, which had an established database of over 20,000 patients.

In 1978, all funding for equipment purchased for application program development and use came from individual VA Medical Centers or was sent to stations by O'Neill for the purpose of enabling a facility to purchase computer hardware and operating system software (and, for several stations, word processing software). The equipment confiscated either went to a non-DM&S location (mostly ODM&T Data Processing Centers) where it has never been uncrated, or it remains unused at a DM&S location, but under ODM&T control.

The Lessons Learned During the Past Three Years

The experience of the past three years has conclusively demonstrated two things. First, the exclusion of VAMC field personnel with professional and administrative responsibility from having an authoritative voice in guiding the design and refinement of information systems intended to support their activities, has resulted in excessively costly, late and ineptly designed systems of no more than marginal utility for the care of veterans. No amount of central office control, management, contractor-supplied systems development services or coordination activity conducted exclusively from the VA Central Office can compensate for the loss of reality in system design resulting from restricting and denying systems resources to VA Medical Center professional and administrative personnel for the experimental development and testing of prototype applications. Second, the Office of Data Management and Telecommunications has obstructed the design, development and use of state-of-the-art medical information systems in the Veterans Administration and must be removed from a position of authority over clinical and medical management uses of information technology within the Department of Medicine and Surgery.

The March 28, 1979 report of the House of Representatives Committee on Government Operations on the TRIMIS Program is today fully applicable to the VA's disastrous management of medical systems development over the past three years. Incorrect methods, castigated in this report, were actually being introduced into the VA at the time that the report was first issued. On the other hand, the positive recommendations in the report had previously been anticipated and installed during 1978, but in March 1979 were being dismantled and suppressed.

Comparing the Chase-O'Neill approach with the official VA approach from 1979 on is a case study confirming the practicality and efficacy of the methodology recommended in the HGOC staff report. During the past three years, both approaches have proceeded side-by-side within the VA (the very "horse race" for which OMB Circular A-109 makes provision). The approach condemned in the March 28, 1979 report was adopted as the official VA approach. It has absorbed the vast majority of ADP resources allocated to DM&S information systems development and has produced nothing of benefit to veterans. It has been both expensive and useless. The approach recommended in the March 28, 1979 report has been followed in a number of VAMCs, guided by the original task structure and coordination principles formulated by O'Neill in 1978. This approach has produced working subsystem prototypes for nearly all medical center functional needs. For example, all of the applications comprising the AHIS functions are operational in various VAMCs. They could be integrated to provide an immediate replacement for the obsolete hardware and software currently providing AHIS services. This VAMC-based effort has proceeded

with virtually no resource allocation other than that provided with the local funds of the individual VAMCs. The prototype subsystems developed in VAMCs have been reported in the professional literature and conferences of the medical information systems field, and have been communicated to professional colleagues in other medical centers and institutions not only in North America, but also around the world. The professional consensus has been that these systems possess two significant attributes, namely, high quality and low cost.

These prototype subsystems can provide the definition of capability elements needed to support DM&S medical care, education and research missions. The existence of working subsystems makes possible the early issuance of a mission solicitation, in accordance with Federal policy established in OMB Circular A-109. On the other hand, the "Interim Solution" has proven to be the piecemeal, incremental proliferation of subsystems and entrenchment of vendor interests that Circular A-109 was intended to prevent. Had the major medical information system acquisition strategy and program plan proposed by O'Neill not been obstructed, in all likelihood DM&S would have met the accelerated timetable promised by the Administrator to the Senate Veterans Affairs Committee in the fall 1977 hearings on the National Academy of Sciences report.

#### Recommended Course of Action

Recommendations that will effect the rapid accomplishment of medical information systems introduction into the Department of Medicine and Surgery are the following:

First: The Committees of Congress that have oversight on these matters must receive a candid and accurate description of the current situation: the equipment and personnel resources being supported, the availability of tested prototype modules and the capability of the VAMCs to rapidly disseminate these modules to other stations in order to assist them in meeting their basic needs. These modules include pharmacy information, outpatient scheduling, ADT, medical center financial management, diagnostic and treatment subsystems, etc. All of these currently exist at different VAMCs. They are programmed in a common ANSI Standard high-level programming language. The same consistent set of data elements, codes and format conventions are used. All are built in a modular fashion, for ease of interfacing with other modules. Consequently, they are easily transported. The subsystems have been tested and refined in actual patient care and hospital management situations and are designed for ease of adaptation to different institutional environments. The existence of these resources and their immediate availability to serve the health care needs of veterans must be revealed to Congress and to the Executive Branch.

Second: Computers purchased over the past three years (with funds appropriated for Medical Care, Medical Administration and Miscellaneous Operating Expenses, the Office of Construction accounts and ODM&T accounts justified on the basis of service to medical care), that have been diverted from this use and moved to ODM&T data processing centers, must be returned to the VAMCs from which they were removed, or otherwise be distributed to VAMCs on a regionally balanced basis.

Confiscated equipment should be returned to the original VAMC which purchased it or, where MUMPS-proficient staff have been dismissed or hiring aborted, given to a site actively engaged in MUMPS program development for determining capability element needs. Restoration of this equipment will enable its immediate use with any of the field-developed medical application or administrative programs, such as the Pharmacy Information System, Outpatient Scheduling and Medical Center Financial Management System, etc. Because most of the confiscated computers are the larger type PDP 11/70, program usage can be hospital-wide or, for selected programs, on a district-wide scale.

Original PDP 11/70 computer sites, which lost their equipment but still have staff intact, are: Loma Linda, Memphis and Palo Alto (which is served by the District 27 office staff). Radiologists at Columbia, MO should also regain their computer. The Washington, D.C. Medical Center should be permitted to use the PDP 11/70 there, which was received from the Richmond VAMC over a year ago.

Third: VAMC Directors and Chiefs of Staff must be accorded the authority to plan and introduce subsystem modules into their own facilities, in the order of priority consistent with local needs and aptitude for making the most effective use of particular specialized subsystems. The budgetary resources, personnel and timetables can be coordinated through the Medical District and Regional planning and management processes, making full use of the inter-institutional sharing of specialized expertise and developed subsystems.

Fourth: A major system acquisition program management organization should be established, in accordance with OMB Circular A-109, with the mandate to expedite the solicitation of alternate technological concepts and approaches to meet the defined capability element needs embodied in the operational DM&S-developed subsystem modules and those modules that are nearing completion, or are obtainable from other non-VA institutions. The operational testing of some very low-cost subsystem modules has been underway for some time in a number of VAMCs. The assessment of other subsystems was prevented because of harassment and the confiscation of equipment. The technology base can be rapidly restored. The subsystems can be introduced for testing in a variety of different institutional settings in

order to thoroughly define the functional commonality and local diversity in each specialty area. This new activity should be devoid of any participation on the part of ODM&T.

Fifth: The Congress and the Executive Branch should insist that the individual VAMCS have the requisite technology base of low-cost computer equipment configurations designated for experimental development and testing of applications tailored to the unique patient care needs and opportunities that are identified locally. In addition, the public domain results of the experimental work of this VA-wide technology base should be made open to the medical care institutions of the nation, with particular attention paid to the synergistic support of comparable efforts in the health care programs of DoD and the Public Health Service. The resultant cost savings for the development and dissemination of medical information systems in the nation would be monumental. Following the approach advocated in the March 28, 1979 HGOC report, these projects would intimately involve the professional and administrative staff of the individual VAMCs in the evolutionary design and refinement of information system approaches, resulting in improved quality of patient care and reduced cost of health service delivery. The experience of over a dozen VAMCs with "programmerless" system development tools using low-cost minicomputer configurations has conclusively demonstrated that clinicians and administrators can by themselves create their own application systems that save time and resources.

### Conclusion

There is absolutely no justifiable reason why veterans should be forced to sit in packed waiting rooms for hours because of official prohibition of use of an available automated patient scheduling system and ODM&T's insistence that this excellent DM&S-developed application be officially declared nonexistent. The recommended course of action outlined above should be vigorously pursued and the well-structured A-109 program instituted by Dr. Chase and Mr. O'Neill revived.