APPENDIX B: DECENTRALIZED HOSPITAL COMPUTER PROGRAM MODULES

Software Development Approach – DHCP software is being developed incrementally in modules, using a rapid prototyping approach. The software is being written using the Massachusetts General Hospital Utility Multi-Programming System (MUMPS), an interpreted language. An American National Standards Institute (ANSI) standard for MUMPS was approved November 15, 1984 and adopted as a Federal Information Processing Standard (FIPS) effective May 1, 1987.[1] According to 'he Institute of Computer Sciences and Technology (ICST) at the National Bureau of Standards (NBS), however, MUMPS is not an active part of the current ICST technical program.[2]

According to NBS,

> The MUMPS standard has standardized the static syntax of the language, which consists of such things as the character set, definition of variables, literals, functions and language commands. The standard also presents the MUMPS dynamic syntax in transition diagram form. These diagrams serve as an implementation outline for the MUMPS language. The necessary operations are given, but their detailed implementation is left to the individual implementor.[3]

One useful characteristic of MUMPS is that implementation-specific (e.g. hardware- or operating-system-specific commands are readily identifiable because they contain the prefix 'Z' and are referred to as "Z-calls". The VA software developers have attempted to minimize the amount of implementation-specific software and this code is isolated in the DHCP Kernel, mainly in the File Manager, Task Manager, and input/output control rout ines.[4]

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1. See: U.S. Department of Commerce, National Bureau of Standards FIPS Publication 125, Nov. 4, 1986 and American National Standard for Information Systems - Programming Language - MUMPS, ANSI/MDC X11.1-1984, Mumps Development Committee, 1984.
2. Letter to OTA from Allen L. Hankinson, NBS/ICST, Aug. 13, 1987.
3. Enclosure to Hankinson letter, op. cit.
4. See: VA RFP # 101-5-87, Mar. 9, 1987, pp. 122-123; and Amendment #5 of the RFP, June 6, 1987.
   In the Federal Republic of Germany, users report that they were able to install a subset of the DHCP software (including File Manager and the Kernel) on a personal computer within 2 days, using the VA-recommended installation procedure. These users reported that only 7 of 150 routines in File Manager, for example, were operating-system specific. See: G. Schuller, "Description of the Decision Process to Use the DHCP as Basis of a HCP at a German Medical School," in Procurement of Hospital Information Systems in the Federal Republic of Germany, Vincent M. Brannigan, OTA contractor report, September 1987.
   (continued)

Module Descriptions — Up until VA reduced the scope of DHCP in June 1987, DHCP consisted of four phases of software development, embodied in four classes[5] of software modules:

1. Initial Core, which was installed in the 169 VA medical centers using DHCP by 1984;

2. Full Core, which the VA plans to have installed in the 169 VA medical centers by the end of 1987;

3. Enhanced DHCP, which by June 1987 consisted of 22 modules to support clinical services and some hospital-wide administrative functions; and

4. Comprehensive DHCP, which by June 1987 consisted of 23 additional modules intended for optional use by medical centers to provide automation for clinical or support services.

In June 1987, DHCP was reduced in scope to include only the Initial and Full Core modules, numbering 4 and 2, respectively, plus 8 of the original 22 Enhanced modules. These eight Enhanced DHCP modules met the OMB investment criteria for net benefits over their 10-year lifecycle and thus were approved for nationwide implementation. According to VA, any of the remaining 14 Enhanced modules and the 23 Comprehensive modules would only be added to DHCP as they are considered to be cost-justified and approved by OMB.[6]

Thus, as of June 1987, the official scope of DHCP was defined as Core Plus 8, consisting of the following 14 modules:

CORE:

1. Registration -- patient registration at the VAMC, demographic data in patient file available to all system users;

2. Admission/Transfer Discharge -- admit, transfer, discharge patients, track patient status and location, bed census, ward rosters, generate patient gain and loss statistics;

3. Clinic Scheduling -- schedule inpatient and outpatient clinic visits, eliminate duplicate appointments and claims, identify no-shows, send form letters to patients;

4. Outpatient Pharmacy -- produce prescription labels, check drug interactions and drug profiles, generate drug control data and management reports;

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5. See: Veterans' Administration, Department of Medicine and Surgery, Decentralized Hospital Computer Program, n.d.

6. See: U.S. General Accounting Office, Hospital Information Systems: VA Needs to Better Manage its Decentralized System Before Expansion, Appendix VI (Agency Comments), pp. 73, 82.

5. <u>Clinical Laboratory</u> -- support chemistry, hematology, microbiology, anatomic pathology, blood bank, order laboratory tests and receive results, patient laboratory profile, provide collection lists and specimen labels, work lists, report generation;

6. <u>Inpatient Pharmacy</u>-- unit dose, ward stock, and intravenous dispensing, tracks drugs, offers many of same functions as outpatient pharmacy;

ENHANCED MODULES:

(Note: Implementation schedules depend on development status, management priorities, funding, and available computer capacity.)

7. <u>Radiology</u> (available, scheduled for implementation in 1987);

8. <u>Dietetics</u> (available, scheduled for implementation in 1987);

9. <u>Medical Records Tracking</u> (under development, scheduled for implementation in 1987);

10. <u>IFCAP</u> (Fiscal and Supply -- in Beta test, scheduled for implementation in 1987);

11. <u>Decentralized Medical Management System</u> (DMMS --under development, scheduled for implementation in 1988);

12. <u>Surgery</u> (in Beta test, scheduled for implementation in 1988);

13. <u>Mental Health</u> (available, scheduled for implementation in 1989); and

14. <u>Nursing</u> (in verification, scheduled for implementation in 1989).

Appendix table B-1, reproduced from appendix 111 of the July 1987 GAO report on DHCP, shows the status of the previously-planned modules that are not included in Core Plus 8.

Modules by Priority	Status as of June 1987 When the Scope of the DHCP Program Was Reduced
Enhanced	
1. Management Support	Under development
2. Medicine	Under development
3. Department of Veterans Benefits Interface	Available
4. Fee Basis	Under development
5. Social Work	Available
6. Engineering	Available
7. Dentistry	Available
8. Rehabilitation Medicine	Under development
9. Extended Care/Geriatrics	Under development
10. Nuclear Medicine	Planned
11. Personnel	Under development
12. Readjustment Counseling/Outreach	Planned
13. Operating System Enhancements	Under development
14. Message Handling/Switching	Under development
Comprehensive	
1. Audiology and Speech Pathology	Planned
2. Prosthetics	Under development
3. Orthotics	Planned
4. Optometry	Planned
5. Podiatry	Planned
6. Library Service	In Beta test
7. Medical Media	Planned
8. Building Management	Planned
9. Voluntary Service	Planned
10. Recreation Service	Planned
11. Chaplain Service	Planned
12. Canteen Service	Planned
13. Gastroenterology	Planned
14. Oncology	Under development
15. Neurology	Planned
16. Pulmonary Service	Planned
17. Patient Monitoring	Planned
18. Pacemaker Registry	Under development
19. Space Management	Planned
20. Employee Health	Planned
21. Parking Management	Planned
22. Security/Police Service	Planned
23. Research Administrative Support	Under development

"prototype development of each DHCP application module is performed in ● medical facility designated ● s an Alpha test site. A subsequent Beta test is performed at ● other site(s) to evaluate the software n ● production environment.

ᵇFollowing the Beta test, the software is verified for both technical ● nd functional adequacy by en Infor- mation Systems Center. other than the center that developed the software