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Prospective Baseline Funding for DoD Medical Facility Inventory Real Property Maintenance Costs

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ABSTRACT

This paper examines Real Property Maintenance (RPM) investment in the DoD medical facility inventory. It reports the findings of several relevant studies and examines the service's recent medical RPM funding histories. There has been a general lack of commitment to maintaining the public infrastructure. I contend that DoD medical RPM has also been underfunded in the past and is likely to remain underfunded in the future.

Medical facility investment funding, including both RPM and new construction, is now the responsibility of the Assistant Secretary of Defense for Health Affairs. Despite the centralized funding responsibility, there appears to be very little consensus as to what constitutes an appropriate medical RPM funding baseline. Decision makers must be provided with credible, persuasive data demonstrating not only the required investment but also the consequences of underfunding medical RPM. There are significant differences between the service's medical facility information systems that must be reconciled and standardized to improve investment decisions. In particular, the services must harmonize the determination of plant replacement values and backlogs of maintenance and repair.

I examine these issues and conclude, among other things, that an interim annual medical RPM funding baseline should be established at 2 percent of the DoD medical plant replacement value (PRV). A higher RPM investment rate is probably warranted and should be determined by a more rigorous, contracted study of the DoD medical facility infrastructure.

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PROSPECTIVE BASELINE FUNDING FOR DOD MEDICAL FACILITY INVENTORY REAL PROPERTY MAINTENANCE COSTS

INTRODUCTION

We live in a resource constrained world. There are never enough resources to do everything that needs to be done. Decision makers must weigh tradeoffs as there are opportunity costs for choosing the level of funding for one area at the expense of another. Consequently, individuals and organizations arrive at the need to prioritize requirements and then allocate scarce resources.

The process of prioritization and allocation of scarce resources takes place in all organizations and at virtually every level. For new or substantially changed conditions there is most often considerable debate as to priority and appropriate funding level. Disputes often receive high level resolution. Resource decisions for recurring requirements are almost entirely decided by organizational and bureaucratic processes and may not receive sufficient attention. Suboptimized resource allocation decisions are much more likely in environments of severe budget pressures and major force reductions.

This paper is concerned with a portion of the Department of Defense's (DoD) Operations and Maintenance (O&M) account - specifically, funds allocated for maintenance, repair and minor construction of DoD's medical facility infrastructure. It is my

contention that maintenance, repair and minor construction - Real Property Maintenance - of the DoD medical facility infrastructure has been underfunded in the past and is very likely to remain underfunded in the future given current funding priorities and decision making processes. There are consequences, both objective and subjective. I contend that underfunding maintenance is a false economy that ultimately leads to more frequent and higher repair and replacement costs as well as a shorter facility life expectancy. It is also clear that underfunding of maintenance and repair limits the ability to meet and maintain minimum environmental, safety and health standards. Underfunding minor construction restricts flexibility to adapt existing medical facilities to changing health care requirements. Unfortunately, underfunding facility improvements also tends to negatively affect the patient's perception of the quality of care provided.

In addition to down-sizing pressures, there are several factors which have combined to constrain support within DoD for medical infrastructure investment:

- There is a lack of understanding and commitment within DoD, and the public sector in general, to maintaining the infrastructure. There is a tendency to emphasize greater operational capabilities, or cost savings, at the expense of the responsibilities of infrastructure ownership.

- In the medical arena, the shifting of O&M budget ownership from the services to the Assistant Secretary of Defense for

Health Affairs has created new budget uncertainties, as well as standardization and accounting problems.

- New congressional legislation affecting the FY93 budget created a new Real Property Maintenance funding category called Major Repair which limits flexibility and necessitates more careful maintenance and repair programming.

- There are no DoD-wide medical facility standards on which to base a consistent maintenance and repair program.

- The service's existing medical facility information systems, including inventory and cost accounting databases, are not universally adequate tools for making maintenance and repair budget decisions.

- There is no strong, central advocate for medical maintenance and repair funding.

There is certainly no way to fully fund all of DoD's medical facility "requirements." Even if the DoD were able to meet its 25 year life cycle goal for medical facility replacement[1] - which is apparently not possible - there is still an almost infinite amount of maintenance, repair and minor construction work that can be generated in the field. There is always something more to paint, a roof or air conditioning system to upgrade or replace, a wall to be moved, or an addition to be built that can consume that next dollar. Interestingly, needs and expectations seem to grow along with expanding available resources.

Because of the uncertainty over how much maintenance and repair is enough, some type of prospective tool or measurement is

necessary to budget for this important work. It is possible to draw some conclusions concerning baseline facility investment by examining available maintenance and repair studies and by looking at past DoD medical real property maintenance expenditures. Based on this information I will make a recommendation for an appropriate annual baseline funding level, as well as propose additional actions I think are necessary to improve the DoD medical facility inventory real property maintenance program.

In all probability, pressures to reduce medical maintenance and repair funding will increase in the future. Action is necessary on several fronts to position Health Affairs to make the most informed resource allocation decisions in the future.

Definitions

It is important to keep in mind several standardized definitions used in the DoD.[2]

Real Property Maintenance Activities (RPMA). RPMA includes funding for all of the functions for the maintenance and repair of facilities, the accomplishment of minor construction, the operation or purchase of utilities, and the provision of operating services and other engineering support.

Real Property Maintenance (RPM). RPM is the portion of RPMA which includes only maintenance and repair of facilities and minor construction.

Maintenance and Repair (M&R). M&R is the portion of RPM which includes only maintenance and repair of facilities.

Minor Construction (MC). MC is the portion of RPM which includes only new work valued less than $300,000; the addition, extension, alteration, conversion, or replacement of an existing facility; or the construction of a new facility.

BACKGROUND

Funding Sources

There are several sources of funds the DoD uses for facilities investment. These funding sources support two broad categories of investment. One area is new or replacement construction and the other is maintenance and repair and minor construction.

New or replacement medical construction funding comes from Congress and occasionally host nations overseas.[3] The largest source of construction funds is congressionally appropriated Military Construction (MilCon) which provides for projects costing more than $300,000.

Maintenance and repair (M&R), and minor construction (MC) funding for DoD medical facilities comes via the Operations and Maintenance (O&M) appropriation.[4] The O&M appropriation provides the funds to operate and maintain weapon systems; recruit and train personnel; purchase parts, supplies, equipment and fuel; perform activities such as intelligence, communications, logistics and medical operations; pay civilian personnel; as well as to maintain base facilities. Each service prepares, defends, and executes its own O&M budget subject to various fiscal guidance and budget cycle machinations. Thus, each service's O&M account has traditionally been the battleground for seeking greater resource allocations for RPM. Although there has always been a tremendous amount of competition for limited resources within the O&M account, each service has had its own advocates

for RPM.

Medical Resource Management

Unlike most of the rest of the DoD inventory, medical MilCon and RPM funding is not controlled by the individual services. Rather, both areas are now managed by separate offices under the Assistant Secretary of Defense for Health Affairs (ASD(HA)). In 1986, in response to recommendations of the Blue Ribbon Panel for the Sizing of DoD Medical Treatment Facilities, the Defense Medical Facilities Office (DMFO) was created under the ASD(HA) to centrally plan, program and budget for all medical MilCon projects.[5] Since that time, allowing input and comment from the services, DMFO has fought for medical MilCon funding in the OSD arena and has defended the MilCon program within DoD and to the Congress. As DMFO's mission is entirely related to medical MilCon they are vitally concerned about funding levels and program execution.[6]

Medical O&M funds, including those for RPM, were transferred from the services to the ASD(HA) in December 1991 as a result of a Defense Management Review Decision.[7] The intent of this and other funding transfers was to make the ASD(HA) "the sole DoD official responsible for the effective execution of the Department's medical mission."[8] Within the OASD(HA), medical O&M funding is now centrally managed under the Deputy Assistant Secretary of Defense for Health Budgets and Programs (HB&P). Of course RPM is only a small portion - less than 3 percent - of the

total medical O&M funding.[9] The RPM piece of the budget is so small that HB&P's role has primarily been one of bookkeeping.[10] HB&P is concerned with RPM budget and execution but only within the context of the entire medical O&M budget. There is certainly no strong central advocate for RPM within Health Affairs in the manner that DMFO advocates MilCon, even though the budget amounts are roughly equivalent.

New Legislation

In 1993 OSD created a new funding category - Major Repair - which it defined as maintenance and repair, and all minor construction projects with costs exceeding $15,000. Although the $15,000 limit was somewhat arbitrary, it was proposed as a dividing line between operating and investment expenses. In an attempt to centralize management of most facility investment funding, OSD proposed realigning Major Repair from the O&M account to the MilCon account. Ultimately this action was not supported by the Congress in the FY93 budget. The Major Repair portion of RPM was left in the O&M account but was fenced apart as a special budget exhibit. Congress directed that Major Repair category funds would allow two years for obligation vice one year as with the rest of the O&M account.

The remainder of RPM - projects costing less than $15,000 - as well as recurring maintenance and service calls were still to be funded from the O&M account. There is no shorthand term used yet for this category so I have called it "routine operating" RPM

to distinguish it from Major Repair. The remainder of RPMA - all utilities, housekeeping, and similar services costs - would also remain funded from the O&M account.

On the one hand, the consequence of Congress's fencing Major Repair was that it was protected from being used, even temporarily, for other purposes. On the other hand, flexibility to reprogram funds within the O&M account to augment RPM for these larger projects was lost. Thus, the importance of the amount programmed for Major Repair RPM becomes quite significant as it can't be easily augmented or reduced. Health Affairs must be able to fund all the service's required, larger RPM projects from this amount.

DOD MEDICAL FACILITY INFRASTRUCTURE

Medical Facility Management Information Systems

The medical facility management inventory and cost accounting systems are maintained by the services. Over the years each service developed systems and databases unique to their own needs. The centralization of medical O&M funding at Health Affairs has demonstrated a considerable lack of standardization between the services. Some differences are embedded within the separate reporting systems and are such as to defy simple comparisons between services. Differences exist because of service unique organizational structures, types of physical plants, and medical mission characteristics. The systems make perfect sense within each service, but certainly not

between services.

For example, there are substantial differences in what Health Affairs is responsible for in terms of replacement MilCon construction and what they are responsible for in terms of RPM. From an RPM perspective, one can't address the "medical" inventory without understanding that it doesn't include all medical treatment facilities but does include many non-medical facilities. Supporting infrastructure, ancillary to the medical mission, may or may not be maintained by medical RPM. There are certainly differences in what each service uses RPM to pay for.

With respect to facilities inventory, each service makes a distinction between medical ownership and operation. This affects RPM funding responsibilities. Differences exist in the accounting for medical research and development, education and training, contingency, and administrative facilities; adjunct bachelor enlisted quarters; utility plants; as well as in the accounting for medical treatment facilities. There are also differences between the services in cost accounting definitions used. Definitional problems are as basic as inventory, determination of plant replacement value, and backlog of maintenance and repair.

The Navy's medical facility information system is quite clearly the most well developed and the least affected by the transfer of O&M funding from the services to Health Affairs. Because of the MilCon and O&M program transfers to Health Affairs, the Army and Air Force medical communities have steadily

lost the support of their service engineers who have traditionally maintained their facility inventory databases.

The accuracy of the available medical facility inventory data appears to be quite variable. The Navy's seems much less so because of the integrated support provided to the Bureau of Medicine and Surgery (BUMED) by Navy Civil Engineering Corps (CEC) officers. The Army and Air Force engineers and medics have not placed a high enough priority on managing this data and are consequently much less prepared to defend RPM funding requirements. As an example, historical RPM cost data is quite accessible to BUMED, and to a lesser extent the Air Force, but the Army is unable at present to access this data.

Some numbers which are now important have not been historically tracked. Because RPM has not been recorded in relation to the new $15,000 dividing line between routine operating and Major Repair RPM, there is no easily accessible data to indicate if the FY93 levels are sufficient.

An Aging Medical Infrastructure

A reasonably good estimate is that the DoD medical facility inventory consists of over 1,100 separate medical and dental facilities.[11] There is some 60 to 70 million square feet of medical inventory.[12] The plant replacement value (PRV) has been estimated at up to $18 billion.[13] The average age of the medical inventory, though somewhat problematical, was reported as 34 years in 1989.[14] Some 33 percent of the inventory is labeled as

substandard or inadequate by the services.[15]

The DoD medical facility inventory suffers from a variety of deficiencies.[16] Many facilities suffer from insufficient space, in some cases acutely. Due to age, heavy use, changing medical missions, new medical technology, and new patterns of health care delivery, much of the existing space is of dysfunctional configuration.[17] Compliance with a multitude of changing codes and standards is a continual challenge. Inadequate electrical, mechanical, and communication systems are not uncommon. Unprofessional medical practice environments affect both the staff and patients. Many medical facilities with critical missions do not meet strict seismic and stand-alone criteria.

Congress has appropriated approximately $240 million annually for the last six years in constant 1993 dollars for new and replacement DoD medical construction.[18] This represents an MilCon investment of approximately 1.3 percent of the plant replacement value; far lower than the 4 percent annual investment required to produce an inventory with a 25 year life cycle. Despite a worsening trend in MilCon, there is no adequate mechanism within OSD or the services to ensure that RPM funding is increased to fill the gap so the aging infrastructure is properly maintained.

Standards

For years there has been a perception that the general quality of medical facilities varies between the services. Even

within services there are apparent variations between commands. This is perhaps in part due to leadership and resource emphasis, but may also reflect the lack of adequate maintenance and repair standards for existing medical facilities.

The Military Handbook 1191, Department of Defense Medical and Dental Treatment Facilities Design and Construction Criteria, is DoD criteria for new or replacement MilCon projects. It states that it "is not intended to be the basis for Operations and Maintenance or Repair and Maintenance work though it may serve as a guide in the absence of other relevant criteria."[19] Because there is no common standard, variability should be expected in the RPM projects identified as requirements by individual DoD health care facilities.

UNDERFUNDING OF MAINTENANCE AND REPAIR IN THE PUBLIC SECTOR

Underfunding of maintenance and repair is unfortunately the rule rather than the exception throughout the public sector. While some $140 billion is being spent annually by local, state, and federal governments, it represents only a fraction of what is needed.[20] A substantial body of data exists which documents the deteriorating condition of highways, bridges, schools, and other portions of the public infrastructure.[21] One indication of a worsening trend is the Federal government's expenditures on public works as a percentage of total outlays declined from 4 percent in the early 1980's to 2.5 percent in the 1992.[22] The public sector is predominantly ruled by an attitude of build-

neglect-rebuild rather than one in which preventive maintenance and repair is consistently applied after initial construction.[23] Somewhat surprisingly, the American public is apparently willing to pay for infrastructure improvements and maintenance when they are clear what they will get for their tax dollar.[24] It is the slow process of deterioration and the lack of "immediately visible consequences" that permits decision makers to avoid making maintenance and repair a higher funding priority.[25]

In 1990, the Committee on Advanced Concepts for Buildings, in a major study for the National Research Council, stated that "underfunding of maintenance and repair is such a prevalent practice in the public sector that it has become in many agencies a de facto policy that each year compounds the problem as the backlog of deficiencies grows."[26] The purpose of the Committee's report was to alert public decision makers to the continuous nature, and magnitude, of maintenance and repair costs inherent in the decision to construct a new facility. This "stream of costs" over the life of a building is fundamentally a part of the "cost of ownership."[27]

The Committee's recommendation was that "the appropriate level of M&R spending should be, on average, in the range of 2 to 4 percent of current replacement value of the inventory."[28] The amount of investment is influenced by numerous factors including building use, size, complexity, age, and condition; technology of component systems; climate; criticality of function; distances between buildings in inventory; type of construction (e.g.

temporary); and economies of scale.[29] Given these factors one would expect the DoD medical inventory investment level to be at the high end of the quoted range.

Public decision makers "are failing, either by conscious decision or insufficient foresight, to protect the value" of the real property investment.[30] New construction attracts considerable attention and debate as the initial lump sum costs involved are substantial. However, subsequent funding of maintenance and repair receives relatively little attention "although over the course of a facility's service life they generally total much more than the initial costs of construction."[31] The report confirms that underfunding maintenance and repair can have serious consequences.

> "Neglect of maintenance can ... affect public health and safety, reduce productivity of public employees, and cause long-term financial losses as buildings wear out prematurely and must be replaced. Decisions to neglect maintenance, whether made intentionally or through ignorance, violate the public trust and constitute a mismanagement of public funds."[32]

Decision makers in the public sector are rarely provided unambiguous information on which to base facility management decisions. Presented with credible, persuasive data, decision makers will often be much more supportive of increased funding for maintenance and repair. This is being demonstrated in many areas of the public sector which are reporting having learned the hard lessons of neglecting the infrastructure.[33]

UNDERFUNDING OF RPM WITHIN THE DEPARTMENT OF DEFENSE

The DoD must maintain a huge infrastructure at operating locations scattered throughout the world. The DoD has well over 435,000 facilities, totalling some 2.7 billion square feet with a plant replacement value of exceeding $500 billion.[34] Maintaining and continually replacing this infrastructure is an enormous challenge. Unfortunately, the average age of these facilities is over 35 years; 30 percent of the square footage is labeled as substandard or inadequate, while 20 percent is of semi-permanent or temporary construction.[35]

In March 1989, the DoD provided a significant report to the Congress - "RPMA Study: Renewing the Built Environment" - which provided a comprehensive view of the DoD's investment in facility infrastructure. The study examined new construction and maintenance and repair within DoD in comparison with both the rest of the public sector and the private sector.[36] It documented the following annual investment levels in terms of the total plant replacement values considered:[37]

Annual Facility Construction Versus Maintenance and Repair Investment[38]

Percent of Plant Replacement Value

	CONSTRUCTION	M&R	TOTAL
DoD[39]	1.6%	1.4%	3.0%
Decaying Public Infrastructure[40]			4.5%
Major Colleges & Univ (C&L Survey)[41]	6.1%	2.0%	8.1%
Major Colleges (RPMA Study)[42]	6.9%	1.5%	8.4%
Major Private Corporations (16)[43]	5.4%	3.5%	8.9%
Non-DoD Government Entities (23)[44]	8.2%	1.4%	9.6%

This data dramatically shows that the DoD has underfunded both construction and maintenance and repair in comparison with other public and private investment histories. The study did attempt to normalize data from these different sources so they could be reasonably compared.[45] Even assuming some normalization problems, these differences are so substantial that one must conclude that RPM is a low priority in DoD. It would also indicate that congressional oversight and/or support has been lacking. There is a documented perception that Congress would not fund the full facility investment requirement due to a "cap" on funding. This real or perceived cap has led to a lack of support in DoD for ever requesting the full requirement.[46]

One could perhaps make a case that this level of funding is appropriate for the DoD facility infrastructure in the aggregate. But if one uses the data above to analyze just the DoD medical inventory, it should be fair to expect the DoD medical infrastructure RPM funding levels, as a percentage of plant replacement value, to be as high or higher than RPM being spent in the public and private sectors.

DoD's goal - at least as advertised - has been to replace facilities on a 50 year life cycle which requires an annual investment of 2 percent of the plant replacement value (PRV).[47] As the results above show, it has not been possible for DoD to meet that goal. In both good and poor funding climates, higher priorities have consistently caused the DoD to underfund infrastructure replacement investment.[48] Unfortunately, reduced

funding in MilCon has also been accompanied by reduced RPM investment.[49] The RPMA study stated that,

> "Industry invests in facilities to get and keep the best people, to get the best from their people, and to accomplish their mission better. We are losing mission capability by under-investing in DoD facilities."[50]

The RPMA Study concluded that the goal for DoD annual O&M appropriated RPM program should be "service calls and recurring maintenance and repair at least 1 percent of PRV, plus other maintenance and repair at least 0.75 percent of PRV" for a total of 1.75 percent.[51] It was assumed that operation costs, purchase of utilities, and other engineering services were additive to this and would be fully funded as "must pay" items.

MEDICAL INFRASTRUCTURE INVESTMENT

FY93 RPM FUNDING

FY93 will be the first full year of Health Affairs management of the medical O&M budget but they must still live within the funds previously budgeted and transferred by the services. With regard to total RPM, until proved otherwise, HB&P will assume the services transferred sufficient funds to perform all RPM activities in FY93.[52]

FY93 funds for RPM were distributed back to each service for execution in two funding sources - the Major Repair RPM and normal operating RPM. The total FY93 Major Repair RPM funding was $92 million.[53] This amounts to an FY93 Major Repair investment of approximately 0.5 percent of the plant replacement value.[54] Health Affairs has not provided guidance to the

services as to how much of the O&M dollars should be expended on normal operating RPM for service calls, recurring maintenance, and projects costing less than $15,000. However, as a point of reference, the services, with Health Affairs concurrence, would have to commit O&M funds for recurring maintenance in excess of $200 million to achieve a total RPM investment of 2 percent of the plant replacement value.[55]

Past DoD Medical RPM Investment

The service's ability to access RPM investment histories varies considerably. The Army has no accounting system in place that can generate these numbers though they are working on developing the capability.[56]

The Navy has annual RPM funding histories by installation immediately accessible. They can track M&R and MC funding levels and approvals at the installation and headquarters level. FY92 was a particularly bad year for RPM funding; a year which totaled $55.1 million for the Navy.[57] Between FY85 and FY92 medical RPM averaged $70.75 million in constant FY92 dollars.[58] This represents an annual RPM investment of above 2 percent of their PRV. However, regression analysis shows that the average RPM growth, in constant FY92 dollars over the eight year period since 1985, has been a negative 2.32 percent.[59] It should be noted that the Navy is the only service with a stated annual medical RPM investment goal - 2.25 percent of PRV.

From data provided by HQ USAF/SGHC, I calculated that Air

Force medical RPM averaged $34.2 million annually in constant FY92 dollars.[60] This represents an average annual RPM investment of less than 1 percent of the Air Force medical PRV.[61] The Air Force funding, particularly for M&R, has been quite erratic since FY87. Interestingly, while FY92 was also a very poor funding year for the Air Force, they chose to take most of the cut in maintenance and repair, preserving a high funding level for minor construction. This was just the opposite of the Navy strategy which chose to protect their M&R line at the expense of MC.

Clearly, there is a significant difference in the rates of medical RPM investment between the Air Force and the Navy despite the fact that their facility inventories are approximately the same size. The Air Force and Navy report PRVs of $4.3 and $3.0 billion respectively yet the Navy on average has invested more than twice the total RPM. More specifically, the Air Force has actually averaged approximately $2.5 million more than the Navy in MC, but about $39 million less annually than the Navy in M&R. There are many reasons why one should expect the Navy M&R to be higher in terms of gross RPM but not as percentage of PRV.[62] These results are not satisfactorily explainable from the data available for this study, except to surmise that either the PRV calculations are significantly different between the two services, or that the Air Force has in fact underfunded its medical RPM. Interestingly, there does not appear to be an Air Force medical backlog of maintenance and repair projects to dramatize this fundamental a difference in M&R strategies. This

must explained by a more in-depth analysis.

As of late February 1993, the services were still unsure how much they would be able to spend for normal operating RPM in FY93.[63] The Navy had proposed to spend some $50 million in this category but with substantial unpaid bills in other medical programs, HB&P will carefully scrutinize the request.[64] As a benchmark, if, in FY93, the Navy expends $23 million in Major Repair and $50 million in normal operating RPM, they would achieve an investment of approximately 2.4 percent of their PRV.[65]

Backlog

DoD has utilized various methods to demonstrate need or defend RPM budgets. As with many other budget categories, "ramping" has been quite extensively used.[66] Ramping is based on the prior years budget, usually plus or minus some percentage based on inflation or some objective or subjective measure of need. Unfortunately, ramping is a better mechanism for allowing growth in good years and cutting back in bad years than it is a true measure of requirements.[67]

In the facilities arena, the service's have also tried, with varying success, to use the "backlog" of unaccomplished projects to demonstrate need for increased funding.[68] Backlog of maintenance and repair (BMAR) is defined as the "total maintenance and repair which remains as a verified firm requirement that was not started during the fiscal year due to

lack of resources."[69] BMAR is still being used extensively but has not proved entirely credible with service or OSD decision makers, or with the Congress, because there has not been a good mechanism to link the volume and cost of backlog with the criticality of the work. In other words, a big backlog may just be an indication of high expectations, not necessarily a measure of vital work. Conversely, a low backlog may simply reflect low expectations. Nevertheless, BMAR, if appropriately and uniformly measured, is still a very useful tool. For example, a BMAR valued at less than a single years RPM budget would not be a great worry; it would be a much greater worry if the BMAR was greater than 2-3 times the annual RPM funding.[70]

There appears to be considerable non-uniformity in the service's BMAR measures. BUMED has developed the most credible medical BMAR reporting system within the services; the Army and Air Force medical services cannot provide documented medical BMAR at this time[71], although both anticipate a reporting system to be in place by the end of FY93. The Navy's medical BMAR is based on hard documentation and is validated annually. They can differentiate between critical and deferable BMAR, and have documented BMAR growth since 1983.[72]

BUMED reports an FY 92 medical BMAR of $200 million.[73] Of this amount, $127 million they identify as critical projects that prudent engineering judgement says should have been completed in FY92. The other $84 million in BMAR was considered deferable, that is, RPM that could be deferred at least twelve months. This

total level of BMAR amounts to almost 3 times the average annual medical RPM funding BUMED has experienced since FY85.[74] Interestingly, BUMED documents that critical and deferable BMAR has grown 67 and 77 percent respectively, in constant dollars since FY83, during a period in which RPM investment approached 2 percent of their PRV.

Project SUSTAIN

Project SUSTAIN[75] was a program initiated in 1987 in the Office of the Air Force Surgeon General to formalize the analysis, and determine the effectiveness of Air Force medical RPM program and to propose management initiatives to improve the program.[76] Project SUSTAIN was an attempt to improve both the Air Force medical MilCon and RPM investment programs. Its objectives were to establish standards for existing medical facilities; identify RPM funding requirements; develop a methodology to forecast RPM requirements; and create a database to support management and budget decisions. Project SUSTAIN faded away as a separate initiative in 1989. Not too surprisingly, Project SUSTAIN objectives are largely still valid for the Air Force Medical Service today.

Project SUSTAIN concluded that $2 per square foot - $2.50 per square foot in FY93 dollars - was the appropriate baseline funding estimate on which to program RPM funding.[77] Based on the Air Force medical inventory at the time, this equated to investing approximately one percent of the plant replacement

value.[78] The $2 per square foot baseline was an extremely conservative conclusion based on the data but still approximately twice the Air Force RPM funding between FY83 and FY87.[79] I believe the Project SUSTAIN data could just as well have supported a baseline of $3.70 per square foot - almost 2 percent of PRV - if only FY88 through FY90 data had been averaged.[80] I believe the false assumption inherent in the Project SUSTAIN calculations was that it assumed, in the aggregate, the individual facilities projects that were either funded or proposed for a six year window actually represented a total baseline requirement. While the near-years may have been fully representative of a baseline requirement, the out-years certainly were not.

While I disagree with the some of the assumptions made in Project SUSTAIN, I feel the data collected actually supported a minimum investment of nearly 2 percent of PRV. I certainly feel Project SUSTAIN was on safe ground in concluding that up until 1988 "insufficient resources (were) being applied to the (Air Force medical) facility O&M program."[81] While it is not entirely clear why the Project SUSTAIN effort was abandoned, it is possible that its central conclusion could not be supported in the face of other priorities.

Interestingly, the BUMED's medical facility information system, which was developed separately, is able to fulfill most of the objectives that the Air Force's Project SUSTAIN attempted to satisfy. BUMED's success is probably due to several factors,

including consistent CEC engineering support; the right individuals in the right spot at the right time; and adequate manpower to support the collection, maintenance, and manipulation of the data.

CONCLUSIONS AND RECOMMENDATIONS

The primary reason for facilities investment is to accomplish the mission. Secondarily, investment is needed to ensure quality facilities in which to work and operate. Facility investment can improve staff productivity and efficiency; permit compliance with stringent government and industry mandated health and safety standards; improve reliability of critical medical systems; improve retention and morale; and meet or exceed beneficiary expectations as to the professional environment. It is also necessary to protect the investments already made. As the RPMA Study stated - "The two most important assets of any organization are its employees and facilities, they both need to be maintained."[82] The question is - how much RPM is enough?

Intuitively we know that some RPM spending is absolutely vital; some additional spending makes good business sense; and some more spending enhances image and professionalism. One can expect that at some point increased spending would not provide a sufficient return on investment to be worth the extra dollar. However, it is apparent that DoD in general is far down this curve. While it is very difficult to prove how much RPM funding is enough, it is possible to draw some conclusions based on past

expenditures and relevant studies.

Health Affairs now owns the planning, programming and budgeting responsibilities for virtually all of DoD's medical facility infrastructure investment. Health Affairs must now assume the full responsibilities of ownership. They must organize, analyze, articulate, and defend medical facility inventory investment requirements. Given the major problems that are inherent in long-term underfunding of the infrastructure, I believe the following actions are necessary:

- Health Affairs must establish an interim baseline for medical RPM funding. The study "Committing to the Cost of Ownership" recommended an annual funding of 2 to 4 percent of the PRV for the public sector. The DoD's RPMA Study recommended RPM funding at 1.75 percent of PRV for DoD-wide facilities, while acknowledging that maintenance and repair in the private sector ranged up to 3.5 percent of PRV, with a much higher total facility investment program. The past medical RPM funding experience by the Navy has been close to 2 percent although they can document a growing medical BMAR at this funding level. I believe that this data makes a strong case for establishing 2 percent of the PRV as an **absolute minimum** annual RPM funding baseline. A higher annual medical RPM funding "goal" should be established at 2.5 percent of the PRV. This goal is a reasonable compromise between the requirements of truly excellent facilities and the current realities of the budget.

- Health Affairs must provide policy guidance for the

improvement and standardization of the service's facility management information systems and reporting requirements. While the aggregate data provided by the services forms the basis for analyzing and defending RPM requirements, there is currently a significant lack of commonality of definitions and accounting methods. Differences that are inherently embedded in the services organizational structures must be clearly recognized and accounted for. Other differences must be reconciled so that a degree of uniformity is ensured between the services. It is crucial, for example, to ensure that what is counted in medical PRV, and how it is calculated, is uniform between the services.

- Medical BMAR is the best tool available to measure the underfunding of RPM. It needs considerably more development in the Air Force and Army. Standardization between the services must be ensured by Health Affairs.

- Health Affairs must formalize standards and criteria for existing medical facilities. Until this common basis is established, one should expect variation in projects submitted within and between services.

- A strong RPM advocate should be created within OASD(HA). Unlike medical MilCon, which is managed closely within Health Affairs by DMFO, HB&P's role in RPM management is more bookkeeping than advocacy. Without a strong, central advocate, RPM will never be able to compete for funding priority. Although there may be other alternatives, I believe MilCon and RPM should be managed by one office - DMFO - that is charged with

determining and defending a total facility investment strategy.

- Health Affairs must determine historical split between normal operating RPM and Major Repair RPM so that Major Repair can be adequately programmed.

- Health Affairs should contract for a comprehensive medical RPM study to be conducted along the lines of the DoD's 1989 RPMA Study. There does not exist today a credible baseline on which to program for medical RPM. Each service is coping in different ways with the new funding levels, organizational and legislative changes. The study could be used as the basis for further improving data collection and reporting methodologies, and for projecting and defending RPM requirements as a function of plant replacement value.[83] With a detailed examination of private sector medical RPM experience, a fuller accounting of past service expenditures, and a fuller analysis of the impact of the drawdown, I would fully expect a medical RPM study to endorse a baseline well in excess of 2 percent of PRV.

At present we cannot accurately measure the extent of the DoD medical infrastructure problems. Certainly the data available for this study was insufficient to make conclusive RPM recommendations. I believe it is possible to say we are headed in the wrong direction, but, from a DoD perspective, we can't measure how fast, or accurately articulate the consequences. Great confidence is generated by such data history as the Navy has accumulated but without much improved and uniform facility inventory information from the Air Force and Army, DoD leadership

and the Congress will not be able to make an informed decision as to the appropriate RPM funding level.

There is really no alternative in DoD to excellent health care facilities. Short term cost avoidance is possible within certain ranges and for short periods of time but ultimately it will affect the mission and the taxpayer. Therefore, once a medical facility inventory investment strategy has been developed, Health Affairs must commit the resources and defend the requirement within OSD and to the Congress.

ENDNOTES

1. Mr Gordon Dowery, Director, Defense Medical Facilities Office, OASD(HA). The 25 year modernization cycle was articulated in a prepared statement before the Senate Appropriations Committee, Subcommittee for Military Construction, 11 May 1989, p. 437.

2. Department of Defense Report to Congress, RPMA Study: Renewing the Built Environment, March 1989, p. C-1.

3. Ibid., p. H-14. New or replacement construction is provided by the Congress in the following appropriations: Military Construction, Family Housing, RDT&E, Procurement, O&M, and Military Pay. New or replacement construction is also provided via the Industrial Fund, Non-Appropriated Fund, host nations overseas, and the private sector.

4. Ibid., p. H-14. Congressional appropriations funding maintenance and repair include O&M, Family Housing, RDT&E, Procurement, and Military Pay. Maintenance and repair is also funded by the Industrial Fund and other government sources.

5. Gordon Dowery, Director, Defense Medical Facilities Office. Testimony before the Senate Appropriation Committee, Subcommittee for Military Construction, 6 May 1987, p. 775.

6. Gerard S. Rutkowski, CDR, CEC, USN. Chief, Program Execution Branch, OASD(HA)DMFO. Personal interview, 1 December 1992.

7. Department of Defense Program Budget Decision 742, "Consolidation of Defense Health Program Resources," 14 December 1991, p. 1.

8. Department of Defense Program Budget Decision Number 742, "Consolidation of Defense Health Program Resources," 14 December 1991, p. 2. Funds affected were in FY92 and FY93. Medical O&M funds are now appropriated in the Defense Agencies Appropriations. Some 21 Defense Agencies have been formed to perform activities which are common to all of the services and which presumably can be accomplished more efficiently and economically by a single organization.

9. Health Affairs FY93 O&M budget totals $8,993 million. Total RPM funding for FY93 has not been established but will almost certainly be less than $300 million.

10. Lane Ongstad, Lt Col, USAF, OASD(HA)HB&P. Personal interview, 1 Dec 92.

11. Gordon Dowery, Director, Defense Medical Facilities Office, Office of the Assistant Secretary of Defense (Health Affairs). Prepared statement for the Senate Appropriations Committee,

Subcommittee for Military Construction, 11 May 1988, p. 437.
Updated in personal interview with Lt Col Ray Pfannstiel, Deputy Chief, DMFO, 19 January 1993.

CONUS	Hospitals	112
	Clinics	428
	Dental Clinics	267
CONUS	Sub-Total	807
OCONUS	Hospitals	28
	Clinics	196
	Dental Clinics	267
OCONUS	Sub-Total	347
	TOTAL*	1,154

* This number includes most known changes through 1996, including the results of closures and BRAC 91 and 92.

12. Data below is from a combination of sources including the RPMA Study; Lt Col Ray J. Pfannstiel, DMFO, 19 January 1993; Capt O'Brien, USAF, 13 January 1993; LCDR Joe Stusnick, USN, 5 February 1993; and Capt Cross, USA, 15 & 25 January 1993.

DoD Medical Facility Inventory
(Square Feet)

	RPMA Study (p. G-8)	RPMA Study (p. H-21)	Services 1993
Army	27,430,000	28,586,000	33,000,000
Navy	15,000,000	13,260,456	10,462,000* 8,537,000**
Marine C	1,284,000	1,238,652	in above
Air Force	17,008,000	not reported	18,800,000
TOTAL	60,722,000		70,799,000

* Navy medical inventory
** Non-medical inventory owned by BUMED but requiring RPM support from Health Affairs.

Note: While the Air Force finds square footage a useful tool in determining RPM budget, the Navy does not. LCDR Stusnick cites the wide variety of physical plant in the BUMED inventory (including piers and energy plants), disparate age of facilities, etc., as reasons to rely minimally on SF measures. BUMED relies more on

PRV, historical data, and other indicators of individual facilities in the inventory to distribute funds.

13. Information from a variety of sources, including the RPMA Study; Lt Col Pfannstiel; LCDR Stusnick; Capt Cross; and Capt O'Brien.

DoD Medical Plant Replacement Value ($ million)

	RPMA Study (p. G-6)	Service 1993	DMFO Estimate
Army	4.3	N/A	
Navy	2.7	3.0*	
Marine Corps	0.2	in above	
Air Force	3.5	4.3**	
TOTAL	10.7	12.3***	18.0

* The Navy reports another $0.6 billion in medical inventory that does not fall under Health Affairs for RPM funding responsibility.
** The Air Force looked at the impact of all known closures, new construction that was funded, including BRAC I and II, and calculated the resulting plant value at $3.98 billion.
*** The Army did not have a current PRV, I used $5.0 billion in this calculation, as the RPMA Study figure plus inflation only. The probably understates the Army's PRV.

14. Report to Congress, RPMA Study, p. G-6. In the study the services report their respective medical facility inventory (weighted by square footage) average ages in 1989 as:

Army	39.0 years
Navy	31.8 years
Marines	26.1 years
Air Force	30.2 years
Total (Weighted Avg)	34.1 years

Notes:
1. Capt O'Brien reported a 1993 average age for Air Force medical facilities of 27 years.
2. I am uncertain if the services report these numbers reflecting original construction or if they reflect age from a major rehabilitation. It is possible that this varies between and even within services.
3. Nevertheless, despite some uncertainty, the average age

approaches 34 years and is certainly increasing.

15. Report to Congress, RPMA Study, p. G-8. Data presented in study required recalculation.

16. Gordon Dowery, Director, DMFO, OASD(HA). Prepared statement before the Senate Appropriations Committee, Subcommittee for Military Construction, 11 May 1989, p. 437.

17. Ibid., p. 437.

18. Fiscal year totals provided by Capt O'Brien.

Congressional Appropriation ($ million)

	Total	Inflator	Constant 93 $s
1988	205.92	1.202	247.52
1989	304.55	1.157	352.51
1990	207.45	1.119	232.05
1991	208.45	1.076	224.39
1992	239.70	1.037	248.49
1993	117.80	1.000	117.49
Total	1,283.87		1,422.45

Average (in constant FY93 dollars) = $237.08 million

19. Department of Defense. Military Handbook 1191, Department of Defense Medical and Dental Treatment Facilities Design and Construction Criteria, 15 October 1991, p. iii.

20. Martha M. Hamilton, "Maintaining Nation's Infrastructure Just Gets Tougher," The Washington Post, 18 April 1992, p. D10:2.

21. See Pat Choate's and Susan Walters' America in Ruins: Beyond the Public Pork Barrel, and the National Council on Public Works Improvement's Fragile Foundations: Report on America's Public Works, for starters.

22. Hamilton, "Maintaining Nation's Infrastructure," p. D-10.

23. Rita Robison, "Preventive Maintenance: Fixing What Ain't Broke," Civil Engineering, September 1989, p. 69.

24. Hamilton, "Maintaining Nation's Infrastructure," p. D11.

25. Committee on Advanced Maintenance Concepts for Buildings, Building Research Board, Commission on Engineering and Technical Systems, National Research Council, Committing to the Cost of Ownership: Maintenance and Repair of Public Buildings, National Academy Press, Washington, D.C., 1990, pp. 10-11.

26. Ibid., p. 2. Emphasis added.

27. Ibid., p. 3.

28. Ibid., p. 18. Emphasis in original.

29. Ibid., p. 17-18.

30. Ibid., p. ix.

31. Ibid., p. 3.

32. Ibid., p. 2.

33. Robison, "Preventive Maintenance," pp. 67-69.

34. Report to Congress, RPMA Study, p. G-1.

35. Ibid., p. G-1.

36. Ibid., p. H-15.

37. Ibid., p.26.

38. Ibid., p. H-16. This was based on data collected from 1980 through 1987 expressed in constant FY 87 dollars.

39. Ibid. The RPMA Study considered data from FY80 through FY87.

40. Ibid., p. H-16. National Council on Public Works Improvement Report, Feb., 1988. Includes waste disposal, transportation, and water.

41. Ibid., p. H-16. Coopers & Lybrand Survey October, 1988 sponsored by the Association of Physical Plant Administrators of Colleges and Universities and the National Association of College and University Business Offices.

42. Ibid. The RPMA Study felt that major colleges most closely resembled the types of facilities in the DoD inventory.

43. Ibid. The RPMA Study examined 16 major private corporations.

44. Ibid. The RPMA Study examined 23 non-DoD public sector institutions including city, county and state governments; school systems; port authorities; and utility commissions.

45. Ibid., p. 4. The study found that there was no standard methodology to evaluate the value of infrastructure. Plant values were converted to PRV. Statistics were converted to standard FY87 dollars to facilitate comparison.

46. Hon. Edward C. Aldridge, Secretary of the Air Force. Testimony before the Senate Committee on Appropriations, Subcommittee on Military Construction, in responding to a question from Senator Sasser, 11 May 1988, p. 419.

47. Report to Congress, RPMA Study, p. 20.

48. Ibid., p. H-14. From 1980 to 1987 for example, the maximum construction funding from all sources was 1.7 percent; the average for these years was just over 1.3 percent.

49. Capt Joel Benefield, HQ USAF/CEOP, telephone interview, 9 February 1993. He related that funding for MilCon and RPM generally went up and down together reflecting the relative funding environment. An exception was the MilCon "pause" of FY92.

50. Report to Congress, RPMA Study, p. 2.

51. Ibid., p. 31. Emphasis added.

52. Lane Ongstad, Lt Col, USAF, OASD(HA)HB&P. Personal interview, 1 Dec 92.

53. FY93 Major Repair RPM breaks out as follows:

Army	$47 million
Navy	$23 million
Air Force	$22 million
Total	$92 million

54. An annual Major Repair investment of 0.5 percent of PRV is calculated by dividing $92 million by the PRV. This calculation assumes a PRV of $18 billion. If a more conservative PRV is used, say $15 billion, the investment rate only adjusts to 0.6 percent of PRV per year.

55. Here we come back to impreciseness of the current measure of plant replacement value. If the PRV is $18 billion, then a total RPM expenditure of $360 million ($92 + $268 million) would be to be spent in FY93 to achieve a 2 percent of PRV investment. If the total PRV is closer to $15 million, then a total RPM expenditure of $300 million ($92 + $208 million) would be required.

56. Bill Cross, Maj, USA, MSC. Chief, Programs and Analysis Branch, Army Health Facility Planning Agency. Personal interview, 15 Jan 93.

57. LCDR Stusnick provided the following information on 5 Feb 93 on the Navy's medical RPM expenditures for inventory for which Health Affairs is now responsible.

Navy Medical RPM Expenditures ($000)

	M&R	MC	TOTAL	TOTAL (Constant 92 $s)
FY85	50,979	12,546	63,526	79,883
FY86	48,076	8,841	56,918	70,006
FY87	54,039	8,211	62,251	74,373
FY88	49,643	6,964	56,607	65,634
FY89	56,514	10,320	66,834	74,621
FY90	54,514	7,016	61,131	65,960
FY91	68,852	8,559	77,411	77,411
FY92	51,112	3,981	55,094	55,094

Note: Constant FY92 dollar averages:

M&R	61,182
MC	9,562
Total	70,744

58. LCDR Stusnick reported the eight year average in constant FY92 dollars as $61.2 million for M&R and $9.6 million for MC.

59. LCDR Stuznick's analysis and calculation that is a part of a program that he developed for BUMED.

60. Lt Col Tom Peters, Chief, Financial Operations, HQ USAF/SGHC, provided the following RPM data on 18 February 1993:

AF Medical RPMA Obligations, FY87 - FY92 ($000)

	Maintenance (EEIC 521)	Repair (522)	MC (529)	Total	Total (Constant 92 $s)
FY87*	792	19,113	9,987	29,892	35,713
FY88*	507	10,776	7,090	18,373	21,303
FY89*	2,642	25,045	12,511	40,198	44,882
FY90*	769	19,307	10,091	30,167	32,550
FY91*	2,078	29,081	14,336	45,495	47,240
FY92	615	10,744	12,449	23,808	23,808

* Includes funding for Brook Army Medical Center, Texas as part of JMMC.

Note: Constant FY92 dollar averages:

M&R	22,192
MC	12,057
Total	34,249

61. The PRV is not available by FY. Obviously PRV changes every year as inventory is added or demolished and is affected by such anomalies as the addition od Brook Army Medical Center to the Air Force maintained inventory (as a part of JMMC). However, if the average annual investment in constant FY92 dollars is compared with the currently reported PRV of $4.3 billion then the Air Force was only investing at 0.7 percent of PRV.

62. For example, the Naval medical facility pays for overhead for the Public Works Centers while the Air Force medical facility does not pay overhead for the Base Civil Engineer. There is also the fundamental differences of facilities like National Naval Medical Center at Bethesda which is responsible for the base operating support for an entire installation.

63. Normal operating RPM is my term for service calls, recurring maintenance and projects costing less than $15,000. BUMED call this category MRP (Maintenance Real Property). The HB&P, Air Force and Army don't yet have a label to differentiate between it and Major Repair RPM.

64. Rick, Weltzin, Lt Col, USAF, MSC. Chief, Budget Execution Division, OASD(HA)HB&P. Personal interview, 3 February 1993.

65. This assumes a $3 billion plant replacement value for plant that Health Affairs is responsible for maintaining.

66. Report to Congress, RPMA Study, p. 6.

67. Ibid., p. 6.

68. Ibid., p. 6.

69. Ibid., p. C-1.

70. Ibid., p. 21.

71. Capt Cross indicated that because of the transfer of O&M funding responsibility from the Army to Health Affairs, the Army engineers were not providing transitional support so they could not develop current BMAR numbers.

Lt Col Woods indicated much the same story; Air Force engineers had stopped tracking medical BMAR. However, Col Willauer, Chief, AF/SGHC, estimated the BMAR at $86 million in a telephone discussion on 14 January 1993.

72. Joe Stusnick, LCDR, USN, CEC. Personal interview, 5 February 1993.

73. LCDR Stusnick provided BMAR going back to FY83. These figures were a recap of the Annual Inspection Summary for activities which BUMED (and thus Health Affairs) has maintenance funding

responsibility. I converted the numbers to constant FY92 dollars to facilitate comparison.

BUMED BMAR (in constant FY92 dollars)
($ millions)

	Critical	Deferrable	Total
FY83	76.126	41.081	117.207
FY84	81.982	53.031	135.013
FY85	57.018	50.906	107.925
FY86	45.033	73.393	118.427
FY87	51.907	63.901	115.808
FY88	59.307	65.961	125.267
FY89	75.507	64.201	139.707
FY90	95.817	58.282	154.100
FY91	99.999	65.711	165.710
FY92	127.148	72.802	199.950

Definitions:

Critical: Work that should be accomplished within the next year. What is critical is not a function of funding but based upon prudent engineering and management judgement.

Deferrable: Long range maintenance and repair requirements that don't have to be accomplished within the next 12 months.

Note: BMAR growth over a nine year period from FY83 to FY92 (in constant FY92 dollars):

Critical - $51 million (67 percent)
Deferrable - $31.7 million (77 percent)
Total - $82.7 million (70.6 percent)

74. The BUMED's average annual RPM funding in FY92 dollars since 1985 is $70.7 million.

75. The SUSTAIN acronym stood for Systematic Upgrade Strategic Tactical Achievable Integrated Now.

76. Headquarters Air Force, Office of the Air Force Surgeon General, Office of Medical Support, Health Facilities Division (HQ AFOMS/SGSF), "Project SUSTAIN: FY89-FY95", p. 1.

Project SUSTAIN gathered RPM data for funded and proposed projects from all AF medical facilities in FY87 and FY88. Data collected over the two years was sorted by project types: functional, technical, professional environment, and life safety. It was also sorted by funding categories: maintenance, repair, and minor construction.

Project SUSTAIN was able to validate that the allocation of medical RPM funding in the Air Force to the major commands generally correlated well with the commands total medical square footage. Exceptions to this were largely explainable as specific initiatives or significantly newer facility inventories.

77. "Project SUSTAIN," Appendix G, p. 7. The resultant FY87 baseline funding estimate was $32.3 million annual requirement in RPM funding; equating to $40.0 million in FY93 dollars.

78. "Project SUSTAIN," Appendix G, p. 7.

79. Project SUSTAIN provided the following historical Air Force medical RPM funding totals:

FY83	$15.2 million
FY84	$17.4 million
FY85	$17.4 million
FY86	$17.4 million
FY87	$25.7 million

80. The resulting average over these eight years supported $2.06 and $1.95 per square foot in FY87 and FY88 respectively. I say this conclusion was very conservative because it was the calculated average of the proposed project data submitted from each base covering a six year window. Not surprisingly, near year projects were quite well defined while the out years contained very few projects. For example, all the projects submitted for FY88 would have resulted in spending $5.41 per square foot across the Air Force medical inventory while FY95 data would have supported only $0.26 per square foot. The problem was that very few projects had been identified and priced past three years out.

81. "Project SUSTAIN," FY88, p. 8.

82. Report to Congress, RPMA Study, p. 18.

83. With respect to maintaining the medical infrastructure as a whole, it is obvious that there is some relationship between the level of MilCon for new and replacement construction, and the level of RPM for maintaining the existing infrastructure. The DoD's 1989 RPMA Study attempted to formulate this mathematically by marginal analysis but was not completely successful. A new study should concentrate on defining this relationship for the medical infrastructure.

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