

IMPROVING CAPITAL INVESTMENT IN MILITARY DEPOTS

By

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Abstract

As of 2007, each military department must invest annually in the capital budgets of its depots at a minimum rate of six percent of their average funded workload. The relevant statute was enacted in response to the deteriorating state of organic depots in the 1990s, which lawmakers and military leaders attributed to insufficient investments in infrastructure and equipment. This study seeks to determine if and how policy should be modified in light of current depot conditions and capabilities. Specifically, it aims to identify the benefits and drawbacks of both fixed and flexible funding mechanisms within the context of the military depots. The findings of this study suggest that the fixed investment requirement should be maintained (but modified), at least until the military departments have implemented strategic investment plans. In addition, it is suggested that the Department of Defense (DoD) consider adopting an enterprise approach to management of capital investment to ensure the most effective and efficient expenditure of capital investment dollars. Among additional recommendations, the timeframe basis for the requirement should be changed, the Capital Investment Program should be streamlined, and that the DoD's definition of capital investment should be widened and clarified.

I. Introduction

The military depots are a vital component of America’s defense capability, providing for the repair, rebuilding, and major overhaul of weapon systems (*e.g.*, ships, armored vehicles, missile systems, and aircraft), their parts, assemblies, and subassemblies. In FY 2017, the DoD spent \$36.3 billion on depot-level maintenance and repair work (OUSD [A&S], 2018).

As of 2007, each of the three military departments is required by law to make annual capital investments in its depots at a rate of at least six percent of their combined average revenue¹ (calculated over the three previous years). The required investments are intended to support “modernization and improvement of depot operations,” and can include military construction, facilities refurbishment and reconfiguration, and equipment procurement and process installation.

This requirement was enacted in response to the deteriorating capabilities of depots during the 1990s, which lawmakers and military leaders attributed to insufficient investments in facilities, equipment, and human capital. According to the Government Accountability Office (GAO; 2001), this lack of investment could be traced to the “DoD’s downsizing of its depot infrastructure and workforce since the end of the Cold War, [which] was done without sound strategic planning” (p. 3).

Indeed, by the end of the millennium, the DoD had outsourced to the private sector a number of logistical support functions, including weapon system maintenance and repair activities, with some arguing that inadequate consideration was being given to the definition and protection of so-called “core” capabilities.²

In light of increasing budgetary pressure at all levels of government, improving strategic investment decision making—the process of correctly identifying, evaluating, and selecting among projects that will have the greatest impact on the organization’s ability to perform its

¹ Through the use of revolving fund structures (*i.e.*, working capital funds), the depots earn revenue via the “sale” of their services to military customers (*i.e.*, military operating units); See Part IV “Funding Capital Investment.”

² Since 1984, law has required that the DoD maintain a government owned and operated logistics capability (including personnel, equipment, and facilities) to ensure “a ready and controlled source of technical competence and resources necessary to ensure effective and timely response to a mobilization, national defense contingency situations, and other emergency requirements” (10 USC 2464).

mission—is of critical importance. In this case, there is concern that the mandated minimum investment requirement may inhibit strategic investment decision-making; that in the face of increasing budgetary uncertainty, the requirement deprives top military leaders of much-needed flexibility.

There is also concern that depot investment strategy and the organic industrial base might be negatively impacted. For instance, although the law does not place upper limits on annual capital investment, there is an implicit assumption that six percent is and will continue to represent an adequate level of investment. Hence, there is worry that a heuristic could come to take the place of deliberate strategy. In other words, merely meeting the 6% goal may drive capital investment decisions.

At the same time, it might be argued that in the absence of dedicated funding, routine investment in depots will be overlooked—that it, in fact, *was* overlooked—to fund more visible, higher-profile programs and projects. This report explores the impact of funding mechanisms on decision-making, investment levels, and capabilities.

Barrett and Greene (2013) assert that “when funds are dedicated, often from a special revenue stream,” the advantage of consistent funding “buffers a program from the powerful wind of changing political climate” (p. 1). They contrast dedicated funding (or “earmarking”) with “one-fund-fits-all” (*i.e.*, general fund financing) which gives legislators and managers more financial flexibility to move funds as needs change.

They conclude, “Unfortunately, there’s no overridingly best practice here—no black or white... but understanding the pros and cons of both routes to funding holds out the hope of coming to the right answer for a particular project” (p. 1). This report evaluates these pros and cons, as well as any barriers to change, within the context of military depot funding. Ultimately, it seeks to determine if and how current capital investment policy should be modified in order to optimize depot capabilities.

Report Approach

The authors of this report conducted an extensive review of the legislation affecting depot operations, workforce structure, and investment strategies. In addition to speaking with Defense

Department personnel from the Office of the Secretary of Defense, the authors conducted site visits to Letterkenny Army Depot, Tobyhanna Army Depot, and Norfolk Naval Shipyard to gain a firsthand appreciation of how the legislation affected decision-making at the depot level. The first sections of this report provide a background on DoD strategies for weapon system maintenance and repair, including, in Part III, a brief description of earlier statutes (*i.e.*, core capabilities, 50/50 requirement, and public-private partnerships) that, like the minimum investment requirement, have been enacted over the last decades in order to safeguard the DoD's organic capacity.

The first sections of this report provide a background on DoD maintain and repair weapons systems and military materiel necessary to fulfill strategic and contingency plans. Part IV defines capital investment within the context of military depots, provides a brief history of depot investment, and discusses capital investment strategies. Part V explores different contexts in which dedicated funding, or earmarking, is used and the impact that it can have on strategic investment decision making. Part VI examines trends in depot investment within each of the military departments. Part VII provides recommendations and conclusions.

II. Background

Over the next five years, Congress is expected to appropriate over \$700 billion annually for defense. Most of this spending occurs in four categories: Research, Development, Test, and Evaluation (RDT&E); Procurement; Military Personnel; and Operation and Maintenance (O&M). Planned spending within the first three of these categories is expected to stabilize over the next decade, whereas O&M spending (\$206 billion in FY 2017) is expected to gradually increase for the foreseeable future (Congressional Budget Office [CBO], 2016). Weapons repair and maintenance is one of the key drivers of O&M spending.

In light of growing federal deficits and political polarization and uncertainty, the envisioned level of overall defense spending may not be realistic—but making cuts to the relatively stable military personnel or procurement budgets may not be either. Active-duty military end-strength has dropped to near all-time post-Cold War lows; and equipment inventories are becoming older, smaller, and less effective against emerging technologies. Meanwhile, sustainment³ costs have increased; to take but one example, the cost to the Air Force to operate its aircraft rose 179% between 1988 and 2008 despite declining aircraft inventories (National Research Council, 2011). Reducing the costs associated with the repair and maintenance of ageing weapons systems is an avenue that should be explored if the DoD is to reduce overall spending.

The potential for decreasing the costs of system sustainment in general—and depot-level maintenance in particular—is larger than one might think. Only about a third of a system's lifecycle costs are incurred during RDT&E and production; the remainder is incurred during operations and sustainment (Jones, Ryan, & Ritschel, 2014). Cost reduction efforts will depend, in part, on the DoD's ability to make targeted capital investments that improve the efficiency and effectiveness of product support, to include depot maintenance and repair.

Weapon System Maintenance

The DoD maintains a wide range of weapon systems including 225 ships, 13,935 aircraft/helicopters, 439,940 ground combat and tactical vehicles, and hundreds of thousands of pieces of common equipment (OASD [L&MR], 2018). In FY 2015, the DoD budgeted \$71.5

³ Sustainment is a broad category that includes depot-level maintenance, contractor logistics support, sustaining engineering, and technical orders (Defense Acquisition Guidebook, 2015)

billion for weapon system maintenance and repair, which is performed at two levels—depot and field—with field-level maintenance further divided into organizational- and intermediate-level maintenance (OASD [L&MR], 2015; See Figure 2). As Figure 2 indicates, the more frequent, though less complex, tasks occur at the field level; more complex, lower-frequency tasks occur at the depot level.

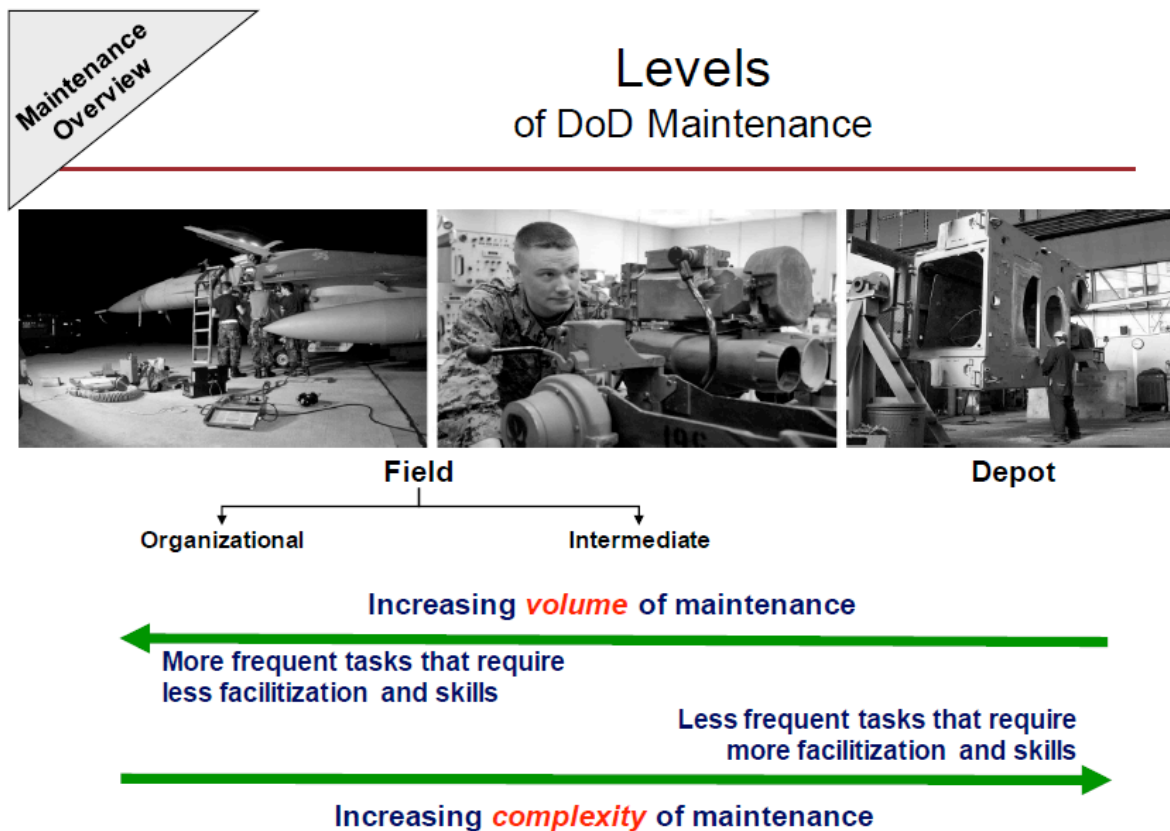


Figure 1. Levels of DoD Maintenance (DoD, 2016a)

Organizational-level maintenance is performed by the using organization, on its assigned equipment, and consists primarily of inspecting, servicing, lubricating, adjusting, and replacing of parts, minor assemblies, and subassemblies (OASD [L&MR], 2015). An important distinguishing feature of organizational maintenance is that it is performed in the field (or on the flightline) not only by designated maintenance personnel, but also by the equipment operators themselves. Intermediate maintenance, on the other hand, is performed by designated maintenance activities. Tasks include calibration, repair, or replacement of damaged or unserviceable parts, components, or assemblies; the emergency manufacture of non-available parts; and providing technical assistance to using organizations (OASD [L&MR], 2016).

Depot-Level Maintenance

In contrast to field-level maintenance, depot-level maintenance encompasses the major repair, overhaul; complete rebuilding of weapon systems, end items, parts, assemblies, and subassemblies; manufacture of parts; technical assistance; and testing. Each military department manages and operates its own organic depot-level maintenance infrastructure. The majority of repair and maintenance—about 86%—is associated with ships, aircraft, and missiles. Combat vehicles, tactical vehicles, and other ground equipment systems make up the remainder (OASD [L&MR], 2014).

Depot funding is provided primarily through the O&M budget⁴ (DoD, 2016b). Of the \$31.4 billion spent for depot-level maintenance and repair in 2014, for example, more than three-quarters (\$25.3 billion) was provided through the O&M budget. Figure 2 shows forecasted depot funding as a proportion of the O&M budget between 2017 and 2023.

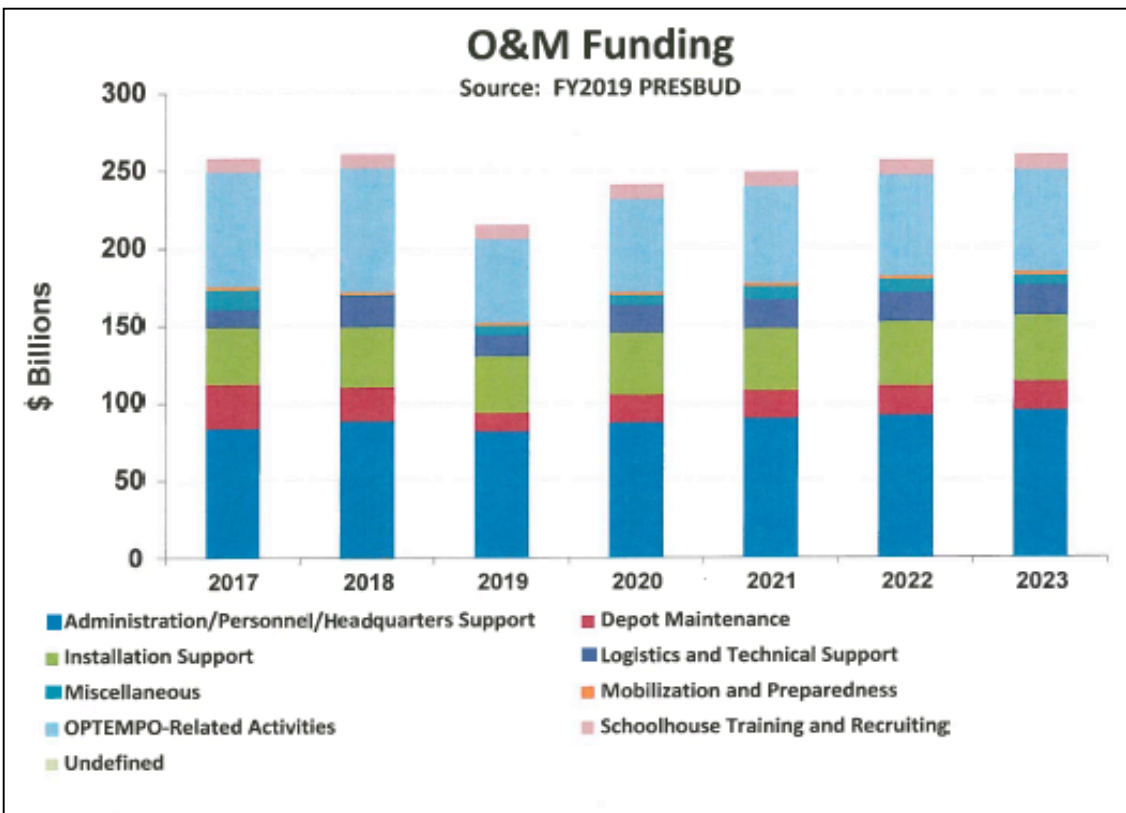


Figure 2. Depot maintenance (red) as a proportion of the O&M Budget (OUSD [Comptroller], 2018)

⁴ Depot maintenance is not appropriation- or source-of-funds-specific. It is funded by various appropriations, including Procurement, Military Construction, RDT&E, and O&M.

The term “depot-level” (as opposed to simply “depot”) is often used to emphasize the type of maintenance and repair as opposed to geographical location, as depot maintenance may be performed in government-owned depots by DoD employees, at commercial facilities by the private sector, or through public-private partnerships.

It should be emphasized that the organic depots vary significantly in terms of their size, number of employees, annual workload (See Figure 3), and the types of work performed. Anniston Army

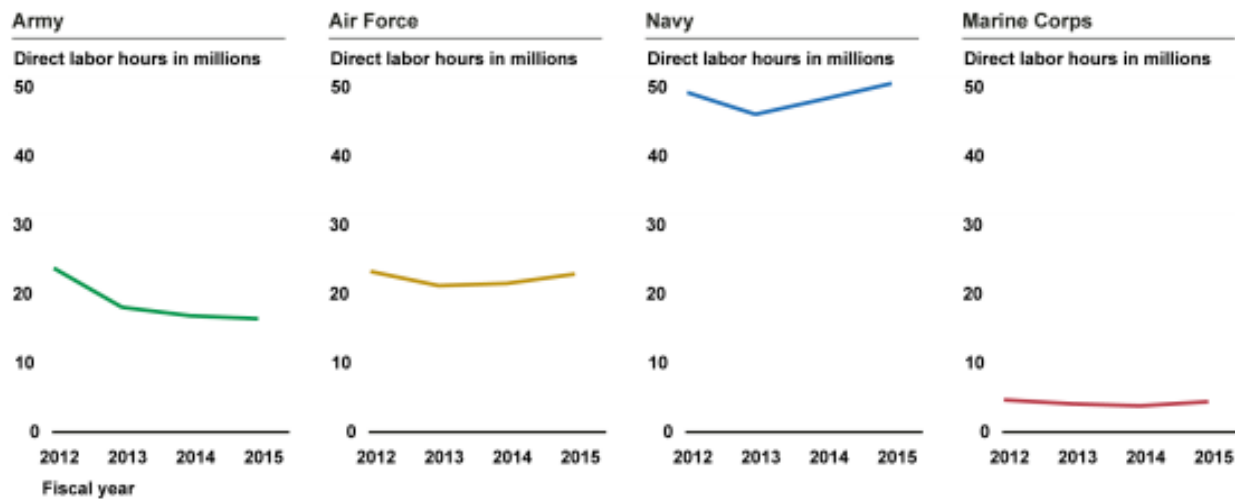


Figure 3. Depot workloads in direct labor hours (\$ Millions), 2012-2015 (GAO, 2017)

Anniston and Red River Army Depots, for example, repair wheeled vehicles and tanks whereas Tobyhanna Army Depot focusses primarily on the repair and maintenance of advanced electronic systems, including communications satellites, radar, night vision, and missile guidance systems. In addition to Army organizations, its customers include the Navy, Air Force, and some federal agencies. With regard to workload, the Army anticipates a continued decline (GAO, 2017) as the frequency of ground combat operations decreases.



The Anniston Army Depot, pictured above, opened in 1941 and employed four people. Today 4000 people (government employees, contractors, and tenants) work at the depot, now the Alabama Third Congressional District's largest employer. (Jackson *et al.*, 2015)

The Air Force operates Air Logistics Complexes that repair a wide range of fighters and attack aircraft, as well as cargo planes, test aircraft, and their numerous components including landing gear, missile systems, and software. The Air Force workload is expected to increase considerably in the future as depots begin repairs on new systems that will include the F-35 and KC-46 (GAO, 2017).

The Navy's depots include shipyards and Fleet Readiness Centers (for aviation maintenance). The Navy depots have significantly higher workloads, totaling more direct labor hours annually than the Army and Air Force combined, which the Navy attributes to maintenance backlogs that have accumulated following a decade of increased operations tempo (GAO, 2017; See Figure 4). The Navy's depot workload is expected to continue to increase for the foreseeable future.

III. Related Statutes

In order to understand the historical context surrounding the minimum investment requirement, we provide a brief description of preceding statutes that, like the investment requirement, have been enacted over the last decades in order to safeguard the DoD's organic capacity to maintain and repair weapons systems and military materiel necessary to fulfill strategic and contingency plans. Congress continues to take a high level of interest in the military depots, and considers them a critical component of the nation's defense industrial base. These statutes help to maintain organic capabilities that might not otherwise have been established on an economic basis.

“Core” Capabilities

Military depots have long played an instrumental role in ensuring the readiness of military systems in both peacetime and during conflicts. During the Cold War era, the DoD's maintenance capability was designed to “sustain protracted engagement of sizeable forces engaged globally against a substantial enemy” (DoD, 1996). This capability relied primarily on the DoD's organic workforce and its network of government-owned and operated depot maintenance facilities.

However, the private sector would soon emerge as the preeminent source of equipment, facilities, and skillsets. Increasingly, the DoD leveraged private-sector capabilities to meet essential military requirements. In response to what Congress perceived as an “over-reliance on private contractors for vital military needs,” legislation was enacted in 1984 that prevented certain core logistics capabilities from being contracted out to private contractors (GAO, 2009a).

The core logistics capability statute, codified in 10 USC 2464, reads as follows:

It is essential for the national defense that the Department of Defense maintain a core logistics capability that is Government-owned and Government-operated (including Government personnel and Government-owned and Government-operated equipment and facilities) to ensure ready and controlled source of technical competence and resources necessary to ensure effective and timely response to a mobilization, national defense contingency situations, and other emergency requirements.

The DoD establishes these required “core” capabilities by first defining the overall force structure required to execute contingency scenarios identified by the Joint Chiefs of Staff. Next, the services identify the applicable weapon systems and their associated annual peacetime depot maintenance requirements, which are then computed in direct labor hours (DLHs). The resultant figures are then adjusted upward to meet the demands of the three different phases of a

contingency operation: preparation/readiness, sustainment, and reconstitution. The upward adjustment is an appropriate composite of the number of hours required in each of these phases.

The DoD’s 2017 total core depot-level maintenance requirement consisted of approximately 58.6 million direct labor hours, which translated to an estimated “accomplishment cost” of roughly \$12.08 billion. Biennially, the Secretary of Defense must submit to Congress a report that details each military service’s core capability requirement (for the subsequent fiscal year) in eleven “work breakdown structure” (WBS) categories (See Figure 4). The report must also provide the corresponding workload that is required, and the anticipated cost. Finally, the report must identify cases where core depot-level maintenance and repair capability requirements exceed planned workloads as well as a plan to correct or mitigate the effects of the shortfall. Figure 4 provides the Air Force component of the 2016 report.

United States Air Force		2464(d)(1) Core Capability Requirement	2464(d)(1)&(2) Public-Sector Depot Maintenance Sustaining Workload	2464(d)(2) Estimated Cost of Sustaining Workload	Workload Shortfall
	WBS Category	DLHs	DLHs	\$	DLHs
1	Aircraft	12,246,257	18,620,326	4,621,431,538	0
2	Ground Vehicles	0	0	0	0
3	Sea Ships	0	0	0	0
4	Communication/Electronic Equipment	675,980	336,424	147,677,794	339,556
5	Support Equipment	0	0	0	0
6	Ordnance, Weapons, & Missiles	706,695	813,422	141,279,867	0
7	Software	4,270,797	4,887,695	604,977,522	0
8	Fabrication/Manufacturing	140,659	457,670	24,481,110	0
9	Fleet/Field Support	0	0	0	0
10	Special Interest Items	0	0	0	0
11	Other	205,826	375,360	39,165,981	0

Figure 4. 2017 Planned Work Breakdown Structure, Core Depot Capabilities, U.S. Air Force (DoD, 2016)

Despite the formal process, defining a military service’s core workload remains a largely subjective endeavor, one that is complicated by reports that assert that the calculation methodologies are inconsistently applied, both internally and across the military services.

Historically, the consolidation of the services' results into a meaningful department wide assessment has been suboptimal (GAO, 2009). It should also be noted that until very recently the DoD has not been required in its biennial core reports to Congress (or elsewhere), to report whether the core workloads have, in fact, been executed. In 2009, the GAO reported that the DoD is not "adequately preparing military depots to support future core requirements through its acquisition process." Often, core requirements for new weapon systems are not determined early in the acquisition process, which means that the DoD must establish organic maintenance capabilities that duplicate those that have already been implemented by the original equipment manufacturer, needlessly increasing costs (Avdellas *et al.*, 2011).

50/50 Requirement

Following the collapse of the Soviet Union and the emergence of the United States as the sole superpower, the DoD initiated the base realignment and closure (BRAC) process⁵ to improve its overall efficiency by eliminating redundant capabilities and divesting unneeded capacity. BRAC led to the closure of several major depots. Additionally, industry's growing capability in the provision of maintenance and repair services for high-technology military systems during this period enabled the DoD to further reduce its organic depot footprint. By the mid-1990s, as high-profile acquisition programs began to decline, the DoD actively promoted the outsourcing of depot workloads to both reduce its costs and ensure the viability of the industrial base (GAO, 1996). The Brookings Institute asserted that "In a period that is projected to experience a reduced overall defense budget, sustainment activities often provide an attractive buffer [to private sector contractors] to mitigate the effects of a limited acquisition environment" (Miller, 2010, p. 3).

Between 1987 and 2001, contractors' share of depot maintenance funding increased by 90%; the military depot's share declined by six percent (GAO, 2001). Figure 5 shows the key events that have affected the size and composition of the military depot system during this period.

The GAO (2001) noted that this shift in policy was not accompanied by comprehensive plans or policies to manage the transition. It identified a number of management weaknesses in the areas of recapitalization, human capital issues, financial management, performance of maintenance programs, and meeting legislative requirements.

⁵ More than 350 installations have been closed in five BRAC rounds: 1988, 1991, 1993, 1995, and 2005.

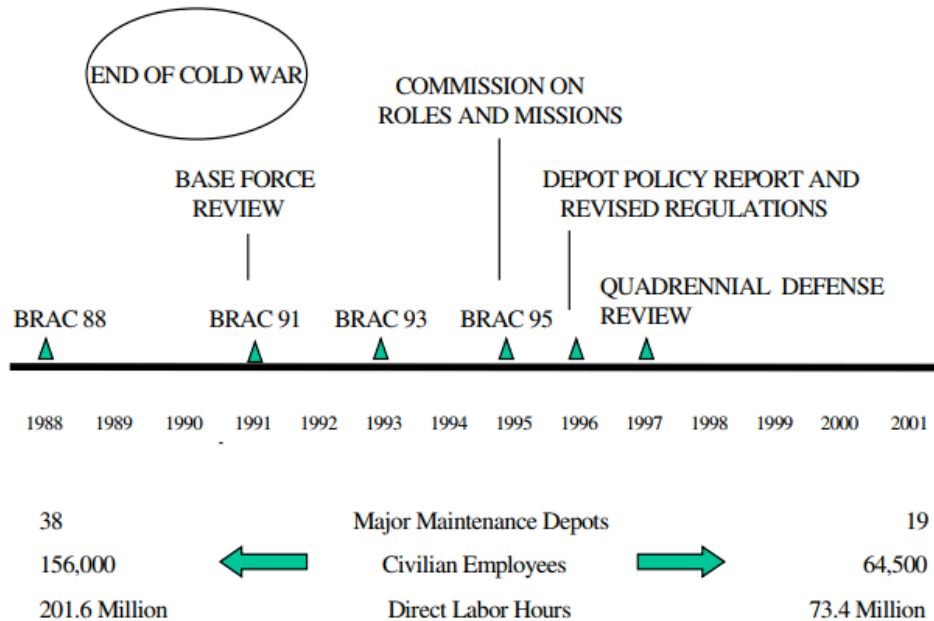


Figure 5. Key events between 1988 and 2001 impacting the size and composition of the military depot structure (GAO, 2001)

The move to greater reliance on the private sector has not gone unnoticed by Congress. Concerned that the aforementioned core capabilities requirement would be insufficient in safeguarding the military’s organic maintenance and repair capabilities, Congress imposed the “60/40” requirement in 1993 (10 USC 2466), which established that “not more than 40 percent of the funds made available in a fiscal year to a military department or defense agency for depot-level maintenance and repair workload may be used to contract non-federal government personnel for the given workload.”

Two years later, *Directions for Defense*, a report written by the Commission on Roles and Missions (formed in accordance with the National Defense Authorization Act of 1994) pushed back against this requirement, recommending that the DoD privatize most depot maintenance work and all support for new and future weapon systems. In 1996, the Office of the Secretary of Defense asserted that “High quality, efficient maintenance service providers have emerged for many DoD overhaul requirements, creating a competitive private sector base from which the DoD can often achieve best value” (DoD, 1996, p. 2).

In its 1996 *Report to Congress on Depot-Level Maintenance and Repair Workload*, the secretary of defense asked “Is there a need for an arbitrary amount of depot-level maintenance (in the

current case, a minimum of 60 percent of the annual funds) to be performed in DoD's organic depot maintenance facilities?" (DoD, 1996, p. 25). It went on to state that "there is no known analytical basis for the 60 percent floor; it is rather based on past levels of organic activity and a subjectively supported view of DoD's needs for organic capacity" (p. 25) As will be discussed, critics of the six percent minimum capital investment requirement argue along similar lines.

The *Report* suggested that the existing core methodology alone should be used to determine the appropriate workload split, as it "provides a reasonable, quantitative approach to identifying the need for, and size of, required organic capabilities" (p. 16). As discussed, this remains a questionable assertion. In any case, Congress disagreed. However, it did change the contract ceiling from 60% to 50% in 1998, which is where it remains today. It should be noted that core workload may contribute to the 50-50 requirement, but does not necessarily ensure compliance. Indeed, "non-core" workload is often assigned to the depots to ensure that the 50% contract ceiling is not breached. According to Defense Acquisition University (2011),

Circumstances entirely outside a program manager's control may drive organic depot maintenance assignment, even when the weapon system does not require core capability, and the business case analysis has led to establishment of contract depot maintenance. For such weapon systems, at any point in time, it might become necessary to arbitrarily reassign contract depot workload to an organic source in order to ensure 50-50 compliance.

Put another way, the 50-50 rule can result in decisions to terminate maintenance contracts and bring existing work into organic facilities if a military department nears its spending limitation, just as the core requirement can result in the development of organic capabilities that "would not otherwise be established on a purely economic basis" (Advellas & Erickson, 2012, p. 4). Both statutes serve to strengthen organic maintenance repair and maintenance capabilities, but limit the potential for competitive contracting. At present, each service and defense agency is required to submit an annual report to Congress indicating the percentage, measured in dollars, of its total depot maintenance workload performed by contractors at military depots and contractor-owned and operated facilities. In FY 2016, approximately 55% of the depot-level workload was accomplished in organic facilities; the remainder was accomplished by the private sector in commercial facilities (OASD (L&MR), 2018).

CITEs and Public-Private Partnerships

Depot maintenance performed by the private sector within a public-private partnership (PPP) may be excluded from the 50% contract ceiling under certain conditions. The exception was made to encourage the military departments to partner with the private sector in the provision of maintenance and repair in order to reduce costs and, as discussed, maintain the defense industrial base in a limited acquisition environment, all while ensuring that the DoD retains depot maintenance capability.

Official DoD policy on the use of PPPs was articulated in a 2002 *Memorandum for Secretaries of the Military Departments*:

It is DoD policy to use public-private partnerships for depot maintenance. In particular, the Military Departments shall shape partnership agreements to support DoD and Defense-related workloads. Partnerships can improve utilization of DoD facilities, equipment, and personnel. Partnerships can bring a wide variety of additional benefits to the parties involved in the agreement, and also foster improved support to the warfighter.

Within the context of military depots, a PPP is defined as a cooperative arrangement between an organic depot-level maintenance activity and one or more private sector entities to perform DoD or Defense-related work and/or to utilize DoD depot facilities and equipment. There are two main types of PPPs: a direct sales agreement (DSA) and a workshare arrangement (WSA).



A Letterkenny Munitions Center employee disassembles an Army Tactical Missile. Letterkenny was named a Center for Industrial and Technical Excellence for Missile Maintenance in 2015 (Barati, 2015).

Under a WSA, the contractor and the depot maintenance activity establish a partnering agreement wherein each is responsible for completing a share of the funded workload, the allocation of which is typically determined by leveraging each partner's capabilities. Each is paid separately.

Under a DSA, the contractor is held accountable for accomplishing the depot's funded workload via an outcome-based support contract. The contractor, in turn, "subcontracts" with the depot to acquire organic repair and maintenance services at the depot's hourly labor rate. This agreement may be used when the DoD wishes to transfer risks associated with product or process immaturity or instability to the private sector.

In 1997, 10 USC 2474 authorized certain depots—those designated as Centers for Industrial and Technical Excellence (CITEs)⁶—to enter into PPPs. The CITE designation was intended by Congress to affirm the role of the military depots in the provision of industry-leading repair and maintenance capabilities. CITEs are required to "adopt industrial processes and best-business practices in connection with their core competency requirements, so as to serve as recognized leaders in their core competencies throughout the Department of Defense and in the national technology and industrial base" (10 USC 2474). Labor and materials provided in support of the core competency for which a given CITE has been designated satisfy core requirements and may be excluded from the 50% contract ceiling.

⁶ There are 27 approved CITEs: 15 Army, 8 Navy, 3 Air Force, and 1 Marine Corps.

IV. Capital Investment in Depots

Included in the 2007 NDAA, 10 USC 2476 *Minimum capital investment for certain depots*—like the statutes (core, 50/50, CITE/PPP) that preceded it—was enacted to safeguard and strengthen the DoD’s organic capabilities in the face of downsizing, base closures, and the preference for increased contracting. The statute reads as follows:

Each fiscal year, the Secretary of a military department shall invest in the capital budgets of the covered depots of that military department a total amount equal to not less than six percent of the average total combined maintenance, repair, and overhaul workload funded at all the depots of that military department for the preceding three fiscal years.

Figure 6 lists the twenty depots currently “covered” by the minimum capital investment statute.



Figure 6: 20 Covered Depots



A look inside the Navy's Fleet Readiness Center Southeast in Jacksonville, Florida

The statute warrants a second read in order to appreciate the details and their implications. One should note the following:

- The six percent requirement is a “floor,” as opposed to a “ceiling.” Some of the military departments have invested well over six percent in a given year.
- The statute does not require uniform investment across a military department’s covered depots.
- The basis for the calculation is the “workload funded at *all* the depots of that military department” (emphasis added), but only investments made in the “covered” depots count toward meeting the six percent requirement⁷.

The law permitted the military departments to phase in the six percent minimum over a period of three years, requiring a minimum six percent investment in FY 2007, 5 percent in FY 2008, and six percent in FY 2009. The law also allows the secretary of defense to waive the requirement for reasons of national security.

Lack of Capital Investment

The minimum investment statute was enacted in response to the deteriorating state of organic depots in the 1990s. In 2001, the GAO reported that “as a result of the DoD’s lack of capital

⁷ For example, the Army’s organic industrial base comprises 13 depots and arsenals, but only investments made in the eight “covered” depots count toward meeting the six percent requirement.

investment, its depots did not keep up with the latest technologies.” In its ongoing review of depot capabilities, the GAO (2001) found that “program managers [had] funded little equipment in the depots since 1995 to establish capability in the depots for new or upgraded weapons systems or advanced technologies” (p. 23).

Figure 4 shows a marked change in the composition of capital investment in depot facilities and equipment beginning in 1995. Whereas facilities and new equipment combined accounted for more than half of the capital investment prior to 1995, it accounted for less than a third between 1995 and 2001, as the amount spent on replacement equipment increased significantly (See Figure 7). In addition to declining investment in new equipment and facilities, the mid and late-1990s saw existing depot facilities shuttered. For example, under the 1995 BRAC close to 4 million square feet of buildings at Letterkenny Army Depot were considered excess property; in fact, 1,500 acres of the Depot were annexed to the local community. Recently, Letterkenny has looked to move back into some of these facilities (Martin and Martin, Inc., 2016).

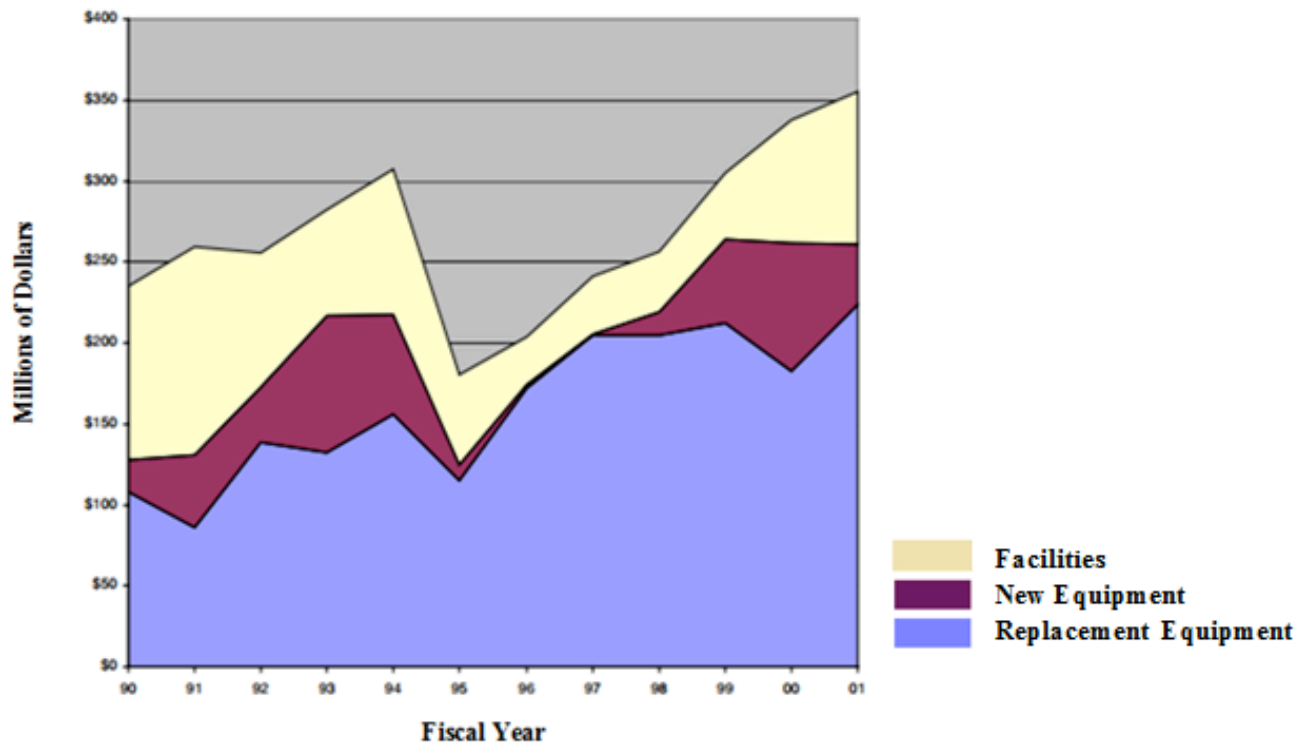


Figure 7. Capital investment (\$ Millions) in Depot Facilities and Equipment (1990-2001; GAO, 2001)

These reductions in capital investment, especially for new equipment, were, to an extent, a predictable consequence of DoD policy. The DoD's 1996 *Policy Regarding Performance of Depot-Level Maintenance and Repair* stated the following:

The Department endeavors to keep depot maintenance capital investments to the minimum necessary for establishing and maintaining robust, technologically proficient CORE capabilities. As the Department goes through force structure reductions, contingency scenarios changes, base and facility closings, and maintenance concept evolution, logistics managers must review current and unexecuted past capital investment plans to ensure continuing need in view of changed requirements.

Though the policy stopped short of calling for an outright reduction in capital investment levels, it was largely interpreted as such. The policy also treated capital investment narrowly—*i.e.*, as a function of core capability requirements rather than total workload. In other words, the policy seemed to ignore that maintaining non-core workload—some portion of which was to be performed in organic depots to meet the 60-40 (now 50-50) statute—likely required some level of capital investment.

Some have argued that the 1996 policy was a reflection of broader support within the Clinton Administration to shift depot-level maintenance to the private sector. In any case, Congress—in particular, those members with depots located in their states—began to voice their objections.

In response to deteriorating depot capabilities and under pressure from Congress, the military departments began to reconsider their capital investment requirements and strategies. In its 2002 *Depot Maintenance Master Plan*, the Air Force committed to allocate \$150 million each fiscal year for six years, beginning in 2004, in order to correct for years of underinvestment (DoD, 2006). The Air Force noted that past capital investment, which averaged three percent of total depot revenue, led to a significant equipment purchase backlog of approximately \$200 million. *The Air Force Depot Maintenance Strategy*, published for the first time in 2002, envisioned an annual capital investment level of 6 percent of revenue (DoD, 2006). According to the Air Force, this level of investment was in line with levels seen in the private sector⁸ (DoD, 2006).

In 2005, Congress commended the Air Force for its proactive capital investment strategy. In Section 324 of the 2006 NDAA, entitled *Sense of Congress regarding depot maintenance*,

⁸ The six percent figure was based on an Air Force study that examined capital investment levels in commercial firms engaged in maintenance, repair, and overhaul (MRO). The study concluded MRO firms' capital investments averaged out to about six percent of revenue. Commercial firms make capital investments to further business objectives; previous years' revenues may be a consideration, but do not form the explicit basis upon which investments are made.

Congress stated that “the *Depot Maintenance Strategy and Master Plan of the Air Force* reflects the essential requirements for the Air Force to maintain a ready and controlled source of organic technical competence, thereby ensuring an effective and timely response to national defense contingencies and emergency requirements.” It is perhaps unsurprising, then, that a version of the Air Force plan made its way into law the following year.

Meanwhile, in 2006, the DoD issued an overarching *Depot Maintenance Strategic Plan*, which articulated its plans for “ensuring its organic depot maintenance infrastructure is postured and resourced to meet the national security and materiel readiness challenges of the 21st century.” The *Strategic Plan* formalized across the DoD the six percent investment figure cited by the Air Force:

Each DoD Component that operates organic depot-level maintenance activities will establish a programming goal for depot maintenance capital investment. The minimum annual funding target for each DoD Component will be an amount equal to six percent of its combined funded core-sustaining workload. Expected implementation is not later than the FY 2009–14.

The *Strategic Plan*, like the 1996 policy, used core-sustaining workload as the basis for investment. A year later, the *Strategic Plan* was superseded by the minimum investment requirement, which, like the Air Force strategy, used total revenue as the basis.

Funding Capital Investment

Today, the DoD invests far more on a per capita basis than it did thirty years ago. From the mid to the late 1980s, the military departments collectively budgeted over \$500 million annually for capital investment in depots. In today’s dollars, this amounts to just over \$1 billion, which is on par with the amount invested today (just under \$1 billion was invested in FY 2013). However, prior to the end of the Cold War, equipment inventories were significantly larger and most depot-level maintenance—upwards of 80%—was performed organically in a far greater number of DoD facilities. In 1987, there were 38 major depots⁹ that employed 160,000 personnel; in 2017, fewer than half this number of personnel was employed by 17 major depots (Glass & Schwartz, 1988; Avdellas *et al.*, 2011; GAO, 2017).

⁹ Depot maintenance activities are considered major if they employ 400 or more personnel.

Capital investment in the military depots is financed through direct congressional appropriation and through the military departments' working capital funds¹⁰. Working capital funds have been in use by the DoD, and other government organizations, for several decades. Their modern authority was granted under the National Security Act of 1947. The basic motivation for the use of these revolving fund structures is to create “a customer-provider relationship between military operating units and support organizations” (Defense Financial Management Regulation [DFMR], 2016). The establishment of working capital funds has proven effective in controlling costs within government organizations (Jones, Candreva, & Devore, 2012).

The funds are financed primarily by reimbursements from customers' O&M appropriated accounts. In effect, each depot relies on revenue from the “sale” of its services in order to finance their operations. Prior to the beginning of the fiscal year, the support organization, in this case the depot, forecasts its expenses in each of the following categories: labor expense, expected materiel expenses, overhead, and depreciation of capital assets. The depot then allocates total anticipated expense on a direct labor hour basis—*i.e.*, for every hour worked, the customer is charged a set price. This is referred to as the stabilized billing rate. Ultimately, the stabilized rate serves to protect military readiness by protecting the customers' buying power and guarding against budgetary uncertainty.

Working capital funds draw on commercial sector techniques for resource management, accounting, and cost allocation via the establishment of customer-provider relationships that encourage managers of support organizations (e.g., depot commanders) to remain attentive to the quality and cost of their products and services. Similarly, requiring the operating forces—*i.e.*, the customers—to pay for the services that they receive not only helps to ensure that those services are actually needed, but places them in the position to critically evaluate the purchase prices and service quality (DFMR, 2016; Jones, Candreva, & Devore, 2012).

The working capital funds permit the depots to purchase capital assets prior to their accumulation of cash balances generated by customer orders, and because working capital funds do not rely directly on congressional appropriations, they can operate without a fiscal year limitation on obligating money. Rather, the law requires that the funds generate sufficient revenue to cover the

¹⁰ The Navy's shipyards (and the associated capital investments) are funded solely through appropriations.

full cost of operations on a break-even basis over time (*i.e.*, the long-term operating result must net to zero). In a given year, an account may show a loss or a gain, thereby prompting a change to customer rates, typically made in the following fiscal year, to account for the discrepancy.

Figure 8 compares the sources of capital investment funding within the Air Force, Navy, and Army over a three-year period between FY 2015 and FY 2017. Note the relative lack of uniformity among the three departments in terms of the composition of investment sources. In particular, the Air Force and Navy have relied significantly more on appropriated funding in recent years. In fact, representatives from the Air Force have noted that if not for the high levels of appropriated funding, the department would have found it very challenging to meet the six percent requirement (DoD, 2014).

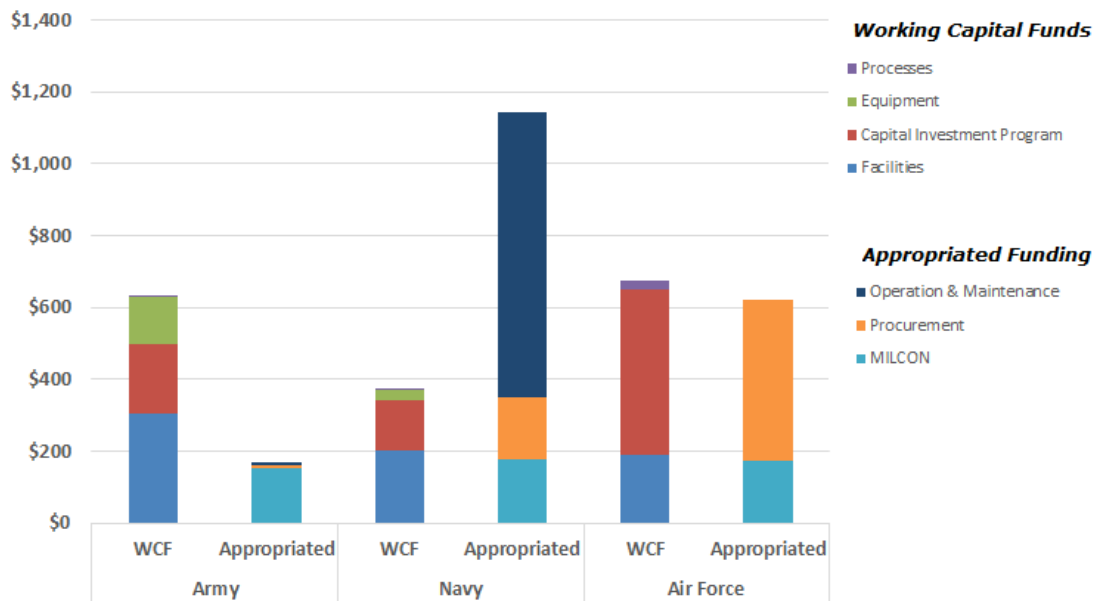


Figure 8. Sources of capital investment (\$ Millions), FY 2015-2017 *Note.* Navy data obtained from Navy Working Capital Fund Budget Justifications, FY 2017 and FY 2018. Air Force data obtained from Air Force Working Capital Fund Budget Estimates, FY 2017 and FY 2018. Army data obtained from Army Working Capital Fund Budget Estimates, FY 2017 and FY 2018.

Capital Investment Program

The capital investment program (CIP) is an important component of the departments’ working capital funds. The program allows the depot to depreciate a capital asset by reallocating its cost over its useful life. In effect, the depot is able to acquire needed assets without having to dramatically increase customer-billing rates. Purchases funded through the other components of

the depot's working capital fund (See Figure 8) are expensed—*i.e.*, the whole cost amount is placed on the depot's income statement.

The CIP provides “the framework for planning, coordinating, and controlling resources and expenditures to obtain capital assets” (FY 2017 NWCF Budget). The four approved capital budget investment categories within the CIP are Automated Data Processing (ADP) and Telecommunications Equipment; Non-ADP Equipment; Software development; and Minor Construction¹¹ (DFMR, 2016; larger construction projects are funded separately through the military construction appropriation). Equipment purchased through the CIP have a unit cost greater than \$250,000 and a useful life of two or more years (FY 2017 AWCF Budget; FY 2017 NWCF Budget).

To qualify as a capital investment, the proposed project must meet one of the following four criteria referred to in the DFMR:

- 1) improved efficiency (savings) or effectiveness;
- 2) required new capability and capacity that cannot be met with current equipment and facilities;
- 3) replacement of unsafe, beyond economical repair, or inoperative and unusable assets; or
- 4) environmental, hazardous waste reduction, or regulatory agency (state, local, or federal) mandated requirements.

The military depots must use a cost comparison or a pre-investment economic analysis to justify proposed capital investments. For proposed investments with a cost of under \$1,000,000, a cost comparison must be included in the depot's capital budget submission. The comparison must present a differential cost display (*i.e.*, the total costs attributed to each alternative) using the payback period capital budgeting procedure¹². For capital investment projects with a cost of \$1,000,000 or more, the depot must submit a pre-economic analysis that presents a differential cost display using the net present value approach¹³.

¹¹ Minor construction is generally limited to projects that cost \$750,000 or less; for projects affecting health, safety or environment, the figure is \$1,500,000 or less.

¹² Payback period shows the number of years it takes to break even from undertaking the initial expenditure, by discounting future cash flows and recognizing the time value of money.

¹³ Net present value analysis evaluates the cash flows forecasted to be delivered by a project by discounting them back to the present using the time span of the project and the firm's weighted average cost of capital.

The development of pre-economic analyses can pose a challenge to the depots. At some depots, there are a limited number of personnel capable of developing the analyses. A greater challenge is that cost tracking at the depot level is limited, and often does not provide the data necessary to develop a timely, comprehensive analysis. As a result, the military command with jurisdiction over the depot may reject the economic analysis. This can be a major setback given that the CIP approval process is seen by the depots as slow and inefficient to begin with; in fact, the turnaround time for approval can extend to three years. During this period, the depot is required to update its analysis to reflect increasing costs and changing assumptions. Contractor quotes, when updated, often exceed the ten percent tolerance permitted by law. Depot personnel must then develop a new analysis or “down scope” the project.

The lengthy and, at times, bureaucratic process can lead depot personnel to try to reduce the purchase cost of a capital asset to below the CIP minimum threshold of \$250,000, especially when the estimate only narrowly exceeds this minimum in the first place. Indeed, one can find examples of facilities and pieces of equipment that cost just under \$250,000 at some depots. Needless to say, these assets may not represent optimal solutions.

Investment Limitations

Prior to 2012, 10 USC 2476 stated, “the capital budget of a depot includes investment funds spent on depot infrastructure, equipment, and process improvement in direct support of depot operations.” Concerned that some depot operating expenses were being funded under the guise of capital investment, Congress sought to clarify the law. The 2012 NDAA was amended to read: “The capital budget of a depot includes investment funds spent *to modernize or improve* the efficiency of depot facilities, equipment, work environment, or processes in direct support of depot operations, *but does not include funds spent for sustainment of existing facilities, infrastructure, or equipment*” (emphasis added).

This construal has generated some confusion over what, exactly, constitutes a capital investment. The Defense Executive Steering Committee (2014) provides some examples of projects that, under the current definition, *cannot* be justified as capital expenditures: the replacement of the roof and fire suppression system of an aircraft hangar; renovation of an avionics repair shop; or a new corrosion control building. Many would argue that these types of expenditures *necessarily*

“modernize or improve efficiency.” Indeed, under criteria used by the Internal Revenue Service—which include “rebuilding property after the end of its economic useful life” and restoring property or equipment to “like new” condition—examples such as these would be considered capital expenditures. In effect, the law limits the depots’ ability to finance certain projects through the CIP, projects that in the commercial sector would almost certainly fall under the category of capital investment and whose costs would be depreciated over time. Thus, new investment in the depots may come at the expense of needed maintenance given the pressure to meet the requirement. Recall that deferred maintenance was a problem that 10 USC 2476 was originally enacted to address.

The treatment of software maintenance has also generated controversy. Historically, the military departments diverged in their treatment of software maintenance. Within the Army and Navy, maintenance was performed at activities that were not considered depot maintenance, whereas the Air Force has long managed and performed software maintenance at its depots (*i.e.*, the Air Logistics Complexes).

Since 1995, the DoD has classified software maintenance as depot-level maintenance. However, within the Army and Navy, a significant portion of software maintenance also falls under sustaining engineering and is often classified as such, which may lead one to argue that the Army and Navy are undercounting their total depot revenue. This limits the financial basis for the required capital investment. Ironically, it may be easier to meet the investment requirement by including the revenue generated by software maintenance, which has been supported by relatively high levels of capital investment in recent years.

Depot Capabilities

Despite some recent improvements and with some notable exceptions, depot capabilities remain at suboptimal levels. In July 2017, *National Defense* reported that “Certain service chiefs, the administration, and some in the media have stated that U.S. military mission capability and readiness could increasingly be considered a national security problem” (Captain, p. 17). *U.S. Naval Institute Proceedings* reports from 2016 and 2017 have stated that “virtually all of the naval services’ helicopters, the F/A-18, and Harriers are at or below 50% readiness levels”

(Captain, 2017, p. 17). Of course, not all of the services' readiness challenges can be traced to inadequate capital investment in depots.

However, many of them can be. At the department level, the absence of strategic investment planning, in particular, has contributed to declining readiness levels. A cursory examination of the *Army's Depot Maintenance Enterprise Strategic Plan, 2008-2025* reveals it to be less of a strategy than a to-do list. Cited objectives include "update infrastructure planning" and "establish an integrated human capital plan." The plan does not state how or when these are to be accomplished. In 2009, the GAO stated that the lack of a "meaningful department wide assessment" of the shortcomings of organic depots has left the DoD with no way to accurately determine whether they have the resources and capabilities to meet sudden threats and warfighter needs.

In 2010, the GAO published another report entitled *Improved strategic planning needed to ensure that Air Force depots can meet future requirements*. The report found that the Air Force's failure to use benchmarks to evaluate the adequacy of investment funding called into question "its assertion that its depots are postured and resourced to meet future maintenance challenges." A year earlier, the GAO released a similar report that questioned the capabilities of Army and Marine Corps depots (GAO, 2009). All three of the services' strategic plans were criticized for not using a results-oriented management framework to help ensure that they were positioned to meet future needs.

As recently as September 2017, the GAO found that despite the Navy's development of an improved investment plan in 2013, its shipyards and equipment remain in poor condition, with backlogged maintenance projects having grown by 41% over five years to a Navy-estimated \$4.86 billion that will require 19 years to complete. The poor condition of the shipyards has contributed to the Navy's inability to meet operational needs. According to the GAO, "In fiscal years 2000 through 2016, inadequate facilities and equipment led to maintenance delays that contributed in part to more than 1,300 lost operational days—days when ships were unavailable for operations—for aircraft carriers and 12,500 lost operational days for submarines" (p. 1). The GAO concluded that unless the Navy adopts a "comprehensive, results-oriented approach to addressing its capital investment needs, [it] risks continued deterioration of its shipyards,

hindering its ability to efficiently and effectively support Navy readiness over the long term. It should be noted that in February 2018, the Navy released a Report to Congress entitled *Shipyard Infrastructure Optimization Plan: Report on the Navy's Strategic Plan for Addressing the Infrastructure Deficiencies at the Public Naval Shipyards*¹⁴, which addressed many of the concerns cited by the GAO and other organizations.

The lack of adequate strategic planning by the DoD and the military departments has led to “at least seven instances of recommendations to create a single depot maintenance command or manager as the preferred direction in the evolution of the organic depot maintenance capability and as a way to achieve the desired performance” (Avdellas, *et al.*, 2011, p. 1-2). Avdellas *et. al* notes that those recommendations have been advanced by various bodies including Congress, DoD review panels, the GAO, and the Joint Staff. Yet none has been implemented. Instead, according to Avdellas *et al.*, “We observe a continuation of the multitude of customer-provider encounters playing out in weapon system acquisition and sustainment, without a consistent or integrated strategic vision” (p. 1-2).

At the depot level, many capabilities are far from “world class” or “best of breed.” Often, the distribution of capabilities is uneven if not bimodal: at one Army depot, state-of-the-art equipment and some new facilities stand out against a landscape of ageing buildings, near-obsolete testing equipment, and shelves of metal parts left exposed to the elements. At Pearl Harbor and Puget Sound, equipment used for repair work is left outside routinely because no covered storage space is available (GAO, 2017). At Norfolk Shipyard, some structures date back to World War I and are in desperate need of expensive renovation¹⁵. The shortage of habitable space has led to the construction of temporary office facilities.

¹⁴ The Plan consisted of a detailed long-term strategy to modernize the shipyards.

¹⁵ Some structures of historical value are protected from demolition and must be renovated according to strict criteria, which leads to added expense.



Double-stacked temporary office facilities at Norfolk Naval Shipyard, 2016 (GAO, 2017).

Whether and to what extent the present lack of strategic planning can be attributed to inadequate military leadership, cultural artifacts within the DoD, segmented lines of authority, congressional intervention or other causes can be debated. It should also be recognized that solutions that work in the commercial sector, especially those aimed at improving economic efficiency, might not work well within large public organizations. According to Nutt (2005):

*The external environment of a public organization is littered with political considerations. The views of opinion leaders, outright manipulation by legislators and interest groups, and opposition to an agency's prerogatives are more important than economic issues, which are crucial for private organizations (Levine et al. 1975). Disagreements, reciprocity, and quid pro quos can occur at any time and, within limits, are permissible ingredients in public decisions. Bargaining is required to find the permissible arenas of action. How things are viewed and understood by stakeholders holds more salience than the accuracy of claims. The meaning of a claim is derived from opinions as well as facts. **If economic reasoning, such as efficiency, is applied, it must be preceded by a decision to deal with efficiency questions, which often has political undertones.** (Emphasis added, p. 293)*

Nutt goes on to say that public sector decision makers generally “have weaker power bases” and that they “lack the funds to make investments that reshape systems they manage” (p. 297). He concludes that decision makers in public organizations are “more apt to use consultative or networking practices to make decisions” and, critically, “less apt to make decisions using analytical and speculative practices, seeing them as more risky” (p. 298).

To improve depot capabilities, approaches to funding capital investment must be considered carefully. As Nutt suggests, “oft-repeated call[s] for public-sector organizations to adopt private

sector practices” (p. 292), though well intentioned, may be misguided. The optimal approach will balance private sector practices with public sector realities.

V. Fixed vs. Flexible Funding

Questions over how to fund projects and programs often provoke considerable debate. One recent example at the local level casts into sharp relief the opposing views that often emerge. In January of 2016, the Baltimore City Council voted to approve a charter amendment that would “lock city government into spending millions more annually on programs that benefit children and teens” by directing three percent of the city’s annual discretionary spending to youth initiatives (Broadwater, 2016, p. 1). The city’s finance director was adamantly opposed. He stated that dedicating revenue for “a specific purpose, no matter how worthwhile it may be, begins to undermine sound financial management, puts core services at risk, and is not the best way to achieve the City Council’s goals” (Broadwater, 2016, p. 1). The City Council president had a different perspective, asserting that “we either invest in our youth now, or we pay later” (Broadwater, 2016, p. 1).

To an extent, both of these views can be mapped on to the debate over how to fund capital investments in military depots. For instance, it can be argued that in the absence of dedicated funding, routine investment in depots will be overlooked—that it, in fact, *was* overlooked—to fund more visible, higher-profile programs and projects. On the other hand, one might argue that the six percent policy hinders military leaders’ ability to adapt to changing circumstances, compromising their ability to meet mission requirements. Government often relies on fixed funding in the form of earmarking—the legislative provision mandating that approved funds be spent on specific projects—whereas the private sector prioritizes flexibility in the form of strategic investment decision making and, increasingly, real options analysis. These two approaches, fixed and flexible, are examined in terms of their applicability to capital investment in the military depots.

Earmarking

In principle, the government should allocate funds, irrespective of their source, in such a way as to maximize benefits to the citizenry. Critics of earmarking—the legislative provision mandating that approved funds be spent on specific projects—support their position by arguing that an earmarking provision is an “unnecessary constraint in the utility- maximization problem of allocating the last dollar to yield equal marginal utility in every direction” (Teja, 1988, p. 523). Or, as the OECD (2005) has asserted, earmarking “harm[s] allocative efficiency.” Proponents, on

the other hand, assert that it is unwise to assume that government is capable, in all instances, of acting as “an omniscient and benevolent welfare maximizer in its decisions about tax levels and allocations for different purposes” (Transport Research Center, 2008, p. 149).

Indeed, the federal government, U.S. states, and localities all rely, to varying degrees, on earmarking tax revenue in order to fund their enduring priorities in areas such as education, transportation, and healthcare. Although the public tends to associate it with “pork-barrel” spending (especially at the federal level), earmarking, like other financial management tools, has both benefits and drawbacks.

The advantages of earmarking include a guarantee of funding, predictability and budget planning, and the potential to depoliticize future funding decisions. The primary disadvantages revolve around budgetary inflexibility: “Earmarked revenues, not program needs or benefits relative to the competing priorities, may determine overall funding levels for the programs” (Michael, 2015, p. 5). Public spending, it is argued, should be determined by deliberate policymaking. However, it is unclear whether and to what extent such deliberation occurs, even in the absence of earmarking. As Teja (1988) has observed, “it is implicitly assumed that expenditures under general fund financing are indeed periodically reviewed and adjusted to ensure that no program is under- or overfunded,” an assumption he describes as “highly questionable” (p. 47)

Alabama is the oft-cited example of earmarking in action. In a 2015 article by Alabama State Senator Cam Ward, the author lamented that 91% of Alabama’s tax dollars were earmarked for specific departments or programs (the national average is 24%). In fact, Alabama’s general fund makes up only 16% of total state generated dollars. The rest flows into earmarked pots. Education, the largest of these pots, receives all of the state’s income and sales taxes. According to Jim Williams, the executive director of the Public Affairs Research Council of Alabama, “If money isn’t protected, you’re very much exposed to getting it taken away from you” (Barrett and Greene, 2013, p.1). Senator Ward, on the other hand asserted that “Earmarking leads to apathy in state government since state agencies are assured specific sources of funding, and there isn’t incentive to show they are using funds efficiently.” The senator proposed a bill that would “un-earmark” some \$450 million in state revenue—or about 15% of earmarked dollars.

It should also be recognized that earmarking some percentage of revenue for capital investment is not unique to the military depots. Because earmarks that are derived from recurring sources of revenue (*e.g.*, annual taxes) “implicitly promise funding of at least the level of the earmark” (Michael, 2015, p. 1) they provide some measure of predictability, which can improve budgeting, planning, and decision making. The state of Missouri amended its constitution in 1996 to create a separate Facilities Maintenance Reserve Fund to dedicate general fund dollars toward maintenance. The fund was gradually phased in from 1998 to 2007, dedicating 0.1% of the state’s general revenue to the fund in its first year, and increasing by 0.1% over the next ten years. Since 2007, one percent of the general revenue is transferred into the fund each year.

The Utah State Legislature has a similar statute on the books; but rather than base capital investment on revenues, it uses the value of existing state buildings as the basis. When adopting a budget, the legislature is required to allocate to capital improvement projects at least 1.1% of the value of existing state buildings. There is another caveat: this allocation must be made prior to funding any new capital development projects. Note that that the amount of funding generated does not cover the cost of total capital improvement. In 2015, \$174 million in capital improvement requests were made to the Utah State Legislature, but only \$111.5 million was dedicated to that purpose.

In its 2005 *Reallocation: The Role of Budget Institutions*, the OECD cited three arguments in favor of using earmarks to fund capital investment:

- Unlike in private firms, the prevailing incentives work against expenditures for the long-term—*i.e.*, “investment expenditures are cut first and increased last” (p. 45);
- Capital investment often requires periodic fluctuations in appropriations, which can make traditional, one-fund-fits-all budgeting difficult.
- Investments are difficult to plan “on-budget;” appropriations often have to be transferred from year to year, which may prove challenging.

Of the various earmarking schemes that have been tried, there is a general consensus that earmarking “benefit taxes” or user fees for related expenditures is preferable (Wilkinson, 1994; Transport Research Center, 2008). Taxes levied by the state on gasoline, which are then used to fund transportation infrastructure, are often cited as examples. A 2008 study by the Transport

Research Center notes that earmarking can have “an element of the benefit approach¹⁶ to equity in taxation, *i.e.*, the idea that people should be paying according to the benefits they receive from consuming a commodity” (p. 150). Not only does this type of earmark link supply and demand, but it also informs the taxpayers of the cost of the services that they are consuming.

On this basis, the depot investment requirement might be viewed quite favorably given that mandatory spending is a function of funded workload—*i.e.*, supply and demand are linked. Moreover, because much of the capital investment requirement is funded through the working capital funds, the military activities that rely on the depots have some visibility into the cost of their operations (through the rates that they pay), which, in principle, serves to further ensure that the earmarked funding is used effectively and efficiently.¹⁷

In some areas, earmarking may be the only effective tool available. Bratland (2010), for example, has argued that the public sector simply does not have the ability to invest effectively in public infrastructure. He points to the sustained lack of investment in transportation infrastructure in the United States, which, though often politicized, is a real and growing problem. According to the American Society of Civil Engineers, cumulative infrastructure investment needs will total \$2.7 trillion by 2020, rising to \$10 trillion by 2040 (Cullen, 2013). Anticipated funding will cover only 60% of these needs through 2020, dropping to 53% by 2040. The corresponding investment gaps are estimated to total \$1.1 trillion by 2020, growing to \$4.7 trillion by 2040 (Cullen, 2013). Bratland (2010) asks the question “Is the neglect of public infrastructure endemic to its governmental provision and management and thus inevitable?” The answer, according to Bratland, is “Yes.” He writes:

The maintenance problem arises from the absence of ownership of public infrastructure and the fact that the infrastructure’s benefits yield no appropriable sales revenue that can serve as a guide to maintenance. Hence, neglect appears to be inherent in the fact of government provision. Labeling components of infrastructure as public capital is simply a metaphor that misleads the electorate into thinking public infrastructure can be successfully maintained. (p. 38)

Bratland concludes “Legitimate capital concepts suggest that ownership and maintenance of infrastructure facilities should never be placed within the government’s scope of responsibility” (p. 41). Again, there is reason to be more optimistic with regard to depot investment. As

¹⁶ The benefit theory of taxation states that each citizen should be called upon to pay taxes in proportion to the benefits derived by him from services provided by the government.

¹⁷ As indicated previously, the DFMR does not allow major construction projects to be funded through the working capital funds, which, it might be argued, reduces this visibility.

discussed, 10 USC 2476 links investment to revenue through the working capital fund structure in a way that imitates, albeit imperfectly, the private sector. In other words, the depots *do* “yield an appropriable sales revenue that can serve as a guide” to capital investment.

The precise role for government earmarks may turn on whether and to what extent infrastructure—and the tendency to neglect it—is representative of public sector capital assets generally. If we are destined to neglect the maintenance, recapitalization, and capital improvement of public sector assets, including military facilities and equipment, then earmarking funds for these purposes may be the only acceptable recourse outside of privatization.

Real Options Analysis

Earmarking lies on the far end of a continuum spanning fixed and flexible approaches to capital investment. On the other end lies real options analysis, which applies option valuation techniques to capital budgeting decisions. Traditionally, managers in the public and private sectors have relied on discounted cash flow techniques¹⁸ in order to determine whether a proposed capital investment should be made. Future net cash flows are estimated over the anticipated life of a given project; if the value that is obtained is higher than the current cost of the investment, then (in theory) the investment should be made. In practice, however, this coarse-grain approach to investment decision making fails to take into account a number of variables that may influence a project’s profitability vis-à-vis the status quo or other investment possibilities.

Specifically, traditional cash flow techniques fail to capture the benefits associated with *flexibility* as it pertains to project size, timing, and process—*i.e.*, the so-called “real options” available to management (Schubert & Barenbaum, 2007). By assigning value to flexibility, private and public sector organizations can make more informed capital budgeting decisions. Schubert & Barenbaum (2007) provide a conceptual example in which understanding real options could alter—and improve—decision-making:

Consider a township interested in building a new school. One architect designs a one-building school while another develops a two-building plan. Assume that in both cases the academic facilities are of equal quality and that both facilities could house an equal number of students. Further, assume that the present value cost of School 1 is less than the present value of School 2. Standard [discounted cash flow] analysis would lead the township to choose School 1, but employing option theory might alter that decision. The use of two

¹⁸ The most commonly used techniques include net present value, internal rate of return, profitability index, breakeven time, and payback period (Chan, 2004).

buildings creates an option to “spin off” part of the school should the school population drop or change geographically. (p. 143)

In this example, School 2 provides value in form of the option to contract. Another option related to project size is the option to expand. Building a project with capacity in excess of the expected level of output allows an organization to expand its operations in the future. A third option that managers might consider is the option to expand *or* contract. In this case, the project is designed such that management can shut down part or all of the operation when conditions are unfavorable, but can then restart operations when conditions improve.

Regarding the timing of a project, another important option that traditionally has been undervalued is the option to *wait*. Just as a prospective homebuyer may wish to continue renting (despite higher monthly payments) until the housing market turns favorable, an organization’s management may find it financially advantageous to wait to invest in new capital assets. For instance, if a government organization has decided to contract out a certain function, but is unsure whether doing so would improve efficiency, it may make sense to enter into a short-term agreement with a contractor, forgoing the cost savings associated with a longer-term agreement, until and unless the benefits are proven.

Examples such as this border on common sense—and, yet, real options are often given little consideration because the value of said benefits is far more difficult to assess relative to the costs. Thus, public sector managers, in particular, tend to view capital investment decision making as an exercise in “straightforward cost minimization” (Schubert & Barenbaum, 2007). In the private sector, on the other hand, the relevant benefits are quantified in terms of a discrete figure—profit—the motivation for which lends itself more readily to the real options approach. Today, firms rely on several different option-pricing models.

Many factors reinforce the public sector’s tendency to resist real options analysis. For instance, the pressure “to use it or lose it” strongly discourages the value of waiting; Rather, there is a tendency to spend as investment funding becomes available, which invariably leads to under or overinvestment. Schubert and Barenbaum (2007) describe the tendency for public sector managers to “overbuild.”

A public sector manager is likely to design a budget that overbuilds assets such as schools and water treatment facilities in order to serve future growth potential rather than to wait and see if such potential growth becomes more likely. In the scenario where the manager waits, and the potential growth occurs, the

manager will need to go back and argue for more resources, when in the overbuilding scenario they need only argue for the financial resources once. (p. 144).

In other instances, where there is pressure to obligate limited funds quickly, investments are likely to be narrowly conceived and, hence, less effective in terms of contributing to strategic objectives.

Historically, real options, even in their crudest form (e.g., wait vs. invest), have seldom been considered within the context of depot capital investment. The portrayal provided by Glass and Schwartz of the Logistics Management Institute in 1988 paints an unflattering picture:

Capital investments [in the military departments' depots], by and large, are made piecemeal, primarily to enhance peacetime operating efficiency or capability. They are biased toward projects that provide quick payback. Pressure to obligate funds quickly exacerbates the tendency to undertake small, easily justified, short-term projects. By using this piecemeal approach, the military services are missing the benefits of an integrated series of investments following a planned, technological direction. Most importantly, they are risking their depots' abilities to accomplish essential wartime missions. (p. iii.)

The military services have argued that the minimum investment requirement, by its very nature, discourages and undervalues investment flexibility. According to a 2014 survey, the military departments are in agreement that the minimum investment requirement represents an “unnecessary burden” that “forces” investment in lower priority projects while discouraging or delaying investment in more costly, higher priority programs (DoD Maintenance Executive Steering Committee, 2014). In other words, the requirement undermines the ability to engage in strategic investment decision making. However, the portrayal by Glass and Schwartz suggests that better investment decisions would not necessarily have been made in the absence of the requirement. Better strategic investment planning is needed at the department level in order to benefit from more flexible approaches to capital investment.

VI. Recent Trends in Depot Investment

Do the military departments view six percent as a spending baseline or the default requirement? Although 10 USC 2476 does not place upper limits on annual capital investment, there is nevertheless an implicit assumption, as there is with any earmark, that previous spending is a sufficient guide to future investment.¹⁹ The concern that emerges is analogous to what has been said about the minimum wage. The President of Australia’s Court of Arbitration argued the following in 1904:

My experience is that it is utterly useless to fix a minimum—that it becomes a standard wage. The question is what is a fair wage? If it can be arranged that the minimum does not become the maximum, then I am prepared to make a minimum; but at present, as far as I can see, the minimum becomes the standard or the maximum.

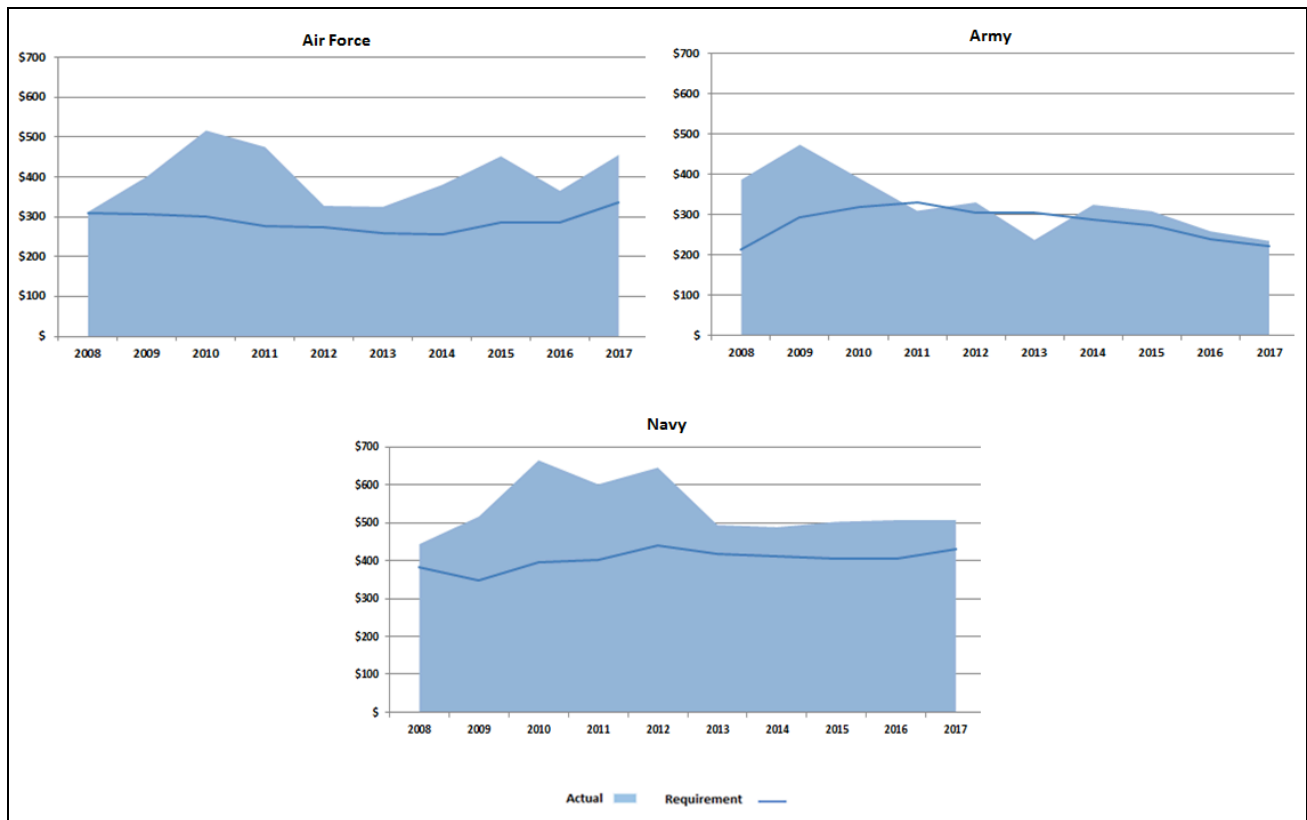


Figure 9. Capital investment in depots by military department (\$ millions), actual and requirement, 2008-2017
Note. USMC data included in Navy figure. Navy data from 2008-2013 obtained from DoD, 2014. Navy data from 2013-2017 obtained from Navy Working Capital Fund Budget Justifications. Air Force data obtained from Air Force Working Capital Fund Budget Estimates, 2008-2017. Army data obtained from Army Working Capital Fund Budget Estimates, 2008-2017.

¹⁹ In the case of the military depots, the implicit assumption is that six percent is and will continue to represent an adequate (minimum) level of investment *and* that previous years’ revenues (specifically, the previous three years’) represent the appropriate sum upon which to base the six percent.

Within the context of military depots, capital investments that are consistently at the level of the requirement could suggest that military leadership has not carefully considered investment needs, instead viewing the minimum requirement as the standard—in other words, it could suggest that the minimum has become the maximum.

Trends by Military Department

Figure 9 shows the actual annual capital investments made by each of the military departments and the corresponding annual investment requirements since the law came into effect. As discussed previously, representatives from the three military departments have stated that it has been a challenge to meet the minimum investment requirement. Yet the Navy and the Air Force, have not only met it, but have exceeded it. As for the Army, the investment landscape shows a significant peak in 2009, followed by valleys corresponding to years in which the investment requirement was not met. However, it should be noted that the Army’s cumulative investment has exceeded six percent since the law came into effect; in total, the Army has invested 3.2 billion, or 6.9% of total revenue between 2008 and 2017 (See Figure 10).

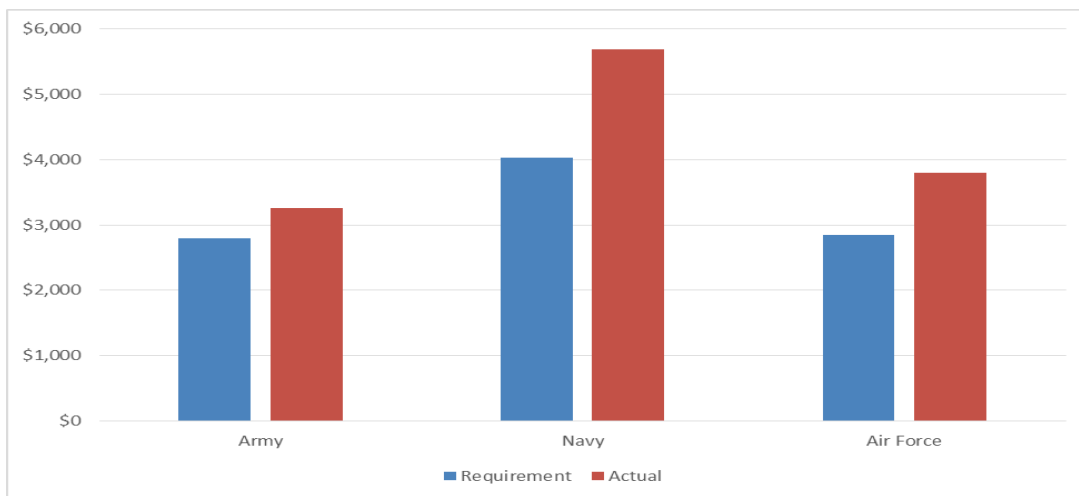


Figure 10. Cumulative capital investment in depots (\$ Millions) between 2008 and 2017, requirement and actual
Note. USMC data included in Navy figure. Navy data from 2008-2013 obtained from DoD, 2014. Navy data from 2013-2017 obtained from Navy Working Capital Fund Budget Justifications. Air Force data obtained from Air Force Working Capital Fund Budget Estimates, 2008-2017. Army data obtained from Army Working Capital Fund Budget Estimates, 2008-2017.

Clearly, the departments are not budgeting to the six percent figure. In fact, at first glance, the investment levels portrayed in Figures 9 and 10 are suggestive of proactive, strategic investment planning at the department level (in that investment levels are *not* consistently at the level of the requirement). Upon further examination, however, this does not appear to be the case.

The six percent requirement is often imposed at lower levels. For instance, Communications-Electronics Command (CECOM) flows down the six percent requirement to Tobyhanna Army Depot, the only depot under its jurisdiction. The Navy, for its part, applies the six percent requirement separately to its shipyards, Fleet Readiness Centers, and to the Marine Corps. By and large, then, capital investment levels within the departments are not reflective of top-down, department-level, strategic planning, but of bottom-up, depot-level decision making. This is not to suggest that these two approaches are mutually exclusive. Indeed, the depots may be in the best position to make capital investment decisions—so long as a high-level strategy is in place.

In the absence of higher-level strategy, local decision-making will remain largely reactive as opposed to proactive, even at well-managed depots. It is worthwhile to reflect on the principle of suboptimization, which states that optimization at the subsystem (or local) level rarely leads to optimization at the system (or global) level. In fact, improvement of a particular subsystem may actually worsen the overall system. Put another way, the well-being of an element is dependent on the well-being of the system of which it is a part; accordingly, it may be necessary for an element to limit its goals and actions in order to preserve the well-being of the system.

The military departments are not monolithic entities. Each is a complex system constituted of many organizations with varying viewpoints, interests, and incentives. It is nevertheless interesting to recall that representatives within the departments have criticized the investment requirement as “an unnecessary burden”—yet have implemented it more stringently than the law mandates. That is, the departments have argued that the investment requirement deprives them of needed flexibility; yet, in some instances, they appear not to be taking advantage of the flexibility that already exists.

Within the Navy, differences in opinion regarding the burden posed by the requirement might be tied to varying definitional interpretations of capital investment. For instance, the Navy shipyards

have reported capital investments of well over six percent annually²⁰ since 2014. Despite these relatively high levels of investment, Naval Sea Systems Command (NAVSEA) has expressed that it is only able to “maintain safety and habitability of existing plant and mission-essential infrastructure functionality” (NAVSEA; 2018). In other words, at the current level of investment, the Navy cannot make “appreciable productivity improvements in its shipyards” (NAVSEA, 2018). It does not appear (given these levels of investment) that the requirement has posed an undue burden, much less an unnecessary one (given the state of the shipyards).

At the same time, one might express doubts as to whether expenditures that “maintain safety and habitability” are justified under the DoD’s definition of capital investment, which, as discussed, does not allow for “sustainment of existing facilities, infrastructure, or equipment.” Those concerned that the requirement poses a burden might be under the impression—arguably, the correct one—that although the shipyards may be making necessary investments, some of these may not be *qualifying* investments under the law.

Steady vs. Unsteady Workloads

Interestingly, the relationship between weapon system use and required maintenance is not straightforward; moreover, this relationship varies considerably among the military services. Figure 11 compares the depot repair and maintenance workloads by military service, expressed in DLHs, between 2001 and 2009, a period marked by high levels of overseas military engagement. Whereas the Army and Marine Corps exhibited significant sustained increases in depot workloads, the Navy and Air Force workloads remained relatively stable, following modest post-2001 increases.

²⁰ In FY 2016, for example, the six percent requirement, applied to the Navy’s shipyards, was approximately \$270 million whereas its capital budget for its shipyards was approximately \$490 million.

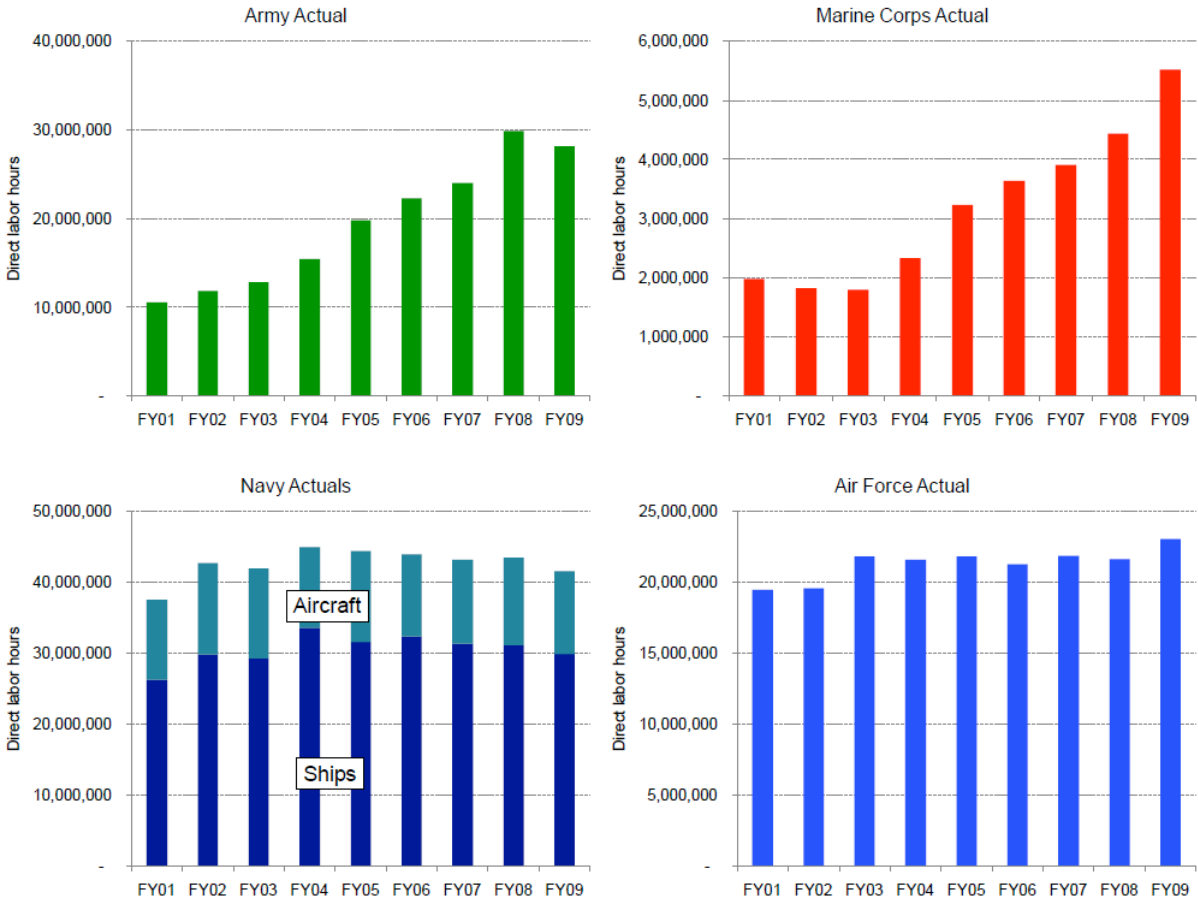


Figure 11. Depot repair and maintenance workloads by military service, expressed in DLHs, 2001-2009 (Avdellas *et al.*, 2011; Note: The Army DLHs reflect work at the five major organic depots only).

Avdellas *et al.* explain that “this level of demand from the Air Force and Navy reflects the operation of an essentially constant inventory of aircraft and ships” (p. 1-4). The Rand Corporation (2005), writing about the Air Force, provided some additional insight:

Surge has become part of regular ongoing depot activity instead of an unusual event. Furthermore, recent contingencies in which there have been increases in flying hours have not led to overwhelming increases in depot repair. Depot work is not necessarily linked to actual demand at a fixed point in time; appropriate planning can help the depots proactively prepare for expected conflicts. (xii)

In fact, an earlier Rand report entitled *How should the U.S. Air Force Depot Maintenance Activity Group be funded?* could not find “any category of organic [Depot Maintenance Activity Group; DMAG] expenditures that is consistently positively correlated with flying hours across multiple weapon systems” (Keating & Camm, 2002, p. xv). Figure 12, which compares C-135 flying hours and organic repair expenditures, illustrates this lack of correlation (though there may be other factors that influence depot requirements).

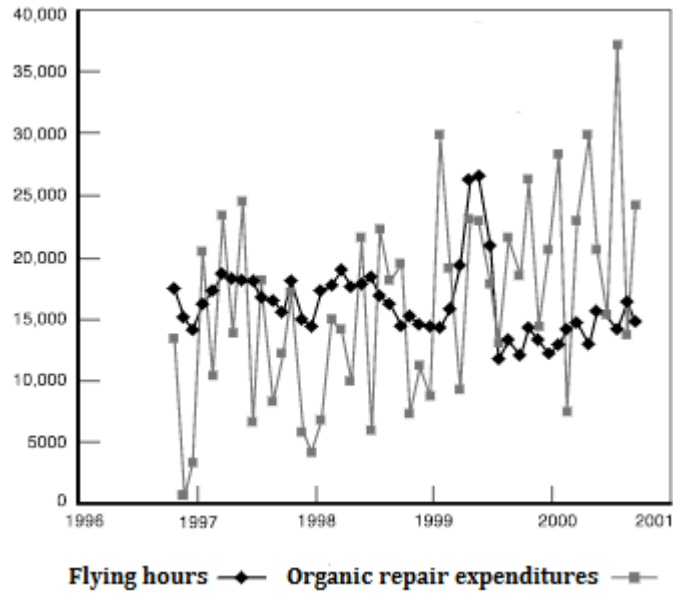


Figure 12. C-135 Flying Hours and DMAG Organic Repair Expenditures (Keating & Camm, 2002)

In contrast, increasing workloads within Army and Marine Corps depots were attributed directly to “the added intensity of equipment operation in combat” (Avdellas *et al.*, p. 1-4). These differences in workload (steady and predictable vs. unsteady and unpredictable) have obvious implications with regard to the six percent investment requirement given in that it is based on depot revenue, which, in turn, is a reflection of workload (specifically, direct labor hours). Needless to say, maintaining adherence to the investment requirement is likely less challenging when demand is steady and predictable in that investments can be made in conjunction with long-term strategy, rather than in response to a changing workload.

A Balanced Approach

The Army, in particular, may find it challenging to meet the investment requirement (if based on higher wartime revenues) following a drawdown from combat (when workloads are declining). Recall that the minimum investment requirement is based on total average revenue from the *preceding three years*. In effect, the law can force overinvestment during a period of declining demand and resources, which is not an enviable position for an organization to find itself in. The challenge is even greater given that capital investment within the Army has been financed primarily through the working capital fund (rather than appropriations) in recent years. In response to this challenge (*i.e.*, overinvestment during periods of declining workloads), the

Office of the Secretary of Defense (OSD) has considered a forward-looking calculation method that bases the six percent target on total average revenue from the previous year, the execution year, and the following three years (*i.e.*, the budgeted, planned, and programmed revenue).

It is not immediately clear whether this method represents a durable solution to the problem of overinvestment. One can envision a situation in which revenues are projected to increase rapidly following a prolonged period of operational stability. The military department may not need to make the required capital investments based on increased revenue projections; however, such a level of investment may be needed following a drawdown from combat in order to recapitalize worn assets—in which case the current calculation method may prove preferable. In any event, it is unlikely that Congress would support an investment basis that relies so heavily on projected revenue.

Exclude OCO Funding from the Requirement?

The Army has also proposed that funding provided through the overseas contingency operations (OCO) fund be excluded from the calculation method. This proposal undermines the linkage between revenue and investment that, as described previously, serves to justify fixed investment strategies in the first place; in other words, the proposal ignores the reality that investment and recapitalization needs are driven, in large measure, by the use, and subsequent wear and tear, of existing capital assets.

The Army, for its part, has proposed a reasonable compromise that bases the six percent target on average revenue from the *previous year, the execution year, and the future budget year*. During periods of steadily declining revenues, the “straddle” method generates minimum investment requirements that are lower than those generated by the current method but higher than what would be generated by OSD’s forward-looking method. Conversely, during periods of increasing revenues, “straddle” would generate minimum requirements higher than the current method but lower than the forward-looking approach.

Figure 13 compares the effect of the current, straddle, and forward-looking methods on the Army’s minimum investment requirement using actual revenues generated between 2008 and 2016 and projections between 2017 and 2019. Revenues during this period declined significantly (from \$5.9 billion in 2008 to \$3.7 billion in 2016). As the chart indicates, using the straddle method would have resulted in a reduction to the minimum investment requirement of about \$20 million annually.

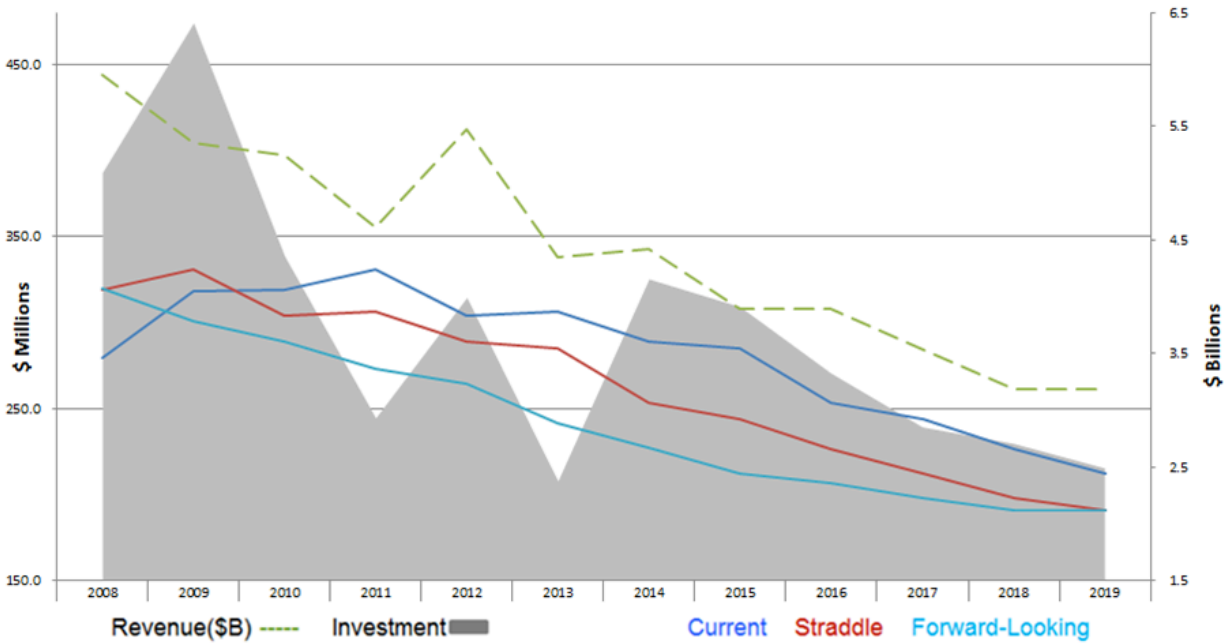


Figure 13. A comparison of the three calculation methods during a period of declining revenues (\$ Millions).

Note, however, that the shortfalls in actual investment (in 2011 and 2013) occur even when the forward-looking method is employed. This is not to say that the minimum investment requirement should necessarily be altered to accommodate such shortfalls in the future; at the same time, they draw attention to the reality of competing priorities and budgetary unpredictability. The military departments should have some added flexibility to adjust to an unpredictable environment, especially considering that such flexibility could also serve to strengthen investment options analysis and facilitate strategic decision-making.

VII. Recommendations and Conclusion

Below we summarize the challenges discussed in the preceding sections of this report:

- Depot capabilities remain suboptimal;
- Unified strategy does not drive investment;
- The CIP approval process is long and bureaucratic;
- The definition of capital investment is narrow and confusing;
- The cap on CIP-funded construction projects can result in suboptimal investments;
- Limiting qualifying investments to the “covered” depots appears arbitrary; and
- The timeframe basis for the six percent requirement can be problematic.

Based on these challenges, the history of capital investment in military depots, our examination of the benefits and drawbacks associated with fixed and flexible funding, and trends in depot investment, we offer the following recommendations.

Recommendations

Develop and implement unified strategic plans to properly guide capital investment.

- Both the DoD (at the enterprise level) and the military departments lack detailed and comprehensive strategic investment plans for the organic industrial base. As a result, investment in the depots is largely reactive and subject to the problem of suboptimization, whereby even well-executed investments may fail to reflect department-level priorities. Without improved strategic planning, it will be challenging to pursue, develop, and execute the integrated series of investments that are necessary to meet future capability requirements.

Maintain—but modify—the minimum investment requirement to encourage strategic investment decision making.

- The rationale and empirical basis for the six percent figure are tenuous. The statistic comes from a single study that relies on a post-hoc analysis of average capital investment rates in commercial sector firms. Nevertheless, the six percent requirement should remain in place as evidenced by the historical challenges in making adequate investments and in light of the continued failure to implement unified, comprehensive investment strategies.

- In its current form, the requirement can lead to overinvestment during periods of declining revenues and potential underinvestment during periods of increasing revenues. To better align investment with revenue, the minimum requirement should base the six percent target on revenue from the preceeding year, the year of execution, and the following year, *i.e.*, the “straddle” approach.
- This change alone may not provide the flexibility necessary to facilitate strategic decision making. Historically, many of the capital investments have taken the form of small, short-term projects—a tendency that, arguably, is exacerbated by the annual investment requirement. Allowing the military departments with detailed strategic capital investment plans to credit any annual investment in excess of six percent to the future minimum requirement may improve investment effectiveness.

Continue to base the minimum investment requirement on total revenue.

- Proposals to base investment solely on revenue generated by “core” workload, or those that seek to eliminate from consideration OCONUS funding represent misguided attempts to reduce the required *level of investment* by narrowing the *basis for investment*. If the required funding level (six percent of revenues) is believed to be too high, then the six percent figure should be reconsidered at some point in the future. Narrowing the basis for investment has the potential to mask investment needs, if, for example, “non-core” or OCONUS-generated workloads increase relative to core workload (a problem that is exacerbated by the fact that defining core requirements is a largely subjective enterprise that relies on methodologies that are not consistently applied).

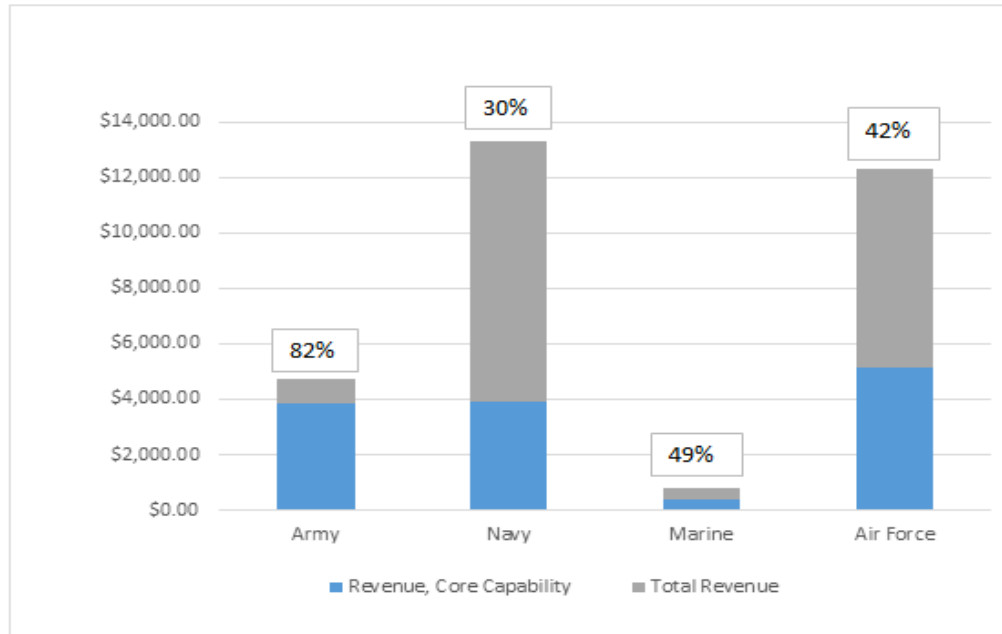


Figure 5. Revenue generated by core capabilities as a percentage of total FY 2016 revenue. *Note.* The information in this figure came from data submitted in DOD 2014 Biennial Core Report (GAO, 2016) and (OUSD AT&L, 2016)

Finally, eliminating core from the investment basis would have a highly disparate impact on the military services. Figure 5 shows revenue generated by core capabilities as a percentage of total FY 2016 revenue for each of the military services. Were the requirement to be based solely on core-sustaining workload, the Army would see minimal relief, whereas the Air Force and Navy requirements would fall considerably.

Modify the minimum investment requirement so that qualifying investments are not limited to the 20 covered depots.

- The revenue generated by *all* of a military department’s depots forms the basis for the six percent investment requirement; hence, it stands to reason that all of a department’s depots should be made eligible for investment under the requirement. At present, a significant amount of the basis for the investment requirement is generated by software maintenance, yet many of the facilities that perform this maintenance are not “covered” by the current requirement.

Widen and clarify the definition of capital investment.

- The depots should rely on a standard definition of capital investment to ensure that the investment requirement does not inadvertently lead to increases in deferred maintenance.

As discussed, rebuilding infrastructure after the end of its economic useful life or restoring it to “like new” condition constitute capital investment under standard definitions.

- The depots must “expense” equipment and facilities that, under a standard definition of capital investment, would be allocated over time. Even if the definition of capital investment is to remain unchanged vis-à-vis the six percent requirement, the depots should be permitted to depreciate certain expenses related to the “sustainment of existing facilities, infrastructure, or equipment.”
- Relying on a standard definition also helps reduce any grey area that might lead to needless bureaucratic meddling, added expense, or schedule delay.

Streamline the CIP approval process.

- The approval process for depot-level capital investments should be shortened. In some cases, CIP expenditures must be approved by a 4-star command. This may be appropriate to ensure compliance with the strategic plan, but projects are rarely disapproved if they meet all the bureaucratic requirements. The structure of the working capital fund system may already provide sufficient constraints on capital investment decision-making at the depot level. Recall that the costs of investments are recouped through asset depreciation incorporated into customer rates. Customer sensitivity to increasing rates promotes sound capital investment at the depot level. Could not the subordinate commands, to which the depots already report, provide the necessary approval? The higher-level commands should devote more time and resources to developing long-term strategic investment plans that guide depot-level decision making.

Study the potential for funding larger construction projects through the CIP.

- Recall that, at present, construction projects valued at more than \$750,000 can only be funded through congressional appropriation (which is often difficult to obtain). Consequently, there has been a longstanding tendency—which persists to this day—to “build groups of very small facilities” (Glass & Schwartz, 1988), when larger facilities would have been better economic investments. Funding larger construction projects through the working capital funds would provide military customers, the DoD, and

Congress with a better understanding of the true cost of depot maintenance and repair, while improving the cost efficiency and effectiveness of capital investments.

Continue to pursue public-private partnerships.

- Public-private partnerships have allowed the DoD to harness the best mix of capabilities from the government and commercial sectors in many areas, including depot maintenance. The DoD should continue to pursue appropriate partnerships to the extent possible.
- Depot labor rates do not fully reflect the associated indirect costs; as a result, the rates are often lower than those seen in the commercial sector (Captain, 2017), which can provide an incentive for firms already performing depot-level maintenance to partner with the DoD (through a DSA) in order to gain access to depots' personnel, equipment, and facilities. PPPs provide a “win-win” for both parties, improving depot capabilities, reducing costs, and enabling compliance with 50/50 and core requirements.

Conclusion

In the absence of detailed and comprehensive strategic investment plans, it is difficult to see how capital investments will develop the required enterprise depot capabilities. Moreover, without dedicated funding, needed investment in capital assets can be overlooked. Even when funding is dedicated, unnecessary or shortsighted investments are sometimes made. Fortunately, fixed and flexible funding strategies are the two end-points on a continuum that spans a significant middle ground. Within the context of depot investment, the optimal balance has not yet been achieved. We believe that the above recommendations will generate the necessary shift along the continuum toward increased flexibility, thereby strengthening the military depots' capabilities and ensuring that their vital role in safeguarding America's security is maintained.

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