



**ABILITY OF UNITED STATES
DEFENSE INDUSTRIAL BASE TO
EFFECTIVELY MEET OUR CURRENT
AND FUTURE NATIONAL SECURITY
REQUIREMENTS**

AN AIAA INFORMATION PAPER

**Based on a paper written by
James McAleese, Esq.
Principal of
McAleese & Associates, P.C.**

**and Approved by the
AIAA Public Policy Committee**

20 May 2002

American Institute of Aeronautics and Astronautics
1801 Alexander Bell Drive, Suite 500
Reston, VA 20191-4344
703/264-7500

Executive Summary

The primary goal of this paper is to examine the current and future ability of the U.S. defense industrial base to effectively meet our National Security requirements. To accomplish this, it is critical to establish a baseline of both short-term and long-term requirements against which to measure U.S. defense industrial base capabilities. This is particularly true in light of the fundamental shift in combat operations during Operation Enduring Freedom.

The tragic loss of almost 3,000 innocent American lives on September 11, 2001 has forever changed our Nation's perception of war. Any final remnants of thinking within the National Security community regarding tank-on-tank, plane-on-plane, and ship-on-ship engagements quickly evaporated after this tragic event.

Today, the new mandate is to destroy Al Qaeda forces wherever they may regroup, sending a clear message to all terrorists, and to rogue states, that the United States will not hesitate to use overwhelming force when American lives, our homeland, or our allies, are threatened. As we speak, both the Administration, and our U.S. Armed Forces, are doing an exceptional job in this regard.

While some American casualties cannot be avoided to defeat non-negotiable terrorist factions, it is imperative that both DoD, and our Nation, seize upon this unique opportunity to procure a complete portfolio of advanced weapon systems, while aggressively driving technical innovation to maximize the

lethality and combat capability of those weapons. This will require the DoD to aggressively foster competition in key “emerging technologies,” particularly in defense-unique/R&D-intensive areas. Rather than fixate primarily on the historic focus of using competition to reduce costs, it is critical that DoD aggressively foster competition in these emerging technologies to drive technical breakthroughs in lethality, survivability and combat capability, which can then be rapidly-deployed to save American lives in combat.

To maximize the fielding of enhanced lethality and combat capability on the battlefield, DoD must take immediate steps to field emerging technologies in both the short-term and long-term. These recommended procurement actions fall into three (3) key areas of:

1. Increased procurement and modification of new and existing platforms with advanced sensor/kill technologies and improved command & control, both of which must be “rapidly-deployable;”
2. Accelerated acquisition of “high-demand/low-density” sensor/control platforms; and
3. Block upgrades of rapidly-deployable offensive “leap-ahead” technologies, such as directed-energy weapons, as well as systems to provide adequate electrical power, and architecture to truly integrate the “digitized battle-space.”

The DoD should review and adopt many of the key recommendations contained in this paper. In particular, it is proposed

that (1) DOD reshape antitrust evaluations to conform to the realities of the “Full Subsystem Capability Model” to complete the long-overdue consolidation of the U.S. mid-tier firms; (2) DOD expand the use of multi-year contracts to attract true “value investors,” since multi-year contracts substantially increase stock valuations due to investor perception of controlled risk; and (3) move to a two-year appropriations cycle on both R&D and procurement funding to stabilize programs and create an environment of controlled risk.

The DoD should also take immediate adoption and implementation of the recommendations contained in the “AIAA Defense Excellence Conference Report.” This activity addresses some of the fundamental issues underlying the proposed “transformation” of the DOD. For example, the federal government needs to provide incentives for firms to pursue innovative research. This could be in the form of higher fees, a practice that has born fruit at NRO, or bonuses for R&D that leads to new or better products. The government also needs to support operational prototyping and to reassess its use of firm, fixed-price R&D contracts. Cost-plus contracts do not inhibit innovation if the contracting officer understands the process and the need for flexibility in carrying out effective R&D.

Critical Emerging Technologies, Which Can Be Rapidly Deployed, Should Be Procured To Enhance Lethality, Survivability and Combat Capabilities In The Battlefield.

The DoD Budget for FY’03 is clearly directed toward fighting terrorism and sustaining morale/readiness, while accelerating transformation of our forces

to the extent that funding is available. While modestly under-funded in these three key areas, this budget’s overall approach is reinforced by the Six Operational Goals of the 2001 Quadrennial Defense Review (QDR), primarily directed toward conducting information operations; defeating anti-access/area-denial environments; denying enemy sanctuary via persistent surveillance and rapid engagement; developing robust space surveillance and communications; and developing an inter-operable C4ISR. Likewise, the Air Force’s Doctrine of “Global Vigilance Reach & Power;” the Navy’s implementation of “FORCENet;” and the “Full Spectrum Operations” theme of the “Army Objective Force” all require the rapid deployment of similar emerging technologies onto the battlefield.

Simply stated, the current and future ability of the U.S. defense industrial base to meet the requirements of DoD is a direct function of which technologies DoD procures. In many cases, the U.S. defense industrial base still has sufficient capacity in defense-unique/non-R&D-intensive, or “mature markets,” to surge for sustained wartime production. In support of Operation Enduring Freedom, DoD has been actively funding alternative suppliers, and taking steps to fully capitalize defense-unique components at the supplier level, particularly in areas such as precision-guided-munitions. By contrast, key technical innovations in rapidly-deployable emerging technologies will be driven by competition, as opposed to heavily-capitalized production facilities. To fully credit DoD, there are already a number of examples of emerging technology programs in progress, such as the Army’s Future Combat System;

Navy's FORCENet experimentation with the multi-sensor grid; and the Air Force's Small Diameter Bomb and deep-target munitions. However, to effectively defeat the full range of terrorist threats, we must focus the full attention of key National Security Stakeholders, Industry, and Shareholders to aggressively drive the rapid-fielding of emerging technologies in key areas that increase lethality, survivability, and combat capability.

More specifically, the following key emerging technologies are critical to providing the United States total battlefield dominance:

- Automatic Target Recognition -- to defeat stealthy and camouflaged targets;
- Laser Communications -- to maximize situational awareness and enable time-sensitive kills;
- Robotic Suppression of Enemy Air Defenses (SEAD) -- to enable close-in helicopter troop transport and strike;
- Unmanned Combat Aerial Vehicles (time-sensitive strike)/unmanned ground combat vehicles (scout and close-quarters combat)/unmanned underwater vehicles (mine counter-measures);
- Directed Energy Weapons -- to maximize lethality and stealth/survivability of light/airliftable forces;
- Fully-Integrated Battle Management Command, Control & Communications (BMC3) -- to provide real-time "kill data" for time-sensitive targets, to enable light-strike, and to enable high-fidelity kill capability beyond line-

of-sight with minimal risk of fratricide; and

- Cooperative Denial of Electronics Technology -- to detect and deny adversary access to radio and light spectrum, while still protecting allied communications gear.

Specific Platforms Recommended for Increased Procurement and Modification with Rapidly-Deployable Sensor/Kill Technologies and Improved Command & Control.

Rapidly-deployable improvements to sensor/kill technologies can be immediately integrated into multiple platforms to increase lethality of offensive systems such as targeting, and Command, Control & Communications, just to name a few. Indeed, of FY'03 Unfunded Priorities Lists by the Services, many sensor/kill technologies rank at the top of those lists.¹ The following are examples of some of these unfunded programs that are recommended candidates for insertions of sensor/kill technologies:

DDG-51 (approx. \$810M each) (To add third ship in FY03 to sustain the surface combatant force at 116 ships. Allows for advanced procurement for third ship in FY03. Additionally, insertion of improved C4ISR facilities and improved Command & Control suites will enable DDG-51s to operate as independent Command & Control ships at remote "hot spots," relieving some of the burden of CVN Battle Groups);²

¹ "Unfunded Priority Lists" are prepared by each of the Armed Services, and includes a "wish-list" of designated programs that are currently unfunded.

² The House Armed Services Committee's (HASC) recent mark-up of the FY03 Defense Authorization Bill adds approximately \$3.2B for

SSN ERO (approx. \$200M) (Will increase force structure to 55 SSNs in FY04. Critical for undetected, long-loiter signals intelligence and time-sensitive tactical strike);

LPD (approx. \$1.1B) (Restores program to 2 ships per year by adding second ship in FY03 to replace the obsolete and costly LPD 4 class ships. Provides forward presence and capabilities for expeditionary and special operations forces);

LHD (approx. \$536M)(Moves FY04-FY06 tail to FY03 to immediately fully fund the replacement ships);

CG-47 Conversion Program (approx. \$456M) (To accelerate funding of field critical warfighting improvements to the Area Air Defense, and Force Protection capabilities of the CG-47 cruisers. Part of Single Integrated Air Picture and enabler of Sea-Based Missile Defense);

FA-18E/F (approx. \$600M) (Increase funding profile to 54 aircraft, and accelerate procurement to support the retirement of F-14 in FY06. Accelerate procurement of the next-generation of the Navy's combined fighter/attack aircraft with updated suites of sensors, targeting, and communication equipment to provide combat bridge until full development, production, and fielding of the JSF); and

procurement, including an additional \$810M for one DDG-51, \$229M to accelerate construction of the CVN(X) by one year, \$312M to improve U.S. naval sensors, command and control, weapons and training, and \$26M in additional funds to procure Predator unmanned vehicles. See [www.http://www.house.gov/hasc/pressreleases/2002/02-05-01ndaamarkupsummary.pdf](http://www.house.gov/hasc/pressreleases/2002/02-05-01ndaamarkupsummary.pdf)

MH-60 (approx. \$88M) (Increase production to 4 MH-60S in FY03 and 5 MH-60S in FY04 to initiate replacement production of the costly H-46D. Provide the Navy with the platform to insert next-generation mine hunting equipment to defeat littoral anti-area denial strategies critical to next stage of campaign against terrorists).

Appendix I contains a complete list of specific unfunded programs recommended for increased procurement and modification with rapidly-deployable sensor/kill technologies and improved command & control.

Accelerated Acquisition of “High-Demand/Low-Density” Integrated Sensor/Control Platforms.

Several emerging programs have proven so valuable in recent combat operations that accelerated acquisition of these “high-demand/low-density” integrated sensor/control platforms is recommended. These include such platforms as:

- Unmanned Aerial Vehicles (UAVs);
- Specialty C4ISR Aircraft;
- Tanker upgrades (AF);
and
- Air mobility/lift upgrades.

Appendix II contains a complete list of recommended high-demand/low-density platforms, which should be acquired in greater quantities to provide U.S. Forces decisive advantages on the battlefield.

Development of Offensive “Leap-Ahead” Technologies Such As Directed-Energy Weapons, Systems That Provide Adequate Electrical Power, Management, And

Architectures That Truly Integrate the “Digitalized Battlespace.”

It is critical that specific emerging technologies be accelerated and rapidly-fielded with interim capability. Block Upgrade strategies should then be pursued as significant improvements in lethality and combat capability are matured. DoD’s emphasis should be placed upon specific configurations that can be fielded in 2002-1010, as opposed to 2020-2030. These emerging technologies will include evolutionary weapons systems development such as:

DDX and CVX series (Spiral development programs for the DDG-51 and CVN replacements. The DDX program will act as the development test-bed for other classes of surface combatants);

Airborne Laser Program (Prototype airborne missile defense interceptor utilizing laser weapons. Will be the platform for leap-ahead developments in other laser applications such as ground and sea-based lasers);

Consolidated C4ISR Wide-bodied Aircraft (clear preference for 767s if reasonable price can be obtained) (Next-generation C4ISR to supplement/replace JSTARS and AWACs. Provide next-generation C4ISR airborne platform to integrate battlefield information grid);

Minesweeping UAVs and airships (Using specialty aircraft and remote aircraft to ensure location and demolition of land and sea-based mines);

Stealthy long-range UAVs (UAVs for ultra-distance, deep target surveillance,

reconnaissance, and bombing missions); and

Hybrid-Electric Weapon Systems (DoD’s development of new, high-energy-demand, electrical weapons will require a new class of hybrid-electric (HE) power system. Helmet-mounted displays and individual sensors and communications, require electric power. Must be lightweight, reliable and rechargeable from the HE vehicle. Several recent technology developments have demonstrated potential, including Army’s Solid State Heat Capacity Laser mounted on a hybrid-electric HMMWV; the Air Force’s High Power Microwave, also mounted on the HE HMMWV).

Appendix III contains a complete list of “leap-ahead” architectures and directed-energy weapons recommended for accelerated development and deployment.

Procurement Strategies To Drive Technical Innovation In Emerging Technologies To Accelerate Rapidly-Deployable Increases in Lethality and Combat Capability.

The DoD must drive technical innovation in these emerging technologies to accelerate the fielding of increased lethality and combat capabilities. However, that does not require that DoD take aggressive actions in all cases to foster technical innovation. If a particular product or technology is commercial in nature, then innovation will likely be driven by the open market. This will enable DoD to take advantage of the faster cycle times in commercial technology development, while also achieving the benefits of lower unit costs given commercial

production economies-of-scale. However, if the technology is defense-unique, with no commercial counterpart, then a careful evaluation must be made to determine whether the product is defense-unique/R&D intensive, or defense-unique/non-R&D-intensive. In defense-unique/non-R&D-intensive areas, the most probable discriminators are likely to be cost, with limited potential for major breakthroughs in offensive leap-ahead technologies. By their very definition, these are mature markets.

Conversely, if a product or technology is defense-unique/R&D-intensive, then the DoD must take two specific actions. First, the DoD must fully fund the procurement of both improved sensor/kill technologies and improved Command & Control into existing platforms, coupled with the full procurement of additional high-demand/low-density platforms. Without the potential for future profitability in production, there will be no incentive for contractors in these defense-unique/R&D-intensive markets to aggressively pursue the inherent technical, schedule, and financial risks. Second, once full funding is provided for those platforms that will incorporate those emerging technologies (block upgrades), then DoD must foster aggressive competition between at least 2-3 committed contractors in each emerging technology to drive the technical innovation so critical to breakthroughs in leap-ahead technologies.

Examples have been provided for all three models for the rapid deployment of key emerging technologies to the battlefield. In addition, the following

procurement actions can be taken to ensure competition in these emerging markets, while at the same time, preserving the defense industrial base for defense-unique/R&D intensive, products:

1. DoD must be very careful to craft acquisition plans to ensure aggressive competition in key technologies. In some cases, that may be best achieved in winner-take-all competitions. In other cases, structured co-development (with the most lucrative subsystems awarded to the most technically-innovative offeror) may be most appropriate. Moreover, DoD can also choose to segregate select those R&D-intensive subsystems for “full and open” competition on a stand-alone basis that are critical to continued tactical battlespace dominance, such as air-to-air radar and electronic warfare suites.

2. Encourage final consolidation of defense-unique/specific subsystems to a point where the number of competing subsystem houses approximately equal the number of prime contractors that manufacture the respective combat platform. Given DoD’s commitment to procurement of bundled platforms (i.e. less Government-Furnished-Equipment), there is often only enough funding to sustain two credible prime contractors for most defense-unique platforms, and only room for one mid-tier subcontractor for each defense-unique/on-board subsystem on each competing team. Consequently, for defense-unique/R&D-intensive subsystems with no appreciable commercial market, the number of sustainable subsystem houses for each critical on-board subsystem is essentially a direct function of the number of platform primes competing in

bundled, “winner-take-all” platform competitions. Only by encouraging the formation of 2-3 committed contractors in these defense-unique/R&D intensive technologies, will there be a sufficient incentive for contractors (and Wall Street from a capital-perspective) to aggressively drive technical innovation in the face of technical, schedule, and financial risks inherent in the accelerated fielding of emerging technologies. Absent such focused mid-tier consolidation in key defense-unique/R&D-intensive markets, DoD will have to openly-subsidize these operations to keep them potentially-viable for the next “mega-competition”--when again only two competing defense-unique subsystems will be funded during the platform-to-platform competition, with only one supplier ever moving into production, if any.

3. Reshape antitrust evaluations to conform to the realities of the “Full Subsystem Capability” Model to complete the long-overdue U.S. mid-tier consolidation, while ensuring that all future antitrust evaluations incorporate DoD’s clear and unequivocal commitment to driving technical innovation in key emerging markets. A large number of defense-unique subsystem markets--both defense-unique/non-R&D-intensive and defense-unique/R&D-intensive--still require extensive consolidation to create two-to-three Full Subsystem Capability suppliers, while sustaining critical “technical discriminators” and the ability to shed major pockets of excess capacity. While individual mergers & acquisitions must still be reviewed on a case-by-case basis, the DoD must work with Industry and Shareholders to develop consistent “Roadmaps” to guide

future market-driven consolidation in both defense-unique/R&D-intensive markets and defense-unique/non-R&D-intensive markets.

4. Expand use of multi-year contracts to at least one per major contractor, and at least three per Service, to attract true “value investors” since multi-year contracts substantially increase stock valuations due to investor perception of “controlled-risk.” While projected defense top-line growth may have a slightly greater increase in stock valuation, risk (or investor decrease in perceived risk) will have a substantially greater impact on stock valuation in the long term. This will enable contractors to consistently raise capital by issuance of stock or debt, regardless of whether the full amount of Procurement funds in the Future Years Defense Plan is actually achieved.

5. National Security Stakeholders must work hand-in-hand with Shareholders to restructure troubled “legacy” programs to develop clear “risk-to-reward” relationships while meeting the National Security Customer’s evolving requirements. At each phase of the acquisition cycle, key National Security Stakeholders at all levels have a very deep and abiding interest in controlling both program and performance risk as the program evolves from “Concept and Technology Development” to “Systems Development and Demonstration;” to “Engineering Manufacturing Development (EMD);” to “Low-Rate-Initial-Production” (LRIP); and then eventually to “Full-Rate Production” (FRP) if approved by DoD and then Congressionally-funded. Given the multitude of mergers over the past decade, many fundamental business

judgments and risk assumptions have dramatically changed from that of the original awardee-contractor and that of the original National Security Stakeholders. This is particularly true in light of the incremental outsourcing of program risk to contractors through various DoD Acquisition Reforms. In essence, when a healthy contractor acquires a less competitive contractor, he or she essentially inherits an inventory of healthy programs and subsystem capabilities, but usually also inherits at least one or more troubled “legacy” programs with major technical, schedule, and financial difficulties. It is critical that both the surviving contractor and National Security Customer develop mutually-beneficial solutions to recapture lost schedule and employ innovative concepts (e.g. accelerated technology refreshment on profitable basis, partial termination-for-convenience of then-obsolete portions of program, conversion to cost-type contract, etc.) to minimize overall cost impacts.

6. Mandate greater use of Public Law 85-804 to provide Extra-Ordinary Contractual Relief, particularly on programs where there is a compelling National Security benefit and the relief is non-monetary (e.g. allocation of sole source support of platform that is necessary for combat operations, etc.).

7. Move to a two-year appropriations cycle on both R&D and Procurement funding to stabilize programs, “lock in” savings to DoD, and create an environment of controlled-risk to value investors. This will enable defense contractors to raise front-end production capital by issuance of additional stock or securing financing at favorable rates.

While the U.S. Constitutional prohibition against standing armies requires that “Military Personnel” (MilPer) and “Operations & Maintenance” (O&M) funding be appropriated on an annual basis, Congress can readily move to a two-year appropriations cycle on both R&D and Procurement funding.

8. Encourage use of Capital Leases and Operating Leases for platforms, coupled with bundled Operations & Maintenance/Logistics Contracts, to enable Customers to legitimately leverage historic shortfalls in Procurement Accounts. There is no legal prohibition against DoD leasing of high-dollar assets such as tactical airlift, naval resupply and auxiliary ships, transport trucks, etc. However, Capital Leases (which are long-term and give DoD essentially all of the attributes of ownership) must be funded with Procurement funds, while shorter-term Operating Leases can be funded with O&M funding. DoD should focus on developing innovative leasing arrangements with responsive contractors, or even third-party leasing consortia where reasonable prices cannot be negotiated from the manufacturer, to leverage current-year Procurement and O&M funds on the eve of the expanded Phase II of the War-on-Terror. However, fiscal issues--such as prohibitions in the Anti-Deficiency Act, that place contractors under such leases at risk because both funding and indemnification are expressly “subject to availability of funds”--must be addressed. Additionally, contractual and personal injury/property liabilities must be negotiated (or insured) and bundled into a coherent package that generates long-term value for the Customer on a

Total-Cost-of-Ownership basis. Lastly, awarding bundled O&M contracts to the contractor, or to the third-party leasing consortium, will ensure that the assets are properly maintained so that they indeed have a resale or liquidation value at the end of the lease or in the event of early lease termination.

9. Award “Emergency Preparedness” contracts to sustain contingency/emergency capacity in those discrete areas where crisis/war could trigger need, such as bombers, armored vehicles, and shipyards. (See Appendix I).

10. Revise the Cost Principles in Federal Acquisition Regulations (FAR) Part 31 and other regulations to maximize the profitability of R&D, to ensure that it is as profitable in key defense-unique/R&D intensive areas as would have been the out-year production runs, due to the high-probability that such Full-Rate Production will not materialize.

11. Revise the Cost Principles of FAR Part 31 to finally allow for contractor recovery of various indirect costs that are an inherent part of any business, such as interest, recruitment/employee retention, goodwill from corporate acquisitions of other defense contractors, etc.

- (1) Increased procurement and modification of platforms with sensor/kill technologies and improved Command & Control that are immediately-deployable;
- (2) Accelerated acquisition of “high-demand/low-density” sensor/control platforms; and
- (3) Development of offensive “leap-ahead” technologies, such as directed-energy weapons, hybrid electric power supplies, and architectures to truly integrate the “digitized battlespace.”

It is clear that the rapid-deployment of such emerging technologies can significantly increase the lethality and combat capability of our Armed Forces in 2002-2010. The DoD must then drive technical innovations in lethality and combat capability by fostering aggressive competition between at least 2-3 committed contractors in each of those defense-unique/R&D intensive technologies.

Ultimately, that clear consensus between key National Security Stakeholders, Industry Management, and Shareholders to drive technical innovation in those key areas will directly save American lives on the battlefield.

Conclusion

To effectively destroy both immediate and mid-term terrorist threats, it is essential that both Congress and the Administration pursue the three recommended acquisition strategies of:

Appendix I

Recommended Programs For Increased Procurement And Modification Of “Rapidly-Deployable” Sensor/Kill Technologies And Improved Command & Control Capabilities.

1. Ships/Armor

- **DDG-51** (approx. \$810M each) (To add third ship in FY03 to sustain the surface combatant force at 116 ships. Allows for advanced procurement for third ship in FY03. Additionally, insertion of improved C4ISR facilities and improved Command & Control suites will enable DDG-51s to operate as independent Command & Control ships at remote “hot spots,” relieving some of the burden of CVN Battle Groups).
- **SSN ERO** (approx. \$200M) (Will increase force structure to 55 SSNs in FY04. Critical for undetected, long-loiter signals intelligence and time-sensitive tactical strike).
- **LPD** (approx. \$1.1B) (Restores program to 2 ships per year by adding second ship in FY03 to replace the obsolete and costly LPD 4 class ships. Provides forward presence and capabilities for expeditionary and special operations forces).
- **LHD** (approx. \$536M)(Moves FY04-FY06 tail to FY03 to immediately fully fund the replacement ships).
- **CG-47 Conversion Program** (approx \$456m) (To accelerate funding of field critical warfighting improvements to the Area Air Defense, and Force Protection capabilities of the CG-47 cruisers. Part of Single Integrated Air Picture and enabler of Sea-based Missile Defense).
- **Force Modernization** (\$2.440.7B)(Army) (Category presumably includes increasing procurement of sensors, digital communication, targeting, and Command & Control capabilities for Interim Brigade Combat Team and Objective Force).

2. Aircraft

- **FA-18E/F** (approx. \$600M) (Increase funding profile to 54 aircraft, and accelerate procurement to support the retirement of F-14 in FY06. Accelerate procurement of the next-generation of the Navy’s combined fighter/attack aircraft with updated suites of sensors, targeting, and communication equipment to provide combat bridge until full development, production, and fielding of the JSF).

Appendix I

Recommended Programs For Increased Procurement And Modification Of “Rapidly-Deployable” Sensor/Kill Technologies And Improved Command & Control Capabilities.

2. Aircraft (continued)

- **MH-60** (approx. \$88M) (Increase production to 4 MH-60S in FY03 and 5 MH-60S in FY04 to initiate replacement production of the costly H-46D. Provide the Navy with the platform to insert next-generation mine hunting equipment to defeat littoral anti-area denial strategies critical to next stage of campaign against terrorists).

Navy (other)

- **CV(N) FMP Shortfall** (\$24M) -- Allows for the upgrade of electrical distribution systems in four aircraft carriers to support future C4ISR, IT -21, and combat systems growth to enhance warfighting and survivability capabilities.
- **FA-18 C/D ECP 583 Shortfalls** (\$69M) -- Allows for electronics, and systems upgrades of USMC FA-18 to bridge to the JSF, including MIDs, color displays, TAMMAC, and AMU to ensure lethality and combat survivability.
- **F-18 C/D IDECM CMN EW** (\$39M) -- Allows for retrofitting IDECM radio-frequency warnings and countermeasures systems to F-18 C/Ds to ensure aircraft survivability and commonality with the F/A-18 E/F.
- **F/A-18 Radar Upgrade** (\$24M) -- Upgrading F/A-18C/D radars to the APG-73 radar for improved air-to-ground resolution and improved ground-strike capabilities.
- **F/A-18 Mod, ECP 580** (\$37M) -- Allows for upgraded Reserve F/A-18A precision guided munitions delivery capability to ensure capability equal to that existing in the active fleet.
- **NAVWAR GPS Anti-Jam Antenna** (\$unconfirmed at this time) -- Anti-Jam GPS antenna for the F/A-18, AV-8B, and EA-6B that allows for increasingly precise navigation, timing, and strike for aircraft operating in a jammed environment.
- **H-60 Link 16** (\$55M) -- Increased battlespace dominance/management by linking H-60 series helicopters with data links to Battle Groups.
- **P-3C BMUP Kits** (\$27) -- Achieves commonality with P-3C UD III Squadrons.
- **P-3C AIP Kits** (\$27M) -- Achieves commonality with P-3C UD III Squadrons.

Appendix I

Recommended Programs For Increased Procurement And Modification Of “Rapidly-Deployable” Sensor/Kill Technologies And Improved Command & Control Capabilities.

Navy (continued)

- **KC-130 APR-39 V2 Radar Warning Receivers** (\$2M) -- Procurement of radar warning receivers to augment the integrated survivability suites of the lift/mobility aircraft.
- **KC/C-130 ARC-210 Radios** (\$4M) -- Updated radio kits to meet the increased secure communication, navigation, surveillance requirements of lift/mobility aircraft assets.
- **AV-8B Litening Pod** (\$55M) -- Procurement of enhanced detection, tracking, and targeting pods for the AV-8B aircraft to aide in precision guidance and ordnance delivery capabilities.
- **AV-8B Laser Guided Bomb Integration** (\$2M) -- Allows deployment of the GBU-12 Precision guided weapons on AV-8B aircraft.
- **CH-53E APR-39A (V)2 Radar Warning Receiver** (\$20M) -- Funding for radar warning receivers to detect, identify, categorize threat radars and missile guidance systems to better protect these helicopters from air defense missiles.
- **NMCI** (\$67M) -- Funding for upgrade of legacy system of SIPRNET access and further development of system.
- **CDL-N (NFN Requirement)** (\$32M) -- Funding to upgrade and install AN/USQ-123A(V)2 common data link-Navy (CHBDL) systems in fleet flagships, LHDs, and LHAs to further the network centric advances in the fleet.
- **INMARSAT (IT21)** (\$13M) -- Improvements and Upgrades to Broadband Global Area Networks.
- **AA3-51C FLIR Kits for SH-60B** (\$7M) -- Upgrades FLIRS for helicopters.
- **SH-60B FCK/GAU -16 FLIR** (\$57M) -- Upgrades block 1 SH-60Bs with FLIR contingency kits and GAU-16.
- **AV-1B Self-Escort System** (\$11M) -- Upgraded system that provides beyond visual range capability to significantly enhance aircraft survivability.

Appendix I

Recommended Programs For Increased Procurement And Modification Of “Rapidly-Deployable” Sensor/Kill Technologies And Improved Command & Control Capabilities.

Navy (continued)

- **C-9/C-20 SATCOM Systems** (\$3M) -- Funding for 4 SATCOM units for C-9 and C-20 command aircraft, allowing for increased long-range Command & Control.
- **CH-46E Aircrew Procedures Trainer (APT)** (\$13M), **CH-53E Aircrew Procedures Trainer (APT)** (\$13M), **AH-1W Aircrew Procedures Trainer (APT)** (\$10M), **F/A-18 18D Aircrew Procedures Trainer (APT)** (\$18M) -- Aircrew trainers to allow for networked simulation training.
- **CV(N) CVN69 RCCH Upgrade** (\$57M) – Portion of funds to upgrade electronics, combat systems, and auxiliary systems.
- **Air Surveillance and Precision Approach Radar Control System (ASPARDS) Phase II** (\$10M) -- Phase II interoperability upgrade of expeditionary air traffic control system.
- **Sonobuoys** (\$140M) -- Additional purchases necessary to meet deployed readiness requirements.
- **HLS** (\$12M) -- Allows for increased force protection by procurement of optical sights and fire control units to upgrade existing 25MM MK38 gun systems (provides day and night sitting capability with laser guided ranging).

Air Force

- **Panoramic Night Vision Goggles (PNVGs)** (\$8.1M) -- Allows for accelerated procurement of 200 v. 55 PNVGs for AF Combat Search And Rescue (CSAR) teams.
- **Mobility Forces (MAF)/Combat Air Forces (CAF) Self-Protection** (\$124.1M) -- Crew Protection for Theater and Strategic Lift Capabilities (To protect mobility aircraft from small arms, anti-aircraft, and missile threats through armor and satellite communication for up-dated threat information). Additionally, satellite communications antennae for mobility/lift aircraft and advanced fighter antenna upgrades and aircraft self-defense packages (fighter electronics attack pods, towed decoys, advance infrared covert flares requested for self-protection from anti-aircraft systems).

Appendix I

Recommended Programs For Increased Procurement And Modification Of “Rapidly-Deployable” Sensor/Kill Technologies And Improved Command & Control Capabilities.

Air Force (continued)

- **Air Force National Security Emergency Preparedness Support and Site R/National Military Communications Systems (\$81.7M)** -- Provides off-Pentagon data storage and information access capability. Upgrades and expands the Defense Red Switch Network to allow for contingency exchanges of information between the National Military Command Center (NMCC) and alternate command centers.
- **Upgrade 5 Air & Space Operations Centers (AOCS) & North American Aerospace Defense (NORAD) Command & Control (\$57.2M)** -- Fully funds technology integration efforts for Combined Air Operations Center (CAOC-X) (AOC testbed for innovation and formal training), and upgrades 5 AOCS to the new Block 20 configurations. This new configuration will increase operational efficiency for homeland defense.
- **Distributed Common Ground System (DCGS) Tasking, Processing, Exploitation Dissemination (TPED) Expansion (\$100.4M)** -- Expands DCGS to fully support Global Hawk, Predator, & new national systems. Enables workstation allocation by task vice set, pre-defined functions.
- **Joint Task Force (JTF) Battlespace (\$101.2M)** -- Increases the availability of secure communications to joint and coalition warfighting units by expanding the SIPRNET infrastructure used to transmit sensitive and classified information (CONFIDENTIAL & SECRET).
- **Two-year acceleration of digital data link (Link-16) (\$144.9M)** -- (Link-16) Allow development of final solution for situational awareness data link gateway for Air National Guard (ANG) F-16s & A-10s for homeland defense and combat patrol missions. Additionally, will allow for the development of Link-16 for AFSOC aircraft to pass Time Critical Targeting information. Accelerates development/fielding of Joint Interface Control Officer Support system (JSS) 2 years early.
- **Critical Communications Support for Operations Noble Eagle (ONE) & Enduring Freedom (EF) (\$158.6M)** -- Airborne Communications Node and increased funding for AF network operations to protect against and provide situational awareness of network attacks, coordinate attack response, and recover from adverse network events. Also funds critical communication capabilities directly supporting the war effort.

Appendix I

Recommended Programs For Increased Procurement And Modification Of “Rapidly-Deployable” Sensor/Kill Technologies And Improved Command & Control Capabilities.

Air Force (continued)

- **U-2 Satellite Communications (SATCOM)** (\$32.8M) -- classified.
- **Operational Testing Critical Shortfalls** (\$27.1M) -- GPS upgrades request for improved guidance for mobility/lift and strike aircraft, smart munitions, missiles, Global Hawk, JSF, and Airborne Laser.
- **CSAR Upgrades** (\$81.2M) -- Accelerates follow-on search and rescue vehicle to upgrade situational awareness to transform CSAR to a command, control and communications (C3) intensive system, and upgrade weapons systems.
- **Civil Airspace Access (Global Access Navigation-Safety/Global Air Traffic Management) (GANS/GATM)** (\$161.4M) -- Funding allows equipping C-130s with TCAS, and KC-10, AWACS, JSTARS, and RC-135s with GATM. The C-130 TCAS funding procures Digital Transponders, and Traffic Alert Visual Speed Indicators (TA/VSI), KC-10 GATM modifications include software development, the Data Concentrator Unit (DCU), Versatile Integrated Avionics (VIA) to meet the mandatory worldwide airspace access and safety of flight by FY05 as civil airspace standards become more restrictive.
- **Space Warning & Surveillance Sustainment Shortfalls** (\$7.0M) -- Provides funds to continue modernization and sustainment of our only deep space optical sites that will prevent potential gaps in the space surveillance architecture. Bridges technology gap until replacement system in FY06 by replacing critical mission display units and ensuring that the only mobile trans/post attack platform remains operational.
- **Air Force Special Operations Command Depot Purchased Equipment Maintenance Engine/Aircraft Spares** (\$11.5M) -- Acceleration of engine maintenance of Special Operations aircraft due to extreme use in Operation Enduring Freedom.
- **Emerging Deficiencies Impacting Aircraft Mission Capable Rates** (\$163.3M) -- Emergency maintenance and technology insertions on three critical weapons systems to prevent grounding. (B-1B pivot shear replacement; B-2 coatings upgrade to replace “hot trailing edge damage”; F-15 - updating vertical stabilizers).

Appendix I

Recommended Programs For Increased Procurement And Modification Of “Rapidly-Deployable” Sensor/Kill Technologies And Improved Command & Control Capabilities.

Army

- **Suite of Integrated Infrared Countermeasures (SIIRC)** (Allows for the protection of vehicles and helicopters from infrared guided munitions) (\$22M each).
- **Suite of Radio Frequency Countermeasures (SRFCM)** (Allows for the protection of vehicles and helicopters from radio frequency guided munitions) (\$30M each).

- **Systems Upgrade** (\$815.8M) (Should include upgrade to enable the Army to decisively successfully fight the Nation’s wars through the U.S. Army Digitation Initiatives).

- **Information infrastructure** (\$565.7M) (While the Army-furnished information is imprecise, it is likely that significant candidates do reside within this generic category).

- **Combat Training Center modernization** (\$13.9M) (Critical to accelerated training requirements).

- **Ammunition**
 - Javelin/Longbow/Hellfire Rounds (\$47M) (Army)
 - Hellfire (\$105M) (Navy, UMC).
 - Extended-range capability for wind corrected munitions dispenser tail kits that allow warfighters to deliver cluster munitions from ranges outside point defenses. Increase stockpiles of sensor fused weapons to maintain readiness of AIM-9X missiles. (Air Force)
 - Other ammunition (\$270M) (Army).

APPENDIX II

Recommended List Of High Demand/Low Intensity Platforms, Which Should Be Acquired In Greater Quantities To Provide U.S. Forces The Decisive Advantage In The Battlefield.

- **Unmanned Aerial Vehicles (UAVs):** (To allow for unmanned reconnaissance and surveillance, C4ISR linking capability, and long-range hunter/killer capabilities).
 - Hunter and Shadow TUAV for Army/Marine Corps (at least \$20M each),
 - Global Hawk (at least \$10M each),
 - Accelerated production of interim armed UAVs (e.g., Predator (\$20M), and Accelerated UCAV-USAF/UCAV-Navy production).
- **Specialty C4ISR Aircraft** are playing an enormous role in current battles in Afganastian, and as such continue to be in high demand. (Currently provide the C4ISR linking capability within the individual and combined battlespace and jamming capacity). These include:
 - JSTARS (approx. \$250M each),
 - E-2C (approx. \$50M-\$60M each),
 - AWACS (approx. \$250M-\$300M each), as well as
 - EA-6B upgrades (Upgrades to center wing sections (\$40M), Band 9/10 \ Transmitters (approx. \$37M), Common Jammer (USQ-113) (\$35M), USQ-113(V)(3) USMC Jammer (\$2M)).
- **Existing aircraft:** Filling vital specialty roles in current and future combat, are also increasingly in demand, but require additional numbers, replacement, or upgrade. These aircraft perform specialized missions that have become increasingly vital to recent combat in Afghanistan, including refueling and airlift capabilities, and special operations Command & Control aircraft, gunships, and transportation assets. They include:
 - Air mobility/lift upgrades (Increased C-17s (\$230M each));
 - C-130 Mods and Upgrades;
 - EC-130E Commando Solo Aircraft (\$70M);
 - AC-130H/U Gunships (\$190M each); and
 - MH-53J/M Pave Low (\$40M).
- **UUV Technology Acceleration** (\$66M) -- Accelerates production of Unmanned Underwater Vehicles (UUV) to provide enhanced reconnaissance and environmental survey capabilities by extending the host platforms sensors off-hull.

APPENDIX II (continued)

**Recommended List Of High Demand/Low Intensity Platforms, Which Should Be Acquired
In Greater Quantities To Provide U.S. Forces The Decisive Advantage In The Battlefield.**

- **Accelerating KC-135 Replacement Aircraft to FY03 from FY05 (\$275M) --** Accelerates funding to replace this vital aircraft, that is also among the oldest among the fleet, to ensure air capability worldwide through in-flight refueling.

APPENDIX III

Recommended Programs For Systems And Architectures That Truly Integrate the “Digitalized Battlespace.”

These emerging technologies will include evolutionary weapons systems development such as:

- **Army Battle Labs** (\$25.9M) (Regardless of what the funds are specifically used for, battlelabs are important to experimentation and technological evaluation.
- **Army Science and Technology Funding** (\$37.9M) (Important to sustain momentum toward Army Objective Force).
- **DDX and CVX series** (Spiral development programs for the DDG-51 and CVN replacements. The DDX program will act as the development test-bed for other classes of surface combatants);
- **Airborne Laser Program** (Prototype airborne missile defense interceptor utilizing laser weapons. Will be the platform for leap-ahead developments in other laser applications such as ground and sea-based lasers);
- **Consolidated C4ISR Wide-bodied Aircraft** (clear preference for 767s if reasonable price can be obtained) (Next-generation C4ISR to supplement/replace JSTARS and AWACs. Provide next-generation C4ISR airborne platform to integrate battlefield information grid);
- **Minesweeping UAVs and Airships** (Using specialty aircraft and remote aircraft to ensure location and demolition of land and sea-based mines);
 - **Stealthy long-range UAVs** (UAVs for ultra-distance, deep target surveillance, reconnaissance, and bombing missions); and
 - **Hybrid-Electric Weapon Systems** (DoD’s development of new, high-energy-demand, electrical weapons will require a new class of hybrid-electric (HE) power system. Helmet-mounted displays and individual sensors and communications, require electric power. Must be lightweight, reliable and rechargeable from the HE vehicle. Several recent technology developments have demonstrated potential, including Army’s Solid State Heat Capacity Laser mounted on a hybrid-electric HMMWV; the Air Force’s High Power Microwave, also mounted on the HE HMMWV).