

## The US Defence Acquisition System

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*This paper makes an attempt to analyse and evaluate the US Department of Defence Acquisition System by highlighting the relationship of the requirements generation and budgeting process, the key actors, the major phases in an acquisition programme, and the major categories of acquisitions. It argues that the Department of Defence Acquisition System represents an ever evolving system-of-systems that attempts to translate Warfighter requirements into actual developed, purchased and fielded systems. While none of the key stakeholders seems particularly happy with its performance, it nevertheless incorporates a number of valuable practices that might be worthy of emulation. It states that recent reforms point to the importance of better cost estimation; high-level consolidated advisory expertise on cost estimation, developmental test & evaluation, and systems engineering; greater influence by combatant commanders; development of the professional acquisition workforce; and greater use of rapid acquisition.*

The US department of defence (DoD) has a “System of Systems” which interacts to identify, prioritise, budget, and manage procurement or weapons systems. The actual purchase of goods and services is defined as procurement, and is managed by the defence acquisition system proper. However, this system of procurement management, which will be discussed in detail below, must interact with two other macro systems, the Joint Capabilities Integration and Development (JCIDS) system which exists to identify and validate war fighter requirements, and the Planning, Programming, Budgeting and Execution (PPBE) which is used to request, prioritise and allocate financial resources.

This paper will attempt to help the reader understand the DoD acquisition system by highlighting the following: the relationship of the requirements generation and budgeting process, the key actors, the major phases in an acquisition programme, and the major categories of acquisitions. Then it will take a look at shortfalls in the system, the trajectory of reform, and aspects that may be of interest for emulation.

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## Relationship of the Acquisition System to JCIDS and PPBE

Before any weapon system can be developed or procured, it must have been identified as a validated joint requirement that requires a material solution, and it must be budgeted for. The DoD identifies its requirements through the JCIDS process, which, since 2003, uses a capabilities based approach, using a formal Capabilities Bases Assessment (CBA) to analyse military needs and gaps to recommend both material and non-material remedies. When a material solution is considered, an Initial Capabilities Document (ICD) is prepared as justification, and sent to the Joint Requirements Oversight Council (JROC) for approval / validation, and prioritisation. If the JROC approves pursuit of a material solution for the ICD, the programme enters the Defence Acquisition System.

The primary objective of the JCIDS process is to ensure the capabilities required by the joint warfighter to successfully execute the missions assigned to them are identified with their associated

operational performance criteria. This is done through an open process that provides the JROC the information they need to make decisions on required capabilities. The requirements process supports the acquisition process by providing validated capability needs and associated performance criteria to be used as a basis for acquiring the right weapon systems. Additionally, JCIDS provides the PPBE process with affordability advice supported by the capabilities-based assessment (CBA), and identifies capability gaps and potential material and non-material solutions.

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Financial resources must also be made available to develop and procure the system. The PPBE is intended to provide combatant commanders the best mix of forces, equipment, and support within fiscal constraints, and develops the proposed budget for all acquisitions. Services propose programme budgets in Programme Objective Memorandum (POM), and they are approved, disapproved, or

altered via the secretary of defence (SECDEF) Programme Budget Decisions (PBDs).

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## Understanding the Key Actors in DoD Acquisition

The key actors formally outside the acquisition process but directly affecting it is the Component or service deputy for plans and programmes who controls the annual budget request, and the Joint Requirement Oversight Council (JROC), which represents the user and approves the JCIDS documents required at various phases of the programme.

**Programme Manager (PM):** “Each acquisition programme, such as the F-22, Littoral Combat Ship, or Expeditionary Fighting Vehicle, is managed by an acquisition programme office. The programme office is headed by a programme manager (PM). PMs can be military officers or federal civil servants. They are usually supported by a staff that can include engineers, logisticians, contracting officers and specialists, budget and financial managers, and test and evaluation personnel. PMs usually report to a programme executive officer (PEO). PEOs can have many PMs who report to them. PEOs can be military officers or federal civil servants. They report to a component acquisition executive (CAE). Most CAEs report to the under secretary of defence for acquisition, technology and logistics (USD(AT&L)), who also serves as the defence acquisition executive (DAE).”<sup>1</sup>

**Defence Acquisition Board (DAB):** Headed by the USD (AT&L). The DAB advises the USD (AT&L) on critical acquisition decisions.

**Milestone Decision Authority (MDA):** That senior official authorised to make decisions to transition between major acquisition phases. The Component Acquisition Executive (CAE) is the MDA for ACAT IC, IAC, II, and III, and the USD (AT&L) for ACAT I, IA, ID.

**Director Programme Analysis and Evaluation (DPA&E):** The DPA&E provides guidance for analysis of alternatives and independent analysis to the MDA.

## Understanding the Major Phases of DoD Acquisitions

Procurements can fall anywhere along a spectrum of product maturity. If there has been a material development decision (MDD), the MDA may authorise entry into the acquisition management system at any point consistent with the phase specific criteria. For instance, if an item is a mature product, it might go directly to production; if it is not a mature product, but the technology is mature, it might enter the EMD phase. However, unlike many nations which may purchase the majority of their arms as developed products via the international arms market, the United States to maintain its technological edge, often must develop its own technology as part of the acquisition process, and the phases of acquisition assume this as the starting point. The DoD acquisition system is said to be “event based,” meaning that progress is determined based upon meeting certain criteria, of which most visible are called “milestones” which are used to oversee and manage

the acquisition programmes. DoD component cost estimates are required for all milestone reviews, and DoD has set up a cost analysis improvement group (CAIG) to conduct independent analysis for major defence acquisition programmes (MDAP).<sup>2</sup>

**Material Solution Analysis Phase:** This phase begins with an MDD and ends when the lead DoD Component (Air Force, Army, Navy, Marines) completes its analysis of alternatives (AoA) to satisfy the guidance given by the DPA&E. The DoD component supplies an initial capability document (ICD) that describes the needed capability, concept of operation, description of needed capability, operational risk, and basis for why a material solution (as opposed to other solutions such as a change in tactics) is required.

The AoA establishes metrics for military worth of each alternative based on a hierarchy of mission tasks, measures of effectiveness, and measures of performance (typically quantitative and often linked to Key Performance Parameters) from identified capability needs. Typically for combat systems, performance is evaluated based on system, then engagement, then mission, then campaign. The AoA also estimates total lifecycle or total ownership costs which are then combined with performance to provide cost-effectiveness comparisons which are depicted on a scatter plot. AoA is provided to DPA&E and service equivalent. DPA&E evaluates and provides an independent assessment of the AoA to the Service and MDA.<sup>3</sup>

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**To pass milestone A,** the lead component must submit a cost estimate for the solutions identified in the AoA, and the MDA must approve the material solution and technology development strategy.

**Milestone A Criteria:** The MDA must be able to certify that the programme fulfils an approved ICD, it is to be executed by an entity with a relevant core competency, and that resources required to develop with programme are consistent with the priority level assigned by the JROC. A favourable milestone A decision does not mean a new acquisition programme has been initiated. To pass milestone A, the lead component must submit a cost estimate for the solutions identified in the AoA, and the MDA must approve the material solution and technology development strategy.

**Technology Development Phase:** The purpose of this phase is to reduce the technology risk and mature the relevant set of technologies to the point of a

prototype. This phase begins with milestone A and ends when an affordable programme or increment of militarily useful capability has been identified; the technology and manufacturing processes have been assessed and demonstrated in a relevant environment, and the programme is ready for a milestone B decision. The guiding product in this phase is the technology development strategy (TDS). Typically, a preliminary design review (PDR) is conducted in this phase.

**Milestone B Criteria:** The MDA must be able to certify that the programme is affordable when considering the ability of the DoD to accomplish the programme mission using alternative systems; that the programme is affordable when considering the per unit cost and the total acquisition cost in the context of total resources available in the period covered in the future year defence programme (FYDP); that reasonable cost and schedule estimates have been developed to execute development and production; that funding is available to execute development and production; that the JROC has accomplished its duties including an analysis of the operational requirements of the programme; that technology in the programme has been demonstrated in a relevant environment; and that the programme demonstrates a high likelihood of accomplishing its intended mission. Typically a programme will not go to milestone B until a programme manager (PM) has been selected, requirements have been approved, and engineering and manufacturing development is ready to begin. At milestone B, the MDA determines the low-rate initial production (LRIP) quantity required for test and evaluation.

**Engineering and Manufacturing Development (EMD) Phase:** The purpose of the EMD phase is to develop a system or an increment of capability by completing full system integration, developing affordable and executable manufacturing processes, producibility, ensuring operational supportability and logistic footprint, and implementing human systems integration (HSI). The criteria for entry are technological maturity and full funding. The phase begins at milestone B, and terminates at a milestone C decision to commit to production and deployment or to end the effort. A capabilities description document (CDD) supplied by the DoD component provides key performance parameters. Once the MDA has approved the acquisition Strategy, final requests for proposal that commit the government can be released.

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**Milestone C Criteria:** This authorises entry into LRIP, production or procurement (if not requiring LRIP), or into limited deployment in support of operational testing. Criteria for this certification include funds available for properly phased and

rapid acquisition, and approved capability production document (CPD), no significant manufacturing risks, mature software, and acceptable performance in developmental test and evaluation and operational assessment via the OSD OTE&E oversight programmes.

**Production and Deployment Phase:** The purpose of this phase is to achieve an operational capability that satisfies mission needs. Effectiveness and suitability are determined by operational test and evaluation (OT&E). This phase begins with a milestone C decision.

**Full Rate of Production Decision:** A Full-Rate Production Decision Review or Full Deployment Decision Review depends on demonstrated control of the manufacturing process and acceptable reliability. The programme must complete OT&E and demonstrate adequate control over the manufacturing process. During this effort, units will typically attain an initial operational capability (IOC). Full operational capability (FOC) is achieved when the system is ready to operate as required.

**Operations and Support Phase:** The purpose of this phase is to execute a support programme that meets material readiness and operational support performance requirements in a cost effective manner over the total system life cycle. Entrance into this phase requires a successful full-rate production (FRP) decision, an approved CPD, and an approved life cycles support plan (LCSP).

## **Categorization**

In general, the DoD acquisition system is set up to provide increasing oversight and regulation for higher resource commitments.

**ACAT III:** This is the lowest category, which falls below the dollar criteria of ACAT II and is not a special interest programme. Typically executed by the DoD Component, with the CAE as the MDA.

**ACAT II:** If a programme cost exceeds \$140 million in Research Development Test & Evaluation (RDT&E) expenditure or \$660 million for procurement it is designated an ACAT II programme. Typically executed by the DoD Component, with the CAE as the MDA.

**ACAT I:** A programme is designated ACAT I if the programme cost exceeds \$365 million for RDT&E, or \$2.19 billion for procurement, where the rests with USD (AT&L). The most significant DoD and Congressional oversight activities apply to MDAPs categorised as ACAT I.

**ACAT IA:** Is a Major Automated Information System (MAIS) procurement that would require in excess of \$32 million in any single year; \$126 million for definition, design, development and deployment; or \$378 million for all costs to include

operations and maintenance through the end of the useful life of the system.

**ACAT IAC:** Is an ACAT IA programme that has been delegated to the Head of a DoD Component, the CAE.

**ACAT IC:** Is an ACAT I programme that has been delegated to the Head of a DoD Component, the CAE

**ACAT ID:** Is a programme that does not meet the cost-bar of ACAT I but is designated as a special interest by the MDA.

A programme, or a technology project that will result in a programme, has special interest if it has one or more of the following factors: technological complexity; Congressional interest; a large commitment of resources; the programme is critical to achievement of a capability or set of capabilities; the programme is part of a system of systems; or the programme is a joint programme. Generally, the level of funding, desired oversight and reporting will determine the MDA and whether or not the programme is designated a "Special Interest" programme. Programmes that already meet the dollar thresholds for an MDAP, Major System, or MAIS programme cannot also be designated Special Interest programmes."<sup>4</sup>

**MDAP:** All ACAT I, IC, or ID programmes are designated Major Defence Acquisition Programme or MDAPs.

Size, maturity, and complexity, however are not an indication of healthy function, and in fact there is great dissatisfaction with the performance of the US DoD acquisition system.

"For more than 100 years, the executive and legislative branch and Congress have been frustrated with the level of mismanagement and corruption in defence acquisitions, and spent significant resources seeking to reform and improve the process."<sup>5</sup>

"Problems are deeply entrenched and have developed over several decades," one study noted. "Too many of our weapons systems cost too much, take too long to develop, and, by the time they are fielded, incorporate obsolete technology." That was the troubling diagnosis of a blue-ribbon commission - in 1986. Yet despite repeated attempts at reform, including more than 130 commissions and studies, the core problems persist.<sup>6</sup>

"Simply put, the Department of Defence (DOD) acquisition process is broken. The ability of the Department to conduct the large scale acquisitions required to ensure our future national security is a concern of the committee. The rising costs and lengthening schedules of major defence acquisition programmes lead to more expensive platforms fielded in fewer numbers. The committee's concerns extend to all three key components of the Acquisition process including requirements

generation, acquisition and contracting, and financial management” (2007 House Armed Services Committee report).<sup>7</sup>

“The DOD’s processes for identifying warfighter needs, allocating resources, and developing and procuring weapon systems...are fragmented and broken” (GAO 2009 High Risk report)

Reforming how we buy: The conventional acquisition process is too long and too cumbersome to fit the needs of the many systems that require continuous changes and upgrades—a challenge that will become only more pressing over time. The department will improve how it matches requirements with mature technologies, maintains disciplined systems engineering approaches, institutionalises rapid acquisition capabilities, and implements more comprehensive testing. We must avoid sacrificing cost and schedule for promises of improved performance. Our efforts must also include reforming the U.S. export control system for the 21st century, and spurring continued improvements in the provision of rapid logistical support to our forces abroad.<sup>8</sup>

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A Reuters news article summarised the current state of affairs:

Nearly 70 percent of the Pentagon’s 96 major weapons-buying programmes were over budget in 2008 for combined cost growth of \$295 billion above original estimates, congressional auditors said in an annual report released on Monday... The total estimated development cost for 10 of the largest acquisition programmes, commanding about half the overall arms purchasing dollars in the portfolio, has shot up 32 percent from initial estimates, from about \$134 billion to more than \$177 billion...The two largest programmes -- Lockheed Martin Corp’s F-35 Joint Strike Fighter aircraft and the Boeing CO-led Future Combat Systems Army modernization – “still represent significant cost risk moving forward” and will dominate the portfolio for years...A total of 75 percent, or 69 programmes, reported increases in research and development costs and these were 42 percent above their original estimates in 2008, up from 40 percent above the year before. At the same time, the average delay in delivering weapons’ “initial operating capabilities” rose to 22 months from 21 months, the seventh annual survey of its kind showed.<sup>9</sup>

## **Reform Trajectory**

Schwarz reviews the major findings of six major reports addressing the DoD

acquisition system since 2000, and finds the following major themes:

- Recognise the importance of having military requirements, resource allocation, and acquisition processes work together throughout the acquisition process.
- Focus more attention on developing requirements and making sure that combatant commanders are more involved in the requirements generation for weapons systems.
- Implement specific reforms relating to the office of the USD(AT&L) such as elevating the role of the Director of Defence Research and Engineering (DDR&E) and requiring the USD(AT&L) to develop a multi-year business plan relating resources to mission purposes
- Implement acquisition “best practices” including (1) risk-based source selection; (2) time certain development; (3) a return to spiral development; (4) using judgment-based instead of requirement-based execution and; (5) expanding and rationalizing the use of rapid acquisition.
- Improve the defence acquisition workforce by (1) recruiting the best leaders and specialists from industry; (2) developing improved personnel developmental opportunities and establishing clear acquisitions career paths; (3) increasing the number of federal employees in critical skill areas; and (4) establishing a consistent definition of the acquisition workforce.
- Generally, transform the culture of DOD to recognize the importance of contracting.

GAO’s recommendations to improve the acquisition process have included:

- DOD’s processes for setting requirements, providing funding, and managing acquisitions do not work together, resulting in a disconnect between the programmes that are started and the funding that is available,
- DOD’s process for determining weapon system requirements (JCIDS) does not evaluate projects from a joint or department-wide perspective and does not have the flexibility to quickly respond to emerging warfighter needs,
- DOD’s process for funding programmes (PPBE) creates an unhealthy competition for funds that encourages sponsors of weapon system programmes to pursue overly ambitious capabilities and to underestimate costs, and
- DOD’s process for acquiring weapon systems allows acquisition programmes to proceed through key decision points without sufficiently

reliable information on funding, schedule, and technology upon which to make a sound decision.

As a result, there have been significant recent changes to the system, starting internally with DoD:

- DoD issued an updated DoD Instruction 5000.2 on December 8, 2008 which includes a mandatory requirement for competitive prototyping, greater emphasis on systems engineering and technical reviews, and a requirement that all programmes go through a Material Development Decision process before entering the acquisition system.
- DoD issued an updated Joint Capabilities Integration and Development System instruction (CJCSI 3170.01G) which streamlines the requirement validation process and expands the role of the joint capability board to review and endorse requirements before they are submitted to the JROC.
- DoD has taken steps to cancel or significantly curtail programmes that experience significant cost growth or can no longer be justified (ARH, VH-71, CSAR-X MKV, and components of the Army's Future Combat System)

Congress has also been active:

- FY2007 NDAA:
  - o Requires DoD to submit biannual reports (by January 1 and July 1) to Congress on the implementation of acquisition reform in DoD. DoD's reports have summarised its initiatives in six areas: workforce, acquisition, requirements, budget, industry and organisation, and have tracked some 55 specific recommendations identified in the above reports.
  - o For all developmental programme MDAPS, requires that the MDA select the contract type to be used for development and document the rationale for the decision
  - o Establishes a Strategic Material Protection Board
  - o Requires development of a strategy to enhance DoD PMs in developing and carrying out Defence Acquisition Programmes.
- FY2008 NDAA
  - o A prohibition on future contracts for the use of new Lead Systems Integrators for major systems

- o Requirement that the SECDEF include a section on military and civilian acquisition workforce as part of the Strategic Human Capital Plan
- o Establish a Defence Acquisition Workforce Development Fund to be used for recruitment, training and retention of acquisition personnel
- o Establishment of a Defence Materiel Readiness Board
- o Removal of private sector service requirement for an individual to be appointed to the USD (AT&L)
- o Appointment of three-star deputies to each military service's acquisition executive
- o Added USD (AT&L) and Director Programme Analysis and Evaluation (DPA&E) as advisors to the Joint Requirements Oversight Council (JROC).
- FY2009 NDAA included the following requirements:
  - o For the Secretary of Defence to commission a study to assess the effectiveness of the process used to generate urgent operational need requirements
  - o Establish Configuration Steering Boards designed to control cost and schedule growth for MDAPs
  - o Establish policies that ensure the acquisition workforce attracts quality officers and civilian personnel including establishment of a minimum number of billets reserved for general and flag officers in the acquisition workforce
  - o Establish a contingency contracting corps
  - o Development of guidance to ensure that urgent requirements submitted by operational commanders are expedited for review
  - o Requirement that each strategic human capital plan address the defence acquisition workforce

**The legislation was created to reform the way the Pentagon contracts and purchases major weapons systems, and “bring greater oversight and accountability to the earliest phases of major acquisition systems.”**

However, the most significant recent reform was the Weapon System Acquisition Reform Act signed into law on May 22, 2009 by President Barack Obama. The legislation was created to reform the way the Pentagon contracts and purchases major weapons systems, and “bring greater oversight and accountability to the earliest phases of major acquisition systems.”<sup>10</sup> Overall, it aims to place a larger focus on testing new weapons systems before they enter production to ensure technologies are sufficiently developed, and to give military commanders a bigger say in framing the requirements for new weapons.

Says the 2010 QDR:

To help in overcoming these challenges and to institutionalize ongoing innovations, President Obama signed the Weapon Systems Acquisition Reform Act (WSARA) into law on May 22, 2009. The goal of this important new statute is to improve acquisition outcomes in the Department, with specific emphasis on major defence acquisition programmes (MDAPs) and major automated information systems (MAISs). In signing the act, the President stated that the legislation is designed to “limit cost overruns before they spiral out of control. It will strengthen oversight and accountability by appointing officials who will be charged with closely monitoring the weapons systems that we’re purchasing to ensure that costs are controlled.” The law also will substantially improve the oversight of major weapons acquisition programmes, while helping to put MDAPs on a sound footing from the outset by addressing programme shortcomings in the early phases of the acquisition process. To achieve these goals and to improve how we acquire and field critical capabilities for today’s wars and tomorrow’s challenges, the Department is undertaking a far-reaching set of reforms.

Specifically, various provisions within the Weapon System Acquisition Reform Act of 2009:

- o Directed appointment of a director of cost assessment and programme evaluation within DoD to communicate directly with the secretary of defence and issue policies and establish guidance on cost estimating and confidence levels.
- o Directed appointment of a director of developmental test and evaluation to develop policies and guidance and who will be the principle advisor to the secretary of defence on developmental test and evaluation
- o Directed appointment of a director of systems engineering to develop policies and guidance, and monitor progress for each MDAP and be the principle advisor to the secretary of defence
- o Requires that the DDR&E periodically assess the technological maturity of MDAPs and annually report its findings to Congress

- o Requires the use of prototyping when practical
- o Creates a requirement that combatant commanders have more influence in the requirements generation process
- o Rescinds most recent milestone approval for any programme experiencing critical cost growth
- o Requires DoD to issue revised guidelines and tighten regulations governing conflicts of interest by contractors working on MDAPs.

As a result, says former Deputy Secretary of Defence William Lynn III, the DoD is “is aggressively pursuing major reforms of how we develop, test and field the weapons our troops need:

- (1) To ensure we have a strong work force with the skills necessary to manage major systems, we’re increasing our acquisitions work force by 20,000 positions, including new cost estimators, systems engineers and programme managers.
- (2) To reduce the risk that costs will spiral out of control - and as Congress and the president have directed - we will rely more on independent cost estimates at the start and bring more discipline to the entire acquisition process.
- (3) To better harness the creative and economic power of competition, we will have competing industry teams make prototypes of systems before choosing the best and most affordable ones to produce.
- (4) To prevent programmes from ballooning in cost and stretching in schedule, we will use more fixed-price development contracts. We will also institute new mechanisms to prevent endless “requirements creep” in which the desire for an ever-elusive perfect system can result in no system being delivered at all.”

### **Practices Worthy of Consideration**

While there is clearly significant dissatisfaction with the DoD acquisition system on behalf of its stakeholders, it nevertheless has aspects that deserve at least significant consideration and perhaps emulation.

What one can say positively about the US system is that it is systematic, and that those systems capture, or at least attempt to capture a number of important considerations.

For instance, the system has a strong relationship to joint requirements and

intelligence threat assessments, it has developed oversight by multiple actors both within the services and DoD as well as externally in the executive and legislative branches. It minimises the inefficiency of public enterprises by relying primarily on contractors and competition while providing special consideration to small, minority and traditionally disadvantaged businesses, and even foreign suppliers through the Foreign Comparative Testing (FCT) programme. Small businesses are particularly advantaged in research through the Small Business Innovative Research (SBIR) programme.

It has developed procedures to seek assistance of intelligence, counter-intelligence, security and anti-tamper programmes to protect the security of the programme.

It has sound procedures for encouraging competition, prototyping, making use of Commercial Off-the-Shelf (COTS) hardware, and for international programmes, as well as for estimating producibility or manufacturing readiness.

Even early in its development, the system seeks to comprehensively ensure the suitability of the procured item for the actual user Concept of Operations (CONOPS), and to be adequately planned for with respect to reliability, availability, and maintainability (RAM) performance risks, and the financial burden they would impose during operations and support. The system seeks avoid the narrow optimisation of just technical performance for the given capability without seeking to optimise the design in maintainability and reliability in the actual environment over the lifecycle of the system. The system requires development of a RAM plan as well as support and maintenance CONOPS that support operational CONOPS and that translate into “design-to” and “build-to” requirements.

Developed guides exist to highlight activities, methods and practice used to design minimal system maintenance requirements and associated costs and designed-in capabilities. These include such things as “intrinsic factors like modularity, interoperability, physical accessibility, minimum preventive maintenance (corrosion), embedded training and testing, HSI, prognosis and diagnosis capabilities for condition based maintenance (CBM), and management through universal RFIDs.”<sup>11</sup>

The system also attempts to be comprehensive with respect to the total lifecycle considerations of the system that might otherwise be ignored leading to problems and costs later on, including lifecycle costing, Health Hazard Analysis (HHA), cradle-to-grave management considerations for hazardous materials (HAZMAT), lifecycle plans for corrosion control, and compliance with regulations related to Environmental, Safety and Occupational Health (ESOH). It has highly developed procedures for dealing with intellectual property (IP), software and data procurement, use and adherence to existing standards (including interface standards), and an increasing emphasis on “green procurement” reducing energy waste and improving energy efficiency. There is an overt recognition that: “We

must continue incorporating geostrategic and operational energy considerations into force planning, requirements development, and acquisition processes,” including specific guidance to use the fully burdened cost of energy as a key consideration.

Another fairly recent, but very important addition worth emulation is a new emphasis HSI, addressing the needs of the system in a holistic manner from engineering to recruitment: “The programme manager shall apply HSI to optimise total system performance and minimise total ownership cost. It may be necessary for the programme manager to estimate long-term savings in manpower, personnel, training, or operations and support costs to justify potential increases in design and acquisition costs.”<sup>12</sup> Further:

The PM shall take steps (e.g., contract deliverables and Government/contractor IPT teams) to ensure ergonomics, human factors engineering, and cognitive engineering is employed during systems engineering over the life of the programme to provide for effective human machine interfaces and to meet HSI requirements. Where practicable and cost effective, system designs shall minimize or eliminate system characteristics that require excessive cognitive, physical, or sensory skills; entail extensive training or workload-intensive tasks; result in mission critical errors; or produce safety or health hazards.<sup>13</sup>

Finally, the system has recently been directed to make greater use of spiral / evolutionary development in order to field useful increments sooner, and to employ a “Modular Open Systems Approach (MOSA) to design for affordable change, evolutionary acquisition, and rapidly field affordable systems that are interoperable in the joint battle space.”<sup>14</sup>

## Conclusion

The DoD Acquisition System represents an ever evolving system-of-systems that attempts to translate Warfighter requirements into actual developed, purchased and fielded systems. While none of the key stakeholders seem particularly happy with its performance, it nevertheless incorporates a number of valuable practices that might be worthy of emulation. Recent reforms point to the importance to better cost estimation; high-level consolidated advisory expertise on cost estimation, developmental test and evaluation, and systems engineering; greater influence by combatant commanders; development of the professional acquisition workforce; and greater use of rapid acquisition.



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Notes:

1. Schwartz, Moshe, *Defence Acquisitions: How DOD Acquires Weapon Systems and Recent Effort to Reform the Process*, *Congressional Research Service (CRS) report*, Washington D.C., 10 July 2009, p. 7.
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5. Schwartz, Moshe, see note. 1, p. 13.
6. Lynn III, William J., "LYNN: Real Acquisition Reform, Spending in a Way that Better Helps Our Troops", available at <http://www.washingtontimes.com/news/2009/jun/04/real-acquisition-reform/>.
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11. See Note. 2, p. 380.
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