NPS-AM-05-005

ACQUISITION RESEARCH
WORKING PAPER SERIES

Cost As an Independent Variable (CAIV):

Front-End Approaches to Achieve Reduction in Total Ownership Cost

30 June 2005

by

Michael Boudreau, Senior Lecturer,

Graduate School of Business & Public Policy

Approved for public release, distribution unlimited.

Prepared for: Naval Postgraduate School, Monterey, California 93943

ACQUISITION RESEARCH
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY
NAVAL POSTGRADUATE SCHOOL

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
30 JUN 2005		**00-00-2005 to 00-00-2005**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Cost As an Independent Variable (CAIV): Front-End Approaches to Achieve Reduction in Total Ownership Cost	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Naval Postgraduate School,Graduate School of Business and Public Policy,555 Dyer Road, Room 332,Monterey,CA,93943**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT
see report

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**50**	

The research presented in this report was supported by the Acquisition Chair of the Graduate School of Business & Public Policy at the Naval Postgraduate School.

To request Defense Acquisition Research or to become a research sponsor, please contact:

NPS Acquisition Research Program
Attn: James B. Greene, RADM, USN, (Ret)
Acquisition Chair
Graduate School of Business and Public Policy
Naval Postgraduate School
555 Dyer Road, Room 332
Monterey, CA 93943-5103
Tel: (831) 656-2092
Fax: (831) 656-2253
e-mail: jbgreene@nps.edu

Copies of the Acquisition Sponsored Research Reports may be printed from our website www.nps.navy.mil/gsbpp/acqn/publications

ACQUISITION RESEARCH
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY
NAVAL POSTGRADUATE SCHOOL

About the Working Paper Series

This article is one in a series of papers addressing one or more issues of critical importance to the acquisition profession. A working paper is a forum to accomplish a variety of objectives, such as: (1) present a rough draft of a particular piece of acquisition research, (2) structure a "white paper" to present opinion or reasoning, (3) put down one's thoughts in a "think piece" for collegial review, (4) present a preliminary draft of an eventual article in an acquisition periodical, (5) provide a tutorial (such as a technical note) to accompany a case study, and (6) develop a dialogue among practitioners and researchers that encourages debate and discussion on topics of mutual importance. A working paper is generally the "internal" outlet for academic and research institutions to cultivate an idea, argument or hypothesis, particularly when in its infant stages. The primary intent is to induce critical thinking about crucial acquisition issues/problems that will become part of the acquisition professional body of knowledge.

It is expected that articles in the working paper series will eventually be published in other venues, such as in refereed journals and other periodicals, as technical reports, as chapters in a book, as cases or case studies, as monographs, or as a variety of other similar publications.

Readers are encouraged to provide both written and oral feedback to working-paper authors. Through rigorous discussion and discourse, it is anticipated that underlying assumptions, concepts, conventional wisdom, theories and principles will be challenged, examined and articulated.

Abstract

Cost As an Independent Variable (CAIV):
Front-End Approaches to Achieve Reduction in Total Ownership Cost

Michael W. Boudreau, Senior Lecturer
Graduate School of Business and Public Policy
Sponsor: Naval Sea Systems Command

OBJECTIVE: Analyze the underlying causes for poor Total Ownership Cost performance within weapon systems acquired through the DoD Acquisition Management System.

SUMMARY: Reduction in Total Ownership Costs (R-TOC) is the current initiative to manage costs over the entire life of a weapon system. Cost as an Independent Variable (CAIV) is the front-end focus of R-TOC. CAIV is the collection of practices, process, and tools by which system developers and other stakeholders control Lifecycle Costs (LCC). CAIV includes setting affordability goals, technical versus cost tradeoffs, cost and performance architectures that include production and sustainment costs, and a range of specific practices. Recent research into R-TOC suggests that CAIV efforts may not be taking full advantage of new JROC/JCIDS processes nor engendering full leadership support to reduce O&S costs. The Program Manager (PM) is responsible for developing and managing a TOC plan—with input from key stakeholders such as the sponsor and other users, the Joint Requirements Oversight Council (JROC), and DoD Component and OSD leadership. Early incentives to encourage focus on affordability, in conjunction with emphasis on warfighting capability, will be examined. This study will examine the critical issues associated with understanding and implementing CAIV and provide recommendations for PMs and other TOC stakeholders.

DoD KEY TECHNOLOGY AREAS: Acquisition Logistics; Cost as an Independent Variable, CAIV; Joint Capabilities Integration and Development System, JCIDS; Performance-Based Logistics, PBL; Reduction in Total Ownership Cost, R-TOC; System Acquisition; Total Ownership Cost, TOC.

KEYWORDS: Acquisition Logistics; Cost as an Independent Variable, CAIV; Joint Capabilities Integration and Development System, JCIDS; Lifecycle Cost, LCC; Performance-Based Logistics, PBL; Reduction in Total Ownership Cost, R-TOC; Total Ownership Cost, TOC; Weapon System Supportability.

Acknowledgements

Many thanks to RADM (Ret) Jim Greene who obtained sponsor funding for acquisition research and later provided very helpful insights to make the report more useful. Thanks, also, to Dr. Keith Snider who provided advice and encouragement along the way.

Finally, my thanks and appreciation to Ms. Karey Shaffer for her work in formatting this report, which has improved its organization, appearance, and readability.

About the Author

Michael W. Boudreau, Colonel, US Army (Ret), has been a senior lecturer at the Naval Postgraduate School since 1995. While an active-duty Army Officer, he was the Project Manager, Family of Medium Tactical Vehicles, 1992-1995. He commanded the Materiel Support Center, Korea, 1989-1991, and the Detroit Arsenal Tank Plant, 1982-1984. COL Boudreau is a graduate of the Industrial College of the Armed Forces; Defense Systems Management College; Army Command and General Staff College; Long Armour-Infantry Course, Royal Armoured Corps Centre, United Kingdom; and Ordnance Officer Basic and Advanced courses. He holds Bachelor of Mechanical Engineering and Master of Business Administration degrees from Santa Clara University, California.

NPS-AM-05-005

ACQUISITION RESEARCH
WORKING PAPER SERIES

Cost As an Independent Variable (CAIV):

Front-End Approaches to Achieve Reduction in Total Ownership Cost

30 June 2005

by

Michael Boudreau, Senior Lecturer,

Graduate School of Business & Public Policy

ACQUISITION RESEARCH
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY
NAVAL POSTGRADUATE SCHOOL

Intentionally Left Blank

Acronym List

AFTOC	Air Force Total Ownership Cost System (the Air Force's VAMOSC system)
APUC	Average Unit Procurement Cost
AoA	Analysis of Alternatives
CAIV	Cost As an Independent Variable
CDD	Capability Development Document
CJCS	Chairman, Joint Chiefs of Staff
CJCSI	Chairman, Joint Chiefs of Staff Instruction
CJCSM	Chairman, Joint Chiefs of Staff Manual
CNO	Chief of Naval Operations
CNO (N1)	Deputy Chief of Naval Operations for Manpower & Personnel
CNO (N4)	Deputy Chief of Naval Operations for Fleet Readiness & Logistics
DAG	Defense Acquisition Guidebook
DAU	Defense Acquisition University
DoD	Department of Defense
DoDI	Department of Defense Instruction
DOTMLPF	Doctrine, Organization, Training and Education, Materiel, Leadership, Personnel, and Facilities
GAO	Government Accountability Office (formerly, General Accounting Office)
ICD	Initial Capabilities Document
IDA	Institute for Defense Analysis
JCIDS	Joint Capabilities Integration and Development System
JCS	Joint Chiefs of Staff

JROC	Joint Requirements Oversight Council
KPP	Key Performance Parameter(s)
LCC	Lifecycle Cost
O&S	Operating and Support (cost)
ORD	Operational Requirements Document
OSD	Office of the Secretary of Defense
OSMIS	Operations and Support Management Information System (the Army's VAMOSC system)
PBL	Performance-Based Logistics
PDSS	Post Deployment Software Support
PM	Program Manager, Project Manager, or Product Manager
R-TOC	Reduction in Total Ownership Cost
SDC	Sample Data Collection
SIA	Special Interest Area
TOC	Total Ownership Cost
USD (A&T)	Under Secretary of Defense for Acquisition and Technology (replaced by USD (AT&L)—see below)
USD (AT&L)	Under Secretary of Defense for Acquisition, Technology and Logistics
VAMOSC	Visibility and Management of Operating and Support Costs data system
VECP	Value Engineering Change Proposal (submitted by contractors on Government contracts)

Executive Summary

During the latter half of the 1980s and throughout much of the 1990s, budget constraints were increasingly tight, resulting in Defense budget reductions (measured in constant dollars) that commenced in FY 1986 and extended through FY 1997—the only increase being FY 1991, corresponding to Operation Desert Storm. In an attempt to squeeze every penny from required resources, DoD leadership emphasized the necessity of controlling cost of new warfighting systems—not only the cost of development and production, but also the cost of sustainment. In 1995, Dr. Paul Kaminski, the Under Secretary of Defense for Acquisition and Technology (USD (A&T)), introduced the term "Cost As an Independent Variable (CAIV)" in recognition that resources were tight and that weapon system costs—lifecycle costs—would have to be managed and controlled through tradeoffs that occur during the developmental process.

As one who is familiar with policy change in the DoD might expect, decisive change did not result immediately. Nevertheless, a group of Pilot programs were identified within each DoD Component that would provide lessons for Reduction in Total Ownership Cost (R-TOC).

Furthermore, a relevant series of OSD and CJCS regulatory changes were published in 2003 and 2004 which were intended to support CAIV and contribute to R-TOC. It now seems time to gauge emerging changes. This research effort proceeds by seeking answers to the following questions.

- Has the DoD put into place policy and implemented guidance to support the practice CAIV in the acquisition of the DoD's warfighting systems?
- Has the DoD established the necessary processes and tools to monitor and control CAIV?
- Has the DoD leadership exhibited the resolve to control Total Ownership Costs (TOC) of its warfighting systems?

- In the meantime, has the focus on CAIV and Reduction in Total Ownership Cost somehow changed?

Using data available from a variety of DoD sources and interviews with expert DoD personnel, this paper highlights changes in policy, process, and practice aimed at reducing system lifecycle cost. The paper will point out new or remaining obstacles to the application of Cost As an Independent Variable (CAIV) and Reduction in Total Ownership Cost (R-TOC). The focus of this paper is the "front end" of the process—that is: during Concept Refinement, Technology Development, associated Joint Requirements Oversight Council (JROC) reviews, and acquisition Milestones A & B.

A. Has the DoD put into place policy and implementing guidance, to practice CAIV in the acquisition of DoD's warfighting systems?

The Under Secretary of Defense for Acquisition, Technology and Logistics (USD (AT&L)) published new acquisition policy and guidance, beginning on 12 May 2003 with DoD 5000.1, *The Defense Acquisition System*, and DoDI 5000.2, *Operating the Defense Acquisition System*. The companion *Defense Acquisition Guidebook*, containing discretionary best practices, was placed online in the fall of 2004.

The Chairman of the Joint Chiefs of Staff published two directives in June 2003—on capability development: CJCSI 3170.01C Instruction, *Joint Capabilities Integration and Development System (JCIDS)* and the accompanying CJCSM 3170.01 Manual, *Operation of the Joint Capabilities Integration and Development System*. The instruction and manual were updated on 12 March 2004, with publication of CJCSI 3170.01D and CJCSM 3170.01A.

In combination, these directives, together with the online Guidebook, address the requirement for affordability assessments (in terms of modernization funding, i.e., RDT&E and procurement, and manpower) and consideration of total ownership cost (TOC) or system lifecycle cost (LCC) during Concept Refinement, Technology Development. Lifecycle cost is related to such activities as preparing the Initial Capabilities Document (ICD); conducting the Analysis of Alternatives (AOA); writing the

Capability Development Document (CDD); and progressing through JCIDS/JROC reviews, the Concept Decision, and Milestones A & B. Collectively, these regulations influence the work of sponsors, users, developers, staff overseers, leaders, and decision-makers.

Although there are numerous references and requirements focused on cost, neither the DoD 5000 series nor the CJSC 3170 series require that lifecycle cost targets or lifecycle cost key performance parameters must be established for newly emerging systems.

B. Has the DoD established the processes and tools to monitor and control CAIV?

The R-TOC Pilots—The R-TOC Pilot programs have yielded numerous processes that are useful to control lifecycle cost. Many lessons have been reported from this effort, which began in October 1999. Additionally, the need for improved cost databases and cost estimating tools has resulted in initiatives in each of the DoD Components and with defense contractors. Unfortunately, the R-TOC pilots currently do not include any programs that are early in their developmental cycle: that is, prior to Milestone B. There are obvious, prominent choices that could be selected as CAIV pilot programs in each of the DoD Components that might yield valuable lessons-learned for the acquisition community. Without designated CAIV pilot programs, the DoD may fail to capture these important lessons. This could leave unresolved whether or not current directives and processes are sufficient to guide the pre-acquisition and early development of new warfighting systems.

C. Has the DoD leadership exhibited the resolve to control Total Ownership Costs of its warfighting systems?

In general, there is considerable pressure on programs to prepare early cost information. In some instances, the pressure has been intensified through the use of Key Performance Parameters (KPP) written by the sponsors or users into requirements (ORD) or capability documents (CDD). Additionally, there is indication of at least one program specifying early cost targets in its acquisition strategy document.

JROC emphasis on TOC—The JROC has the latitude to question cost or affordability, but the role of the JROC is reportedly more focused on other issues (such as interoperability and joint use) than on cost. The JROC's lack of emphasis on affordability seems to be an opportunity lost; users might be more strongly encouraged to take an active interest in setting ownership cost targets.

Milestone Decision Authority emphasis on Cost—For various reasons, acquisition milestone decision points may offer a better opportunity than the JROC process to address and influence warfighting system lifecycle cost. Much of the pressure on cost comes from mandatory independent cost estimates (ICE) that precede milestone reviews.

DoD Component leaders (within and outside acquisition) seem reluctant to demand lifecycle *cost targets* prior to system development, possibly out of concern that incorrectly specified cost targets could increase program risk from "outside." No doubt, such an error in estimated cost could result in unfavorable attention to a critically needed warfighting system, and might even lead to its termination.

DoD Component leaders also may lack confidence in lifecycle cost estimates until systems have been sufficiently tested and are poised for production and fielding. There is a balance that needs careful handling. The earlier developers can set realistic cost targets, the better the cost control—earlier is better. On the other hand, poorly chosen cost targets might provide a program obstacle that delays or even topples the program.

D. In the meantime, has the focus on CAIV and Reduction in Total Ownership Cost somehow changed?

Sec. 811. Rapid Acquisition Authority to Respond to Combat Emergencies—This law provides relief from applicable law and regulation in acquiring critical materiel where combat fatalities have occurred. In a *wartime* environment, when US Armed Forces personnel are operating in harm's way, TOC necessarily should become secondary to safety and survivability. An obvious example, up-armoring HMMWVs and other trucks

in Iraq, illustrates the point. A likely outcome of up-armoring vehicles, albeit one that seems to attract little notice, is the significant wear and tear on other vehicle components, which will directly result in increased system lifecycle cost.

Other Changes in Focus—Two other major acquisition initiatives may increase pressure on TOC and possibly compete against CAIV during the "front-end" analysis of an emerging warfighting system. The first is spiral development, which almost assuredly adds to logistics burden (that is, O&S cost). The other is the possibility of errors in analysis during the Performance-Based Logistics (PBL) determination—resulting in outsourced logistics that are virtually locked-in, but which, in certain scenarios, may become more expensive than alternative approaches. Both spiral development and PBL have potential effects on TOC that need further study.

Fact-of-Life Growth in Post Deployment Software Support (PDSS)— Although this may not be a change in focus, essential change has gradually shaded the picture of system lifecycle cost. That is, the miracles wrought by software do not come without an increase in logistics cost. PDSS costs are expensive and must be anticipated in system lifecycle cost estimates.

I. Background

During the latter half of the 1980s and throughout much of the 1990s, budget constraints were increasingly tight, resulting in Defense budget reductions (measured in constant dollars) that commenced in FY 1986 and extended through FY 1997—the only increase being FY 1991, corresponding to Operation Desert Storm.[1] In an attempt to squeeze every penny from required resources, DoD leaders emphasized the necessity of controlling cost of new warfighting systems—not only the cost of development and production, but also the cost of sustainment. In 1995, Dr. Paul Kaminski, the Under Secretary of Defense for Acquisition and Technology (USD (A&T)), introduced the term "Cost As an Independent Variable (CAIV)" in recognition that resources were tight and that weapon system costs—lifecycle costs—would have to be managed and controlled through tradeoffs that occur during the developmental process.[2]

Over several years, the United States General Accounting Office (now renamed the Government Accountability Office (GAO)) reported private sector best practices for controlling costs and pointedly compared DoD acquisitions against private-sector best practices. In response to GAO suggestions for improvement, the DoD said the improvements would be forthcoming with the publication of new policy guidance. The new policy directives were published, beginning in May 2003. The final piece—the Defense Acquisition Guidebook that recommends process and practice—was placed online in the fall of 2004. Now it is possible to address the operative question: Has the DoD put into place policy and implementing guidance to practice CAIV during the development and acquisition of the DoD's warfighting systems? Likewise, has the DoD established the necessary processes and tools to monitor and control CAIV? Additionally, has the DoD leadership exhibited the resolve to control Total Ownership

---

[1] Congressional Budget Office, *Long Term Implications of Current Defense Plans: Detailed Update for FY 2005*, September 2004, Figure 1-1, 2.

[2] Paul Kaminski, Office of the Secretary of Defense, *Untitled Memorandum to the Secretaries of the Military Departments, et al*., 4 December 1995.

Costs or lifecycle costs of its warfighting systems? In the meantime, has the focus on CAIV and Reduction in Total Ownership Cost somehow changed?

Using data available from a variety of DoD sources and interviews with expert DoD personnel, this paper highlights changes in policy, process, and practice aimed at reducing system lifecycle cost. The paper will point out new or remaining obstacles to the application of Cost As an Independent Variable (CAIV) and Reduction in Total Ownership Cost (R-TOC).

The focus of this paper is the "front end" of the lifecycle process. As defined by the researcher, "front end" refers to Concept Refinement, Technology Development, associated Joint Requirements Oversight Council (JROC) reviews, and acquisition Milestones A & B. The importance of the "front end" (that is, those activities that occur prior to Milestone B) may be easily understood from the notional diagram at Figure 1, below. Activities such as the Analysis of Alternatives, selection of the Preferred System Concept, writing of the Capability Development Document, and conducting technology demonstrations all occur at the "front end," prior to Milestone B; collectively, these activities set the course for system development and effectively lock in a high percentage of the lifecycle cost of the future warfighting system. Milestone B is the point at which the decision authority approves entry into System Development & Demonstration; this signals the beginning of the detailed design effort.

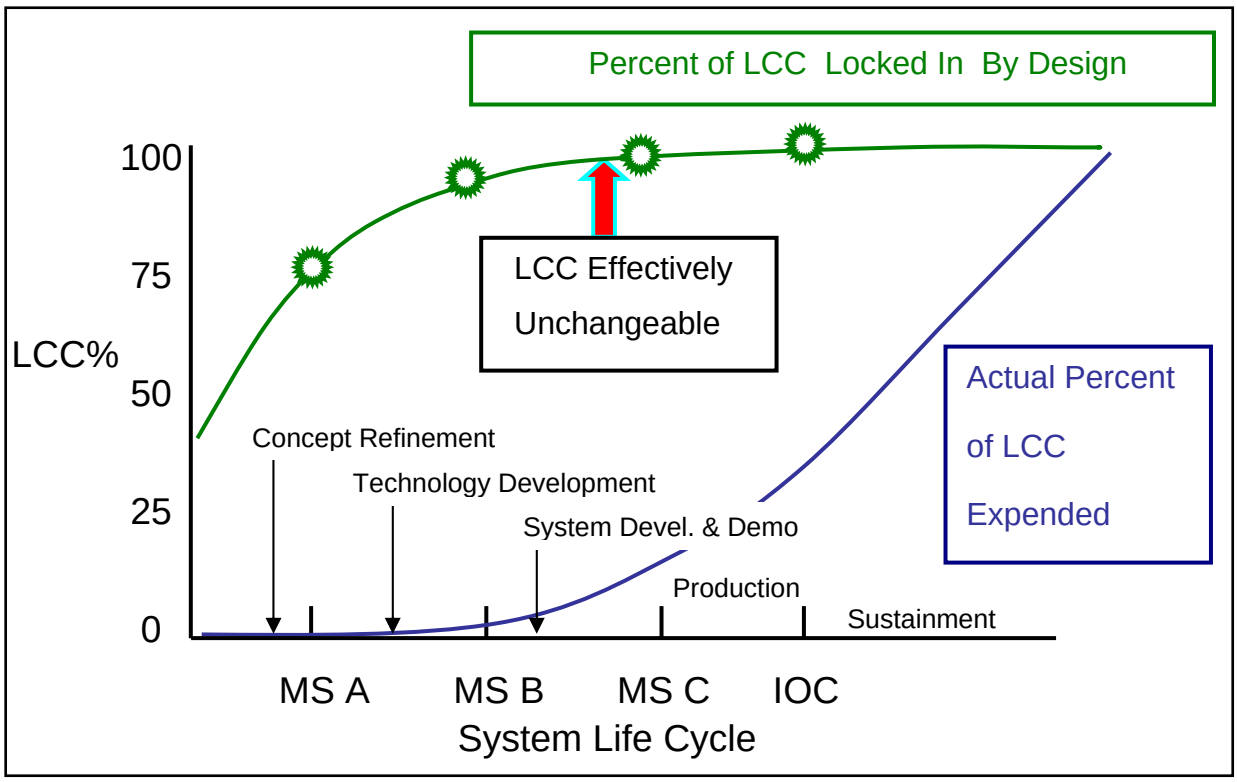

Figure 1. Percent of LCC Locked in by the Design Decisions[3]

II. Scope

The scope of this research effort is, first, to review OSD directives, identify specific CAIV guidance, and weigh whether that guidance is up to the task of implementing CAIV in the development of warfighting systems.

Second, this research will include interviews of knowledgeable personnel who might offer insights into programs that have recently completed their Milestone B Decision Points. It is worth examining whether leadership pressure is being brought to bear in reducing ownership cost around this point of development, because the period when warfighting systems are in pre-acquisition, progressing through various reviews,

[3] Modified from schematic use in Naval Postgraduate School course MN3331, Principles of Acquisition and Program Management.

and in early System Development is recognized as providing a unique opportunity to affect system lifecycle cost.

Third, this research will examine whether existing cost databases and estimating tools contribute to setting realistic CAIV goals and, then, tracking performance in pursuit of those goals.

Definitions

Definitions of Total Ownership Cost (TOC), Cost as an Independent Variable (CAIV), and Reduction in Total Ownership Cost (R-TOC) provide a foundation on which to have a discussion of the "front-end" processes that are used to control the lifecycle cost of warfighting systems.

TOC: The following definition of TOC is deliberately written from the vantage point of the program manager of the warfighting system:

> Defense Systems TOC is defined as Lifecycle Cost (LCC). LCC (per DoD 5000.4M) includes not only acquisition program direct costs, but also the indirect costs attributable to the acquisition program (i.e., costs that would not occur if the program did not exist). For example, indirect costs would include the infrastructure that plans, manages, and executes a program over its full life and common support items and systems. The responsibility of program managers in support of reducing DoD TOC is the continuous reduction of LCC for their systems.[4]

CAIV: Cost As an Independent Variable (CAIV) addresses Total Ownership Cost during the warfighting system's pre-acquisition and developmental phases, beginning with Concept Refinement. The focus of CAIV is to establish cost targets based on affordability and required capabilities and then to manage to those targets, thereby controlling TOC. CAIV includes consideration of costs for development, production, operations and support, and disposal. An example of the CAIV process would be to set

[4] Jacques S. Gansler, Office of the Secretary of Defense, *Memorandum: Definition of Total Ownership Cost (TOC), Life Cycle Cost, and the Responsibilities of Program Managers,* 13 November 1998.

specific cost and reliability targets for each subsystem or component of a weapon system in development, such that the warfighting system would be able to achieve its required operational availability (A_O) at the specified cost.

R-TOC: The second approach to TOC is the Reduction in Total Ownership Cost (R-TOC). This focuses on the reduction of average procurement unit cost (APUC) and weapon-system sustainment cost—that is, operating & support (O&S) costs. R-TOC is employed as the warfighting system is produced and placed in service. Examples of R-TOC would be a value engineering change proposal (VECP) to reduce the cost of manufacturing a component by improving the process yield (the percentage the manufactured items that are defect-free) or a VECP to reduce the operating and support cost by improving the reliability of an expensive subsystem or component. Often, there are secondary benefits of enhanced performance (e.g., improved operational availability), but the forcing function is the reduction of operating and support costs—the largest constituent of TOC.

This paper will focus on the "front end" of TOC, and will address CAIV primarily. CAIV should begin to take shape during pre-acquisition—that is, during the Concept Refinement and Technology Development phases, when the user and/or sponsor are shaping the direction of the future program. During this period, much attention is aimed at stating required capabilities, which the eventual warfighting system must deliver. Decisions made during the pre-acquisition phases will determine much of the eventual system costs, including operating and support costs, most of which will not actually be incurred until years later.

Affordability: Affordability is system Total Ownership Cost (or, system lifecycle cost) against a backdrop of available resources. A current DoD definition is "the degree to which the lifecycle cost of an acquisition program is in consonance with the long-

range modernization, force structure, and manpower plans of the individual DoD Components, as well as for the Department as a whole."[5]

III. Methodology

Literature Research

This technical paper includes literature research. Data collected through a literature review is arranged and analyzed.

OSD and CJCS Regulatory Guidance. There is a body of mandatory and discretionary guidance published by the Office of the Secretary of Defense Chairman of the Joint Chiefs of Staff and by the DoD Components. Much of this material is on the AT&L Knowledge Sharing System website maintained by the Defense Acquisition University (DAU) for the Under Secretary of Defense (Acquisition, Technology and Logistics), USD (AT&L).[6] The site provides current web-based materials on TOC and CAIV.

Published Materials: Books, Journals, Periodicals, Government Documents, Reports, Best Practices, Theses, Studies, Speeches, and Briefs. Much has been written on the subjects of lifecycle cost (LCC), total ownership cost, cost as an independent variable (CAIV), reduction in total ownership cost (R-TOC), average procurement unit costs (APUC), and operating and support costs (O&S). There are numerous reports on Flagship Programs and Pilot Programs that are, or were, experimenting in cost-reduction methodologies. Students at the Naval Postgraduate School have accomplished considerable research and published numerous Master's theses related to management of total ownership cost. The Government Accountability

[5] DoD, *Defense Acquisition Guidebook,* 17 October 2004, Chapter 3, part 3.2; available from http://deskbook.dau.mil/jsp/default.jsp.

[6] see http://deskbook.dau.mil/jsp/default.jsp.

Office (GAO) (previously the General Accounting Office) has published significant work comparing the DoD system acquisition to commercial best practices.

The Defense Acquisition University has developed educational materials on Total Ownership Cost (TOC) and Cost As an Independent Variable (CAIV) best practices and has placed significant materials online. The Total Ownership Cost "Special Interest Area (SIA)" site may be reached from the "AT&L Knowledge Sharing System" website.

In addition to the DAU websites, the Institute for Defense Analysis (IDA) maintains an informative website, "Reduction of Total Ownership Costs," that comprises a collection of the lessons-learned and best practices garnered from the R-TOC Pilot programs.[7]

Expert Interviews

Published guidance and useable tools may be found to a large extent, as described above. The third question, however, relates to the will and determination of the DoD leadership in applying and emphasizing CAIV and other up-front efforts to reduce lifecycle cost; therefore, it requires discussion with practitioners and others who are positioned to see the acquisition process in action. This requires interviews, the scope of which will not catalyze a high degree of statistical confidence, but will provide a sense of the direction of DoD leadership on matters of lifecycle cost.

[7] see http://rtoc.ida.org/rtoc/rtoc.html.

IV. Data and Analysis

Data and analysis are arranged in the order that the questions were posed in the Section I, Background, above.

A. Has the DoD put into place policy and implementing guidance to practice CAIV in the acquisition of the DoD's warfighting systems?

Published Policy and Guidance

New policy on acquisition was published on 12 May 2003: DoD 5000.1, *The Defense Acquisition System* and DoDI 5000.2, *Operating the Defense Acquisition System*.

A month later, in June 2003, capability development was described in CJCSI 3170.01C Instruction, *Joint Capabilities Integration and Development System (JCIDS)* and the accompanying CJCSM 3170.01 Manual, *Operation of the Joint Capabilities Integration and Development System*. The instruction and manual were updated on 12 March 2004, with publication of CJCSI 3170.01D and CJCSM 3170.01A.

During the fall of 2004, the Defense Acquisition Guidebook (DAG) was put online; the Guidebook recommends processes and practices that support both the DoD 5000 series and the CJCS 3170 series directives. Together, these recent OSD and CJCS documents and the online Guidebook's best practices provide policy and process guidance for preparation of user-required capabilities (CJCS 3170 series), along with acquisition policy and practice (DoD 5000 series).

DoD 5000 series direction related to ownership cost is prominent in DoDI 5000.2. Addressing pre-acquisition activity, this document directs that multiple approaches be examined with robust analysis that considers *affordability* along with technology maturity and responsiveness.[8] In a later paragraph, it mandates that the user and developer

[8] DoD Instruction, *Operation of the Defense Acquisition System*, May 2003, DoDI 5000.2, paragraph 3.4.1, 4.

must *agree that the solution is affordable*.[9] This document establishes that an *affordable increment of militarily useful capability* must be identified as a condition for exiting the Technology Development phase.[10] Finally, it stipulates that *cost* be addressed in the Capability Development Document, using *lifecycle cost or TOC, if available*.[11] Mandatory program documentation includes an *Affordability Assessment* at both Milestone B and Milestone C.[12]

The various references to cost and affordability do not require that lifecycle cost targets be established during pre-acquisition. It would seem prudent to amend DoD 5000.2 to require establishment of LCC targets at the system level and encourage establishment of LCC targets down to sub-system and component levels.

Affordability Assessment—Affordability was defined in the Defense Acquisition Guidebook as "the degree to which the Lifecycle cost of an acquisition program is in consonance with the long-range modernization, force structure, and manpower plans of the individual DoD Components, as well as for the Department as a whole."[13] This guidance seems a relevant and useful approach, starting from the perspective of the funding for a warfighting system within its particular mission area and expanding outward to show the programmatic effects in concentric rings—first, comparing a program's modernization cost and manpower with other programs in the specific mission area; then, comparing competing mission areas; and, finally, illustrating the modernization and manpower impact at the DoD Component level—such that the Milestone Decision Authority can see where the system modernization funding and manpower must come from and can verify that the system is fully-funded over a time horizon that stretches out about 20 years. The three sample charts on affordability in

[9] Ibid., paragraph 3.6.5, 6.

[10] Ibid., paragraph 3.6.7, 6.

[11] Ibid., paragraph 3.7.2.6, 8.

[12] Ibid., Enclosure 3, 21.

[13] DoD, *DAG*, part 3.2.

the Defense Acquisition Guidebook are extracted and shown below. As informative as this approach is, the depictions in the Defense Acquisition Guidebook focus very pointedly on *modernization* funding and *manpower* requirements;[14] the Guidebook approach does not include other O&S costs (beyond the manpower portion). Affordability assessment (as described in the Guidebook) fails to show the increasing effects of the operating and support portion of lifecycle cost; these increases occur particularly as sustainment costs build up due to the increasing quantities of warfighting systems entering service and as the fielded systems age and begin to require more costly support.

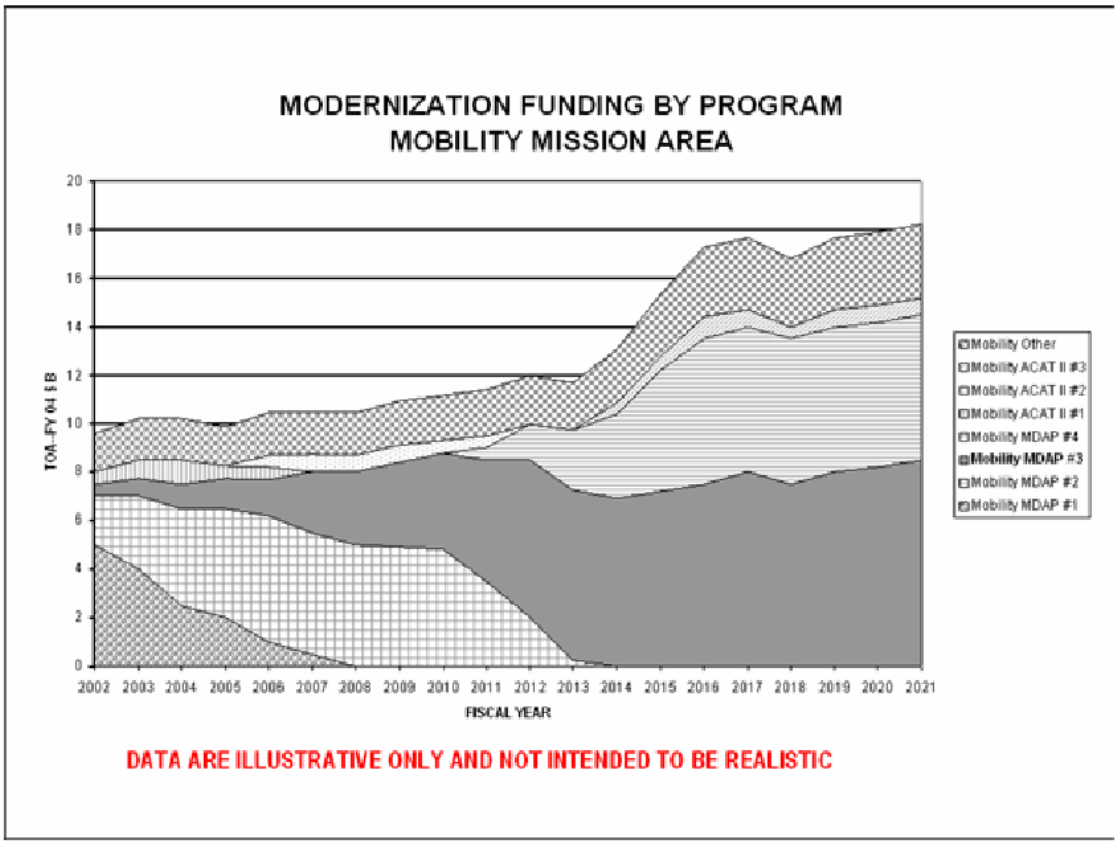

Figure 3.2.2.1. Sample Chart of Funding Streams by Program[15]

[14] Ibid., part 3.2.2.

[15] Ibid.

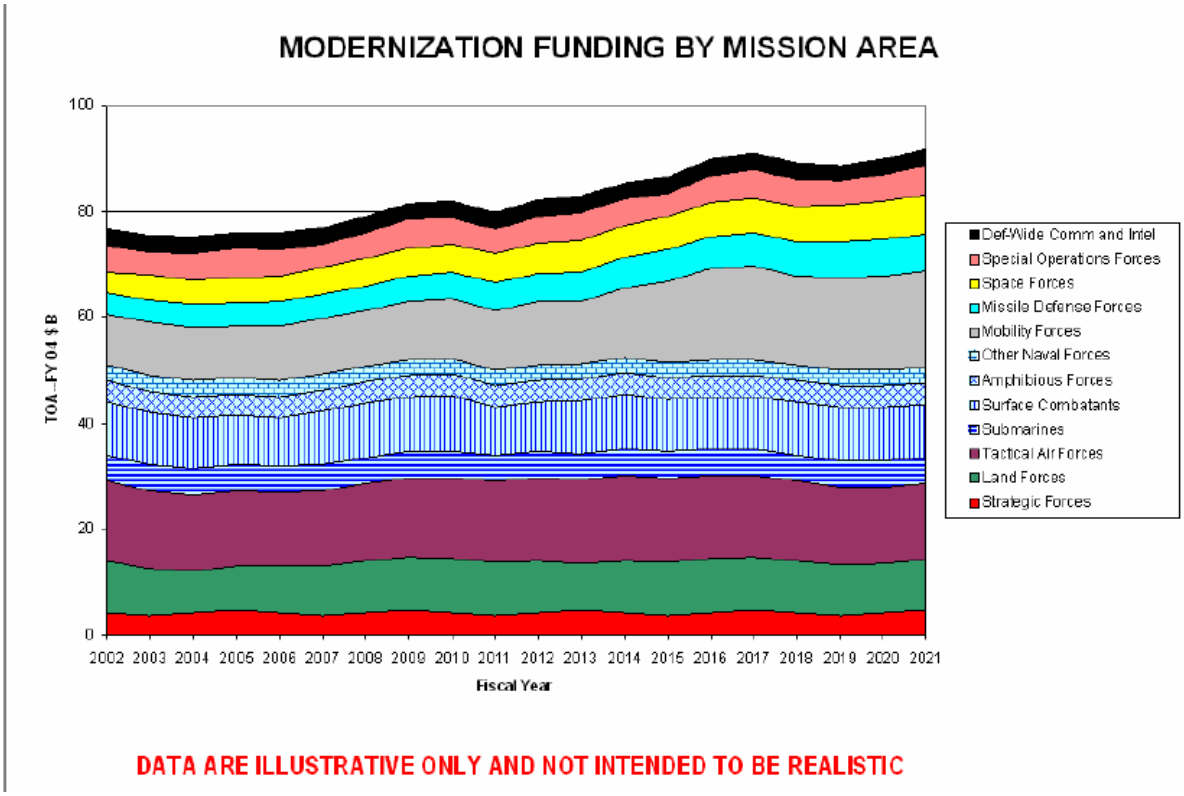

Figure 3.2.2.2. Sample Chart of Funding Streams by Mission Area[16]

[16] Ibid.

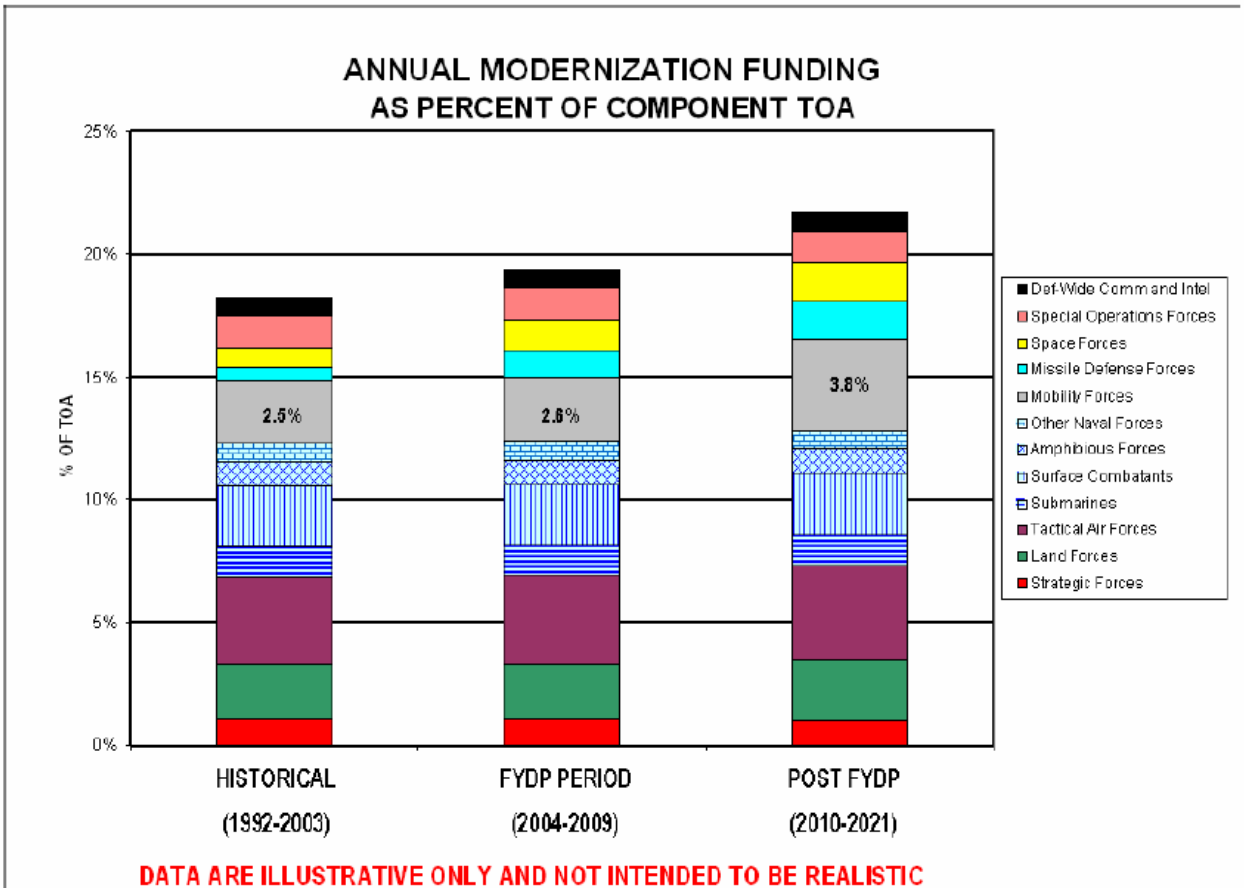

Figure 3.2.2.3. Sample Annual Modernization Funding[17]

The follow-on section of the Guidebook addresses the longstanding DoD policy of *full funding* of acquisition programs. Further, it defines full funding as including the dollars and manpower needed for all current and future efforts to carry out acquisition *and support* strategies.[18] In support of full funding, amendment to the Guidebook section on affordability assessment would be prudent in order to depict the estimated full lifecycle cost of the warfighting system, including the *O&S portion*. Affordability assessment could be made into a useful tool for understanding full funding, if expanded

[17] Ibid.

[18] DoD, *DAG*, part 3.2.3

to address the complete lifecycle cost, instead of being limited to modernization funding and manpower.

Capability Development Document—User and/or Sponsor decisions are part of the JCIDS process addressed in the CJCS 3170 series directives; User/sponsor decisions are described in several user-prepared documents, among them being the Capability Development Document (CDD). The CDD articulates the required capabilities at such time as the developmental effort is turned over to the acquisition community to be executed. A small number of the required capabilities described in the CDD may be designated by users/sponsors as Key Performance Parameters, KPP.

KPP are those minimum attributes or characteristics considered most essential for an effective military capability; KPP are included verbatim in the Acquisition Program Baseline.[19] KPP are of such importance that: "failure to meet a CDD KPP threshold can be cause for reevaluation of the system selection, reassessment or termination of the program."[20]

Key Performance Parameters (KPP) Describing Cost—CJCSM 3170.01M, *Operation of JCIDS*, considers total ownership cost or lifecycle cost (including O&S, which is the sustainment portion of TOC and LCC) as a possible KPP in the following discussion of affordability:

> 15. Program Affordability. The affordability determination is made as part of the cost assessment in the JCIDS analysis. Cost will be included in the CDD [Capability Development Document] as lifecycle cost or, if available, total ownership cost. The cost will include all associated system(s) DOTMLPF* costs. Inclusion of cost allows the sponsor to emphasize affordability in the proposed program. In addition, the discussion on

---

[19] CJCS Instruction, *Joint Capabilities Integration and Development System*, 12 March 2004, CJSCI 3170.01D, GL-9.

[20] CJCS Manual, *Operation of the Joint Capabilities Integration and Development System*, 12 March 2004, CJCSM 3170.01A, E-5.

* DOTMLPF acronym refers to doctrine, organization, training and education, materiel, leadership, personnel, and facilities. See acronym list.

> affordability should articulate the CDD sponsor funding level estimates for developing, producing, and sustaining the desired capability. The cost figure should be stated in terms of a threshold and objective capability (**not necessarily a KPP**) to provide flexibility for program evolution and cost as an independent variable (CAIV) tradeoff studies. **If cost is identified as a KPP**, include it in the KPP summary table. Cite applicable cost analyses conducted to date.[21] [emphasis added]

The above wording in CJCSM 3170.01A certainly does not appear to encourage the designation of cost as a KPP, but leaves open the possibility.

Corresponding Navy Guidance. The Navy's companion instruction, SECNAVINST 5000.2C, provides direction that is slightly different from JCIDS language on cost as a KPP. Corresponding Navy guidance on KPP is depicted in the following passage:

> Supportability and manpower may be key performance parameters (KPPs) for selected systems. For Navy programs the determination will be jointly made by the program sponsor and the Fleet Readiness and Logistics Sponsor (CNO (N4)) or the Manpower Sponsor (CNO (N1)), respectively. Program sponsors should assume a default consideration for supportability and manpower KPPs unless they obtain prior agreement with the CNO (N4) or CNO (N1) Sponsors.[22]

It is heartening that supportability and manpower assume default consideration as KPP, as both of these aspects directly and significantly contribute to lifecycle cost.

---

[21] CJCS Manual, *Operation of the Joint Capabilities Integration and Development System*, 12 March 2004, CJCSM 3170.01A, Appendix A, 6, to Enclosure E.

[22] SECNAVINST, *Implementation and Operation of the Defense Acquisition System and The Joint Capabilities Integration and Development System.* November 19, 2004. SECNAVINST 5000.2C, Enclosure (Chapter) 2, 6.

B. Has the DoD established the processes and tools to monitor and control CAIV?

The R-TOC Pilots—Each DoD Component—Army, Navy (including the Marine Corps), and the Air Force—identified ten R-TOC Pilots in 1999 and have updated them when necessary, since that time. However, the current list of R-TOC pilots does not include any programs early in their developmental cycle (i.e., prior to Milestone B).

There are obvious, prominent choices that could be selected as CAIV pilot programs in each of the DoD Components that might yield valuable lessons-learned for the acquisition community. However, for unknown reasons, none has been designated; this absence is quite troubling, because it is well understood across the DoD (and, indeed, outside the DoD) that early design decisions are likely to have the greatest potential influence on lifecycle cost.[23] There may be justifiable rationale for not selecting any of the current systems in pre-acquisition to be an R-TOC pilot; however, without including R-TOC pilots that are at or approaching their Milestone B decision point, the community of users and developers may miss valuable learning opportunities pertinent to the critical period when decisions are made that could potentially have the greatest effect on TOC. This is both a leadership and a learning issue. It is a leadership issue if programs are not aggressively pursuing cost reduction during pre-acquisition; it is a learning issue if the DoD is not documenting different approaches for setting and refining lifecycle cost targets and managing in accordance with those targets.

Specific demands for TOC Goals or Targets by the DoD Components—Interviews at the program office and oversight levels indicate that analogous lifecycle cost estimates are being constructed during pre-acquisition, but interviews did not yield any examples of LCC goals or targets at the subsystem or component level during pre-acquisition, prior to milestone B. Observance of cost targets would reflect a clear CAIV bias. Lack of cost targets at the subsystem or component level may suggest a

[23] Benjamin S. Blanchard, *Logistics Engineering and Management*, 5th ed. (Upper Saddle River, NJ: Prentice Hall, 1998), 493.

breakdown in cost control. This could be due to different reasons, such as insufficient cost data, a lack of confidence in cost databases, or lack of commitment to control costs.

Need for Clear, Accurate, Scrubbed Cost Data—One of the ways that analysts estimate the costs of a new warfighting system is to begin with the costs of earlier systems of a similar nature: that is, *analogous systems*. The "cleaner" the cost database of the predecessor system(s), the higher the confidence in cost estimates for the new system. However, there are many problems associated with collection of cost data. Cost databases are pulled together from many different sources. For example, in the Army's OSMIS database, fuel costs are pulled from one database and repair parts from another. OSMIS merges or draws from multiple databases. OSMIS peacetime information also is kept separate from wartime or contingency information.

In an effort to obtain clean, reliable field-usage data, the Army has used Sample Data Collection (SDC) in special circumstances such as the fielding of a new system. SDC is obtained by paid data collectors under contract and is likely to result in cleaner, more accurate data than is routinely provided by using units. Although SDC seems attractive, the presence of SDC personnel in military units is an irritant; SDC also is expensive. Additionally, loading sample data into the OSMIS database is problematic.

System configuration differences (type, model, series) cause confusion in collecting data on warfighting systems, contributing to data errors at the time of field entry. Type, model, series errors can be scrubbed by a PM or contractor personnel, but such effort is time-consuming. An expected corollary benefit of performance-based logistics (PBL) is improved database accuracy, which likely would contribute to improved analogous cost estimates for successor systems.

Practitioners who were interviewed either stated directly or implied that cost of new technology was not credible without empirical data. This is similar to the assertion in one particular practitioner interview that cost analysts do not consider innovative developmental processes or practices to be credible in the absence of empirical cost

data. That is, innovative system or component designs or developmental processes are seen as risky until the costs are actually demonstrated. Of course, it might be argued that decision-makers should be slow to accept promises without confirmatory data.

C. Has the DoD leadership exhibited the resolve to control Total Ownership Costs of its warfighting systems?

Leadership Pressure to Reduce Total Ownership Cost (TOC)—Program office and other DoD personnel indicated during interviews that there is significant emphasis on control of cost. One respondent suggested that the emphasis on cost was most prevalent around a milestone decision point. Another offered that acquisition milestone decision process might be better suited to address ownership cost than the JCIDS/JROC process. Both of these observations are consistent with the mandatory independent cost estimates and other cost-related requirements at Milestone B (or Program Initiation for Ships in the case of Naval vessels).

JROC Emphasis on TOC—Three practitioners interviewed who were familiar with the JCIDS process and JROC reviews indicated that the JCIDS principal focus was *interoperability* and *performance*, but none would say that *cost* was ignored during JROC/JCIDS reviews. This appears to be an opportunity missed because the JCIDS and JROC reviews could reinforce the need for user involvement in *cost* management. One obvious approach to emphasize ownership cost would be for the JROC to encourage sponsors/users to designate lifecycle cost as a KPP; this is discussed in more detail below.

During pre-acquisition, sponsors or users set out to identify required capabilities and include them in the Capability Development Document (CDD). The most important attributes of the new system may be designated Key Performance Parameters (KPP). According to persons interviewed, users or sponsors of programs have designated cost or sustainment as a KPP for several systems that have recently emerged from pre-acquisition into system development. The use of KPP to describe cost or sustainment is certainly not a practice that has been adopted universally; nevertheless, that such

Key Performance Parameters are stated at all suggests that leadership within the user community is showing interest in ownership cost and the desire to influence it.

The observation that cost and sustainment KPP are not used universally may reflect users' long held bias toward *warfighting performance*, whatever the price. However, this observation might also reflect perceived additional risk from bringing attention to system lifecycle cost. It might also suggest that leaders in the user community lack confidence in the accuracy of lifecycle cost estimates, particularly as related to sustainment costs, which may be accrued far out in the future.

Leadership Emphasis on Control of Cost— Senior leaders and practitioners interviewed generally agreed that significant pressure is being placed on programs to reduce cost. There was wide agreement that in pre-acquisition and early system development, leaders paid more attention to *acquisition cost* than to *O&S cost*. This has traditionally been the case and does not seem to have changed appreciably. Acquisition cost, such as average unit procurement cost (AUPC) is more immediate and can be seen much more clearly than O&S costs that may accrue many years out into the future. There is a sense that O&S costs can be estimated more accurately after prototype testing and that prior to that time, O&S simply isn't accurate enough to support decision-making. The problem with that perception is that it suggests acceptance that early tradeoff decisions cannot effectively be influenced by CAIV analysis.

Although during interviews senior-level leaders and other practitioners acknowledged uneasiness with trying to target operating and support cost too early in development, there may be possible compromise positions. Practitioners in both Army and Navy acquisition thought that emphasis on LCC components should evolve during different stages of the developmental process. For instance, parametric cost analysis used during pre-acquisition might be useful for programming, but does not provide sufficient granularity to generate detailed cost information with which to influence a system's design or its sustainment plan. Early tradeoff analysis needs to be supported by analogous cost estimates; however, in the absence of complete analogous cost

estimates, selective O&S cost analysis may be feasible in such areas as system fuel and manpower costs. Other contributors to O&S cost, such as subsystem or component reliability, might have to be revisited when relevant data becomes available through specific component or system testing.

Interviews that support this research have taken place against a backdrop of media reporting on the rapidly escalating costs for warfighting systems. My perspective is that the present environment discourages aggressive analysis and control of O&S cost. Media emphasis seems riveted on acquisition cost, not system lifecycle cost. A program that shifts the discussion to lifecycle invites unpleasant and possibly undeserved criticism of the lifecycle cost, which always appears unreasonably large, contrasted to acquisition cost.

D. Has the TOC focus been pushed aside by necessity?

A portion of the acquisition landscape post-9/11 includes expedited actions to support military forces engaged in Iraq and Afghanistan. While this is only a small percentage of Defense acquisition, it is very visible and engenders emotional response.

Sec. 811. Rapid Acquisition Authority to Respond to Combat Emergencies[24]—This law provides relief from applicable law and regulation in such cases where combat fatalities have occurred. Rapid acquisitions under this law are limited to $100,000,000 and two years. Whereas this law provides extraordinary relief in support of Armed Forces members in combat, there may be very significant associated logistics burdens and operating and support costs that result. This paper in no way argues that rapid acquisition is a wrong approach that should not be used. Rather, this paper acknowledges that there is a fresh rationale for avoiding TOC/CAIV consideration.

During the Cold War, the argument for ignoring TOC was that the United States was in a death struggle and that it was necessary to spend the required resources to

[24] Congress. *Ronald Reagan National Defense Authorization Act for Fiscal Year 2005*: Section 811, Rapid Acquisition Authority to Respond to Combat Emergencies. PL 108-375,

ensure our survival as a nation. Since 9/11, the earlier argument has resurfaced and "morphed" into the necessity for spending money *to reduce combat fatalities*. Using the armoring of Army and Marine Corps tactical vehicles (HMMWVs and trucks) as an example, significant funds have been expended applying armor protection to reduce troop fatalities. Few Americans would argue that up-armoring initiatives should be scrapped. However, at the same time, the DoD should recognize that there are will be sizeable logistics support costs due to increased stress on the frame, suspension, tires, and power train components of up-armored vehicles. The apparent lesson for the acquisition community is that when it comes to prevention of combat fatalities, questions of associated operating and support costs are moot.

Other Changes in Focus —Two major acquisition initiatives may increase pressure on TOC and possibly compete against CAIV during the "front-end" analysis of an emerging warfighting system.

The first is spiral development, which almost assuredly adds to logistics burden; this outcome results from proliferation of type, model, or series of equipment. The second is related to Performance-Based Logistics (PBL). That is, there is the possibility of analysis during the Performance-Based Logistics (PBL) determination—resulting in outsourced logistics that are virtually locked-in but are more expensive in some scenarios than alternative approaches. Both spiral development and PBL have potential effects on TOC that deserve further study.

Fact-of-Life Growth in Post Deployment Software Support (PDSS) — Although this may not be a change in focus, essential change has gradually shaded the picture of system lifecycle cost. That is, the miracles wrought by software do not come without an increase in logistics cost. PDSS costs are expensive and must be anticipated in system lifecycle cost estimates.

V. Conclusions and Recommendations

1. Has the DoD put into place policy and implementing guidance to support CAIV considerations during the acquisition of the DoD's warfighting systems?

OSD and CJCS capstone documents (DoD 5000 series and CJSC 3170 series) reflect consideration of affordability, CAIV, and TOC, as described in Section IV of this paper.

DoD 5000 Series, Including the Defense Acquisition Guidebook. DoDI 5000.2 mandates the analysis of affordability during pre-acquisition and requires that an Affordability Assessment be documented at milestones B and C. Its guidance on LCC ought to be expanded to require lifecycle cost targets at the system level and to encourage similar targets at subsystem and component levels. The Defense Acquisition Guidebook provides best practices related to affordability. The Guidebook's approach is helpful as it examines affordability against a broad background, not in a vacuum. However, the revised guidance needs to extend the affordability analysis to show the full effects of expected lifecycle cost, not just modernization cost and manpower portions.

CJCS 3170 Series. CJCSI 3170.01D and CJCSM 3170.01A guidance allows for the possibility of ownership cost being designated a key performance parameter (KPP). However, this guidance would be more convincing if it established (as a default option) that Key Performance Parameters would be used to address lifecycle cost (LCC) or Total Ownership Cost (TOC). In the absence of such direction, TOC simply enters the "trade space" and may be traded off for reduced APUC, greater system capability, or larger production quantity.

2. Has the DoD established the processes and tools to monitor and control CAIV?

Since 1999, the various DoD Components have designated Flagship or Pilot programs that would lead the way in development of tools, processes, and management actions to help control Total Ownership Cost. However, currently none of the pilot programs is in pre-acquisition. New programs that are in pre-acquisition need to be designated as R-TOC Pilots to increase the opportunity for lessons learned on application of CAIV.

Additionally, the DoD Components have OSMIS, AFTOC, and VAMOSC databases that, even if imperfect, can nevertheless be used to gain useful insights into O&S cost drivers. The DoD and defense contractors need to continue to refine cost databases and develop innovative cost models from which to better understand lifecycle cost impacts for legacy and future warfighting systems.

3. Has DoD leadership exhibited the resolve to control Total Ownership Cost of warfighting systems?

Based only on anecdotal information, this writer is persuaded that the leadership backs away from insisting that warfighting programs address affordability. Lifecycle costs are not defined in terms of key performance parameters (KPP). Emerging programs in pre-acquisition are not required to establish lifecycle cost targets to guide CAIV analysis. Current guidance does not focus on total lifecycle affordability, but rather on the acquisition cost components and manpower only.

4. Has the DoD's Total Ownership Cost focus changed?

Since 9/11/2001, some of our priorities have changed as conditions in contingency areas have changed. The DoD has used rapid acquisition processes to be responsive to warfighters engaged in conflict. In some cases, total ownership cost has diminished in importance, particularly when our military members are being wounded and killed. This bias does not seem to have affected the longer-term developmental

programs at this juncture. However, increased O&S bills are already coming due and must be paid; Supplemental Authorizations notwithstanding, large O&S bills will compete with investment accounts for the same scarce resources.

5. Recommendation for further Study

Research should be conducted on the influence of spiral development, performance-based logistics, and post-deployment software support on lifecycle cost.

List of References

1. Blanchard, Benjamin S. *Logistics Engineering and Management*. 5th ed. Upper Saddle River, NJ: Prentice Hall, 1998.
2. Congress of the United States*. Ronald Reagan National Defense Authorization Act for Fiscal Year 2005*: Section 811, Rapid Acquisition Authority to Respond to Combat Emergencies. Public Law 108-375.
3. Congressional Budget Office., *Long Term Implications of Current Defense Plans: Detailed Update for FY 2005.* September 2004.
4. Chairman of the Joint Chiefs of Staff. Instruction. *Joint Capabilities Integration and Development System*. 12 March 2004. CJCSI 3170.01D.
5. Chairman of the Joint Chiefs of Staff. Manual. *Operation of the Joint Capabilities Integration and Development System*. 12 March 2004. CJCSM 3170.01A.
6. Department of Defense. *Defense Acquisition Guidebook.* Defense Acquisition Guidebook Website, Version 1.0. 17 October 2004. Available from http://deskbook.dau.mil/jsp/default.jsp. Accessed 15 June 2005.
7. Department of Defense. Defense Acquisition University (DAU) AT&L Knowledge Sharing System Website. Updated June 2005. Available from http://deskbook.dau.mil/jsp/default.jsp. Accessed 15 June 2005.
8. Department of Defense. Directive. *The Defense Acquisition System*. 12 May 2003. DoD 5000.1.
9. Department of Defense. Instruction. *Operation of the Defense Acquisition System*. 12 May 2003. DoDI 5000.2.
10. Gansler, Jacques S. Office of the Secretary of Defense. *Memorandum: Definition of Total Ownership Cost (TOC), Life Cycle Cost, and the Responsibilities of Program Managers.* 13 November 1998.
11. Institute for Defense Analysis. "Reduction of Total Ownership Costs." Available from http://rtoc.ida.org/rtoc/rtoc.html. Updated 6 June 2005. Accessed 15 June 2005.
12. Kaminski, Paul. Office of the Secretary of Defense. *Untitled Memorandum to the Secretaries of the Military Departments, et al*. 4 December 1995.
13. Lifecycle Table. Course MN3331. Principles of Acquisition and Program Management. Monterey, CA: Naval Postgraduate School. 23 March 2004.

14. Secretary of the Navy Instruction. *Implementation And Operation of the Defense Acquisition System And The Joint Capabilities Integration And Development System*. 19 November 2004. SECNAVINST 5000.2C.

FY 2005 Sponsored Acquisition Research Products

Sponsored Report Series

NPS-CM-05-003 Commodity Sourcing Strategies: Supply Management in Action
January 2005

Working Paper Series

NPS-AM-05-005 Cost As an Independent Variable (CAIV):
Front-End Approaches to Achieve Reduction
in Total Ownership Cost
March 2005

NPS-AM-05-002 The Yoder Three-Tier Model for Optimizing Contingency
Contracting Planning and Execution
December 2004

NPS-AM-05-001 Engagement versus Disengagement:
How Structural & Commercially-Based Regulatory Changes have
Increased Government Risks in Federal Acquisitions
November 2004

Acquisition Symposium Proceedings

NPS-AM-05-004 Acquisition Research: The Foundation for Innovation
May 2005

FY 2004 Sponsored Acquisition Research Products

Sponsored Report Series

NPS-LM-04-014 Optimizing Phalanx Weapon System Life-Cycle Support
October 2004

NPS-AM-04-013 Business Case Analysis and Contractor vs. Organic Support:
A First–Principles View
September 2004

NPS-CM-04-006 Measurement Issues in Performance Based Logistics
June 2004

NPS-CM-04-004 Update of the Navy Contract Writing, Phase II
June 2004

NPS-CM-04-001 Update of the Navy Contract Writing, Phase I
December 2003

NPS-CM-04-002 Marine Corps Contingency Contracting MCI
December 2003

Working Paper Series

NPS-CM-04-019 Contractor Past Performance Information (PPI) In Source Selection: A comparison Study of Public and Private Sector
December 2004

NPS-PM-04-017 The New Joint Capabilities Integration Development System (JCIDS) and Its Potential Impacts upon Defense Program Managers
December 2004

NPS-CM-04-016 An Analysis of Industry's Perspective on the Recent Changes to Circular A-76
October 2004

NPS-CM-04-012 Air Force Commodity Councils: Leveraging the Power of Procurement
September 2004

NPS-CM-04-011 Using Metrics to Manage Contractor Performance
September 2004

NPS-LM-04-009 Improving the Management of Reliability
August 2004

NPS-AM-04-007 The Impact of Software Support on System Total Ownership Cost
July 2004

NPS-LM-04-003 Enablers to Ensure a Successful Force Centric Logistics Enterprise
April 2004

Acquisition Case Series

NPS-CM-04-008 Privatization of the Naval Air Warfare Center Aircraft Division, Indianapolis
July 2004

NPS-PM-04-010 The Army Seeks a World Class Logistics Modernization Program
June 2004

Acquisition Symposium Proceedings

NPS-AM-04-005 Charting a Course for Change: Acquisition Theory and Practice for a Transforming Defense
May 2004

FY 2003 Sponsored Acquisition Research Products

Sponsored Report Series

NPS-AM-03-003 Centralized Control of Defense Acquisition Programs:
A Comparative Review of the Framework from 1987 – 2003
September 2003

NPS-AM-03-004 Reduction of Total Ownership Cost
September 2003

NPS-CM-03-006 Auto-Redact Toolset for Department of Defense Contracts
September 2003

Working Paper Series

NPS-CM-03-002 Transformation in DOD Contract Closeout
June 2003

Acquisition Case Series

NPS-CM-03-005 Contract Closeout (A)
September 2003

Other Sponsored Research

NPS-CM-03-001 Transformation in DOD Contract Closeout
MBA Professional Report
June 2003

Copies of the Acquisition Sponsored Research Reports may be printed from our website www.nps.navy.mil/gsbpp/acqn/publications

ACQUISITION RESEARCH PROGRAM
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY
NAVAL POSTGRADUATE SCHOOL
555 DYER ROAD, INGERSOLL HALL
MONTEREY, CALIFORNIA 93943

www.nps.navy.mil/gsbpp/acqn