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

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**COST AS AN INDEPENDENT VARIABLE (CAIV): FRONT-END  
APPROACHES TO ACHIEVE REDUCTION IN TOTAL OWNERSHIP  
COST**

**Published: 1 May 2005**

**by**

**Michael Boudreau**

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ACQUISITION RESEARCH PROGRAM  
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY  
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## Proceedings of the Annual Acquisition Research Program

The following article is taken as an excerpt from the proceedings of the annual Acquisition Research Program. This annual event showcases the research projects funded through the Acquisition Research Program at the Graduate School of Business and Public Policy at the Naval Postgraduate School. Featuring keynote speakers, plenary panels, multiple panel sessions, a student research poster show and social events, the Annual Acquisition Research Symposium offers a candid environment where high-ranking Department of Defense (DoD) officials, industry officials, accomplished faculty and military students are encouraged to collaborate on finding applicable solutions to the challenges facing acquisition policies and processes within the DoD today. By jointly and publicly questioning the norms of industry and academia, the resulting research benefits from myriad perspectives and collaborations which can identify better solutions and practices in acquisition, contract, financial, logistics and program management.

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

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**Presenter: Michael 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 a Bachelor of Mechanical Engineering degree and Master of Business Administration degree from Santa Clara University, California.

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## Abstract

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); these reductions 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 (USDA&T), introduced the term “cost as in 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 Service 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. Now, it seems, is the 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 CAIV as a practice in the acquisition of the DoD’s warfighting systems?
- Has the DoD established the necessary processes and tools to monitor and control CAIV?
- Has DoD leadership exhibited the will and determination to control Total Ownership 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 DoD personnel participants, 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 is the “front end” of the process—that is, we will examine practices during Concept Refinement, Technology Development, associated 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 publication of DoD 5000.1, *The Defense Acquisition System*, and continuing with DoDI 5000.2, *Operating the Defense Acquisition System*. The companion *Defense Acquisition Guidebook*, containing discretionary best practices, was placed on-line in the fall of 2004.

The Chairman of the Joint Chiefs of Staff first published CJCS Instruction 3170.01D, *Joint Capabilities Integration and Development System (JCIDS)* and the accompanying CJCS Manual 3170.01A, *Operation of the Joint Capabilities Integration and Development System* in June 2003 and then updated both directives on 12 March 2004.

In combination, these directives, together with the on-line Guidebook, address the requirement of affordability analysis and attention to Total Ownership Cost or system lifecycle cost during the following processes: Concept Refinement, Technology Development (in such activities as preparation of the Initial Capabilities Document (ICD)), conducting the Analysis of Alternatives (AOA), writing the Capability Development Document (CDD), progressing through JCIDS reviews, and preparing for acquisition Milestones A & B. Collectively, these regulations influence the work of sponsors, users, developers, staff overseers, leaders, and decision makers.

***B. Has 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 numerous initiatives in each of the Services 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 for designation as CAIV pilot programs in each of the Services that might yield valuable lessons-learned for the acquisition community. Without CAIV pilot programs, the DoD may lose valuable lessons which would add to the difficulty of determining whether current guidance provides the desired benefits during pre-acquisition and the early development of new warfighting systems.

***C. Has the DoD leadership exhibited the will and determination 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** 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), and less concerned about cost. The JROC's lack of emphasis on affordability seems to be an opportunity lost, wherein 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 cost. Much of the pressure on cost comes from required independent cost estimates (ICE) that precede milestone reviews.

**Service leaders** (within and outside acquisition) may be reluctant to demand lifecycle *cost targets* leading into system development, out of concern that incorrectly specified cost targets could increase program risk from “outside.” Such an error could result in unfavorable attention to a critically needed warfighting system, possibly resulting in its termination.

Service leaders also may lack confidence in lifecycle cost estimates until systems have been sufficiently tested and are poised for production and fielding.

***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 for 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. An obvious outcome of up-armoring vehicles, albeit one that seems to attract little notice, is the armoring's significant impact on O&S costs—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 logistical burdens to the acquisition process. The other is the possibility of cost errors during the Performance-Based Logistics (PBL) determination—resulting in out-sourced logistics that are more expensive than estimated. Both spiral development and PBL have potential effects on TOC that need further study.



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- MOSA Contracting Implications
- Strategy for Defense Acquisition Research
- Spiral Development
- BCA: Contractor vs. Organic Growth

### **Contract Management**

- USAF IT Commodity Council
- Contractors in 21st Century Combat Zone
- Joint Contingency Contracting
- Navy Contract Writing Guide
- Commodity Sourcing Strategies
- Past Performance in Source Selection
- USMC Contingency Contracting
- Transforming DoD Contract Closeout
- Model for Optimizing Contingency Contracting Planning and Execution

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- PPPs and Government Financing
- Energy Saving Contracts/DoD Mobile Assets
- Capital Budgeting for DoD
- Financing DoD Budget via PPPs
- ROI of Information Warfare Systems
- Acquisitions via leasing: MPS case
- Special Termination Liability in MDAPs

### **Logistics Management**

- R-TOC Aegis Microwave Power Tubes



- Privatization-NOSL/NAWCI
- Army LOG MOD
- PBL (4)
- Contractors Supporting Military Operations
- RFID (4)
- Strategic Sourcing
- ASDS Product Support Analysis
- Analysis of LAV Depot Maintenance
- Diffusion/Variability on Vendor Performance Evaluation
- Optimizing CIWS Life Cycle Support (LCS)

### **Program Management**

- Building Collaborative Capacity
- Knowledge, Responsibilities and Decision Rights in MDAPs
- KVA Applied to Aegis and SSDS
- Business Process Reengineering (BPR) for LCS Mission Module Acquisition
- Terminating Your Own Program
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