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INSTITUTE FOR DEFENSE ANALYSES

IDA 2004 Cost Research Symposium: Investments in, Use of, and Management of Cost Research

Stephen J. Balut, Project Leader
Richard P. Burke
David W. Henningsen
Jay H. Jordon
Howard J. Manetti
David L. McNicol
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PREFACE

The Institute for Defense Analyses (IDA) prepared this document as part of a project that is jointly sponsored by IDA's Independent Research Program and the Office of the Director, Program Analysis and Evaluation, in the Office of the Secretary of Defense (OSD).

Every year, OSD's Cost Analysis Improvement Group (CAIG) reviews the status of DoD's ability to estimate the costs of forces and weapons at the DoD Cost Analysis Symposium. Later, at the IDA Cost Research Symposium, CAIG meets with representatives from selected government offices, Federally Funded Research and Development Centers, and military universities to discuss ongoing and planned cost research activities. Following these gatherings, the CAIG prepares an analysis plan that focuses on the areas of cost research needing the most attention given upcoming acquisition decisions.

This document contains material related to that process for the 2004 cycle. Its purpose is to make the material available to those who participated in the 2004 IDA Cost Research Symposium, and for other purposes the Chairman of CAIG deems appropriate. The material has not been evaluated, analyzed, or subjected to formal IDA review.

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I. INTRODUCTION

Several Department of Defense (DoD) offices are responsible for estimating and monitoring the costs of defense systems and forces in support of planning, programming, budgeting, and acquisition decisions. For example, the Cost Analysis Improvement Group (CAIG) in the Office of the Secretary of Defense (OSD) provides independent cost estimates and reports on life-cycle costs of major defense acquisition programs (MDAPs) in Acquisition Category ID (see Reference [1]). Cost agencies and centers in the relevant defense components provide independent estimates for other MDAPs.

The OSD CAIG leads efforts by these and other offices and organizations to improve the Defense Department's technical capabilities to forecast future costs. Near the beginning of each year, during the DoD Cost Analysis Symposium, the CAIG reviews the status of the Defense Department's capabilities to estimate the costs of defense systems. Several months later, representatives from offices that sponsor defense cost research meet at the Institute for Defense Analyses (IDA) to discuss and exchange information on their ongoing and planned cost research projects.

The 2004 IDA Cost Research Symposium was held on May 27, 2004. The symposium, jointly sponsored by the OSD CAIG and IDA, has been held every year since 1989 (see References [2 through 17]). This document contains the proceedings of the 2004 symposium and catalogs defense cost research projects in progress or planned at the time of the symposium.

The remainder of this document is organized as follows:

- Chapter II presents the welcome and opening remarks by Stephen J. Balut of IDA, the host and co-sponsor of the symposium.
- Chapter III presents the keynote address by Richard Burke, Chairman of the OSD CAIG and co-sponsor of the symposium. (His remarks were recorded and transcribed.)
- Chapter IV documents the panel discussion by all former and current CAIG Chairmen, along with introductory remarks by the Panel Moderator, Stephen Balut. (All presentations in this chapter were recorded and transcribed.)
- Chapter V documents a panel discussion by representatives from OSD, the military services, and the Missile Defense Agency addressing issues related to service/agency management of cost analysis and cost research. The subsections here are annotated briefing slides prepared by the panel members.
- Chapter VI documents the invited presentation on a timely, high-interest topic: "Independent Cost Estimate (ICE) Development Under the New Space Acquisition Process." The second invited presentation, "Estimating a Reasonable Price for the KC-767 Transport Aircraft," is not documented in this report.
- Appendix A lists the study titles and keywords for the cost summaries submitted by offices participating in the symposium. The summaries, in Appendix B, represent ongoing and planned defense cost research at the time of the symposium.

II. WELCOME AND OPENING REMARKS (STEPHEN BALUT, IDA)

Welcome to the Institute for Defense Analyses (IDA) and thank you for your support of the 2004 IDA Cost Research Symposium. I'm Steve Balut, Director of the Cost Analysis and Research Division at IDA. This symposium is jointly sponsored by the OSD Cost Analysis Improvement Group (CAIG) and IDA. This is the sixteenth annual Cost Research Symposium.

This table (Table 1) shows the participants in this year's symposium.

Table 1. Participants in the 2004 IDA Cost Research Symposium

Office/Organization	Abbreviation	Representative
Office of the Director, Program Analysis and Evaluation	PA&E	Richard Burke
Missile Defense Agency	MDA	Jan Young
Deputy Assistant Secretary of the Army for Cost and Economics	DASA-CE	Dave Henningsen
Army Materiel Command[a]	AMCRM	N/A
Army Tank-automotive and Armaments Command	TACOM	Dave Holm
Army Aviation and Missile Command[a]	AMCOM	Frank Lawrence
Army Space and Missile Defense Command	SMDC	Lisa Gilbert
Naval Cost Analysis Division	NCAD	Chris Deegan
Office of Naval Research	ONR	Katherine Drew
Naval Air Systems Command	NAVAIR	Dave Burgess
Naval Sea Systems Command	NAVSEA	Lofti Ali
Naval Surface Warfare Center, Dahlgren Division[a]	NSWCDD	Amanda Cardiel
Naval Surface Warfare Center, Carderock Division	NSWCCD	Chris Whitaker
Air Force Cost Analysis Agency	AFCAA	Richard Hartley
Aeronautical Systems Center, Air Force Material Command[a]	ASC/FMC	Kathy Ruffner
Air Force Space and Missile Systems Center[a]	SMC	N/A
Electronics Systems Center, Air Force Material Command[a]	ESC/FMC	N/A
Department of Veterans Affairs[a]	VA	Michael McLendon
UK Ministry of Defence, Pricing & Forecasting Group	PFG	Nick Pearse
Air Force Institute of Technology[a]	AFIT/ENV	N/A
Defense Acquisition University	DAU	Martha Ann Spurlock
The Aerospace Corporation	AEROSPACE	N/A
The MITRE Corporation	MITRE	Robert Fuller
RAND Corporation	RAND	Obaid Younossi
CNA Corporation	CNAC	Jino Choi
Institute for Defense Analyses	IDA	Stephen Balut

[a] These offices/organizations did not submit project summaries this year.

The prize for traveling the furthest to attend this year's symposium goes to Nick Pearse and Andy Nichols of the Defense Procurement Agency, UK. A special welcome to Don Srull, the first Chairman of the OSD Cost Analysis Improvement Group (CAIG). Welcome also to Mike McLendon, Deputy Assistant Secretary at the Department of Veterans Affairs.

Following opening remarks, the agenda for this symposium (Table 2) begins with the keynote address by our co-sponsor, Rick Burke, Chairman of the OSD CAIG. The remainder of the morning will bring an event that is special to the defense cost community. We have a panel of CAIG Chairs that will discuss investments in and use and management of cost research during their tenures. Milt Margolis will not be with us today. However, Howard Manetti will fill in for Milt. Howard's tenure in PA&E overlaps

the full period during which Milt was Chair, and Howard managed most or all of the research having to do with weapon system costing during that period.

Table 2. Agenda for the 2004 IDA Cost Research Symposium

Welcome and Opening Remarks—*Stephen Balut, IDA*
Keynote Address—*Rick Burke, OSD CAIG*
Panel Discussion
Investments in, Use of, and Management of Cost Research—*Stephen Balut, Moderator*
Panel Members: *Don Srull, Howard Manetti (for Milt Margolis), David McNicol, and Rick Burke*
Panel Discussion
Service/Agency Management of Cost Analysis and Cost Research—*Russell Vogel, OSD CAIG, Moderator*
Panel Members: *Jay Jordan, AFCA; Dave Henningsen, ODASA Cost and Economics; Bob Hirama, NCAD; and Jan Young, MDA*
Invited Presentations
Independent Cost Estimate (ICE) Development Under the New Space Acquisition Process *Steve Miller, OSD(PA&E)*
Estimating a Reasonable Price for KC-767 Tanker Aircraft *Dick Nelson and Jim Woolsey, IDA*

After lunch, we have another panel, this time including representatives from the military services and defense agencies. Panel members will discuss their organization's management and use of cost research from the time their organization was started to the present.

Later in the afternoon, we have two invited presentations. The first will be by Steve Miller of the OSD CAIG. He will discuss independent cost estimate (ICE) development under the new space acquisition process. Our final presentation of the day will be given by Dick Nelson and Jim Woolsey of IDA on the subject of the newsworthy KC-767 tanker aircraft acquisition program. They will describe our role in estimating a reasonable price for this aircraft.

III. KEYNOTE ADDRESS
(RICHARD BURKE, OSD CAIG)

On behalf of the Department of Defense, let me welcome all of you to the 2004 Cost Research Symposium. As many of you know—I see some familiar faces out there—this is an annual event, and this is the sixteenth time we've done this. I'd like to thank Steve Balut and IDA for arranging and hosting this symposium. It makes it much easier for us to have the symposium here; IDA does a lot of work arranging this and gathering all the input. We really appreciate that. They keep the cost community coordinated by doing this symposium, because in the past—many, many years ago—we were duplicating cost research in the different areas throughout the Department. One of the key purposes of this symposium is to avoid that. So we are here to fulfill the function of coordinating research activities, as well as several others.

I would welcome and pay thanks to all of the representatives of the major commands who came from out of town to attend. I know we had a session on space costing here yesterday—hopefully we have some representatives who decided to stay for today's session. I also welcome the representatives of the various FFRDCs—I see we have some RAND representatives here—and Steve put up the entire list of organizations earlier. I think it's a healthy thing to have many organizations attend this symposium and see where we are in the business of cost research.

We also have an international delegation from the British MOD [Ministry of Defence]—today we have Nick Pierce and Andy Nichols in attendance. I regret to say that we are missing Terry Proffitt, who retired from MOD service a month or two ago. He had been a MOD representative at the past several Cost Research Symposiums, and I think Terry is off doing other things in the security business, as I understand it. Finally I'd like to welcome Martha Spurlock from the Defense Acquisition University. It's always good to see you. I appreciate your attendance here.

I'm going to give you a little bit of background about what's going on in cost analysis right now in the Department of Defense and the environment in which we're operating today, and I'll be rather direct about it.

The cost community right now in the DoD proper—that is the Government side—is, (a) getting smaller; (b) probably declining in capability overall; and, I would say, (c) struggling with what would appear to be a constantly changing environment. Ironically, the demand for the products produced by the cost community is either constant or increasing. That is the environment we're operating in today in the Department of Defense. This environment has some implications for what you're going to hear today about the status of cost research. In general, funding and budgets available for performing cost research writ large are either constant or declining throughout the Department.

You will hear today—and I hope it becomes apparent in the second panel discussion—that a number of organizations are taking what used to be their research funds and spending them on trying to fulfill statutory requirements or trying to fulfill operating requirements to get cost estimates done. We're not necessarily spending as much on cost research as we did in the past; that's a fact of life in which the Department and the cost community is operating today.

You'll see in the discussion we will have this morning that the statutory and regulatory requirements for cost estimates haven't decreased or gone away, they're actually increasing somewhat. And this is putting pressure on service and OSD organizations to cope with how to operate in the environment I just described. It is a tough situation. If you know people who are in the cost community in DoD, you will probably find them (a) very busy and (b) somewhat dissatisfied with the situation as they currently see it, but they are also intellectually challenged. So that is kind of the big picture in which we're going to have discussions today about cost research.

I think if you look at the agenda for today, the panel discussion this morning is going to give you an overview of the history of how we got to where we are today from the CAIG perspective. It will provide you with an overview of the past 60 years. I see there's a chart provided by Steve Balut that starts with the formation of the Department of Defense. So that's the beginning of the history. There's been a long evolution of cost estimating in DoD. There are some recent activities you'll see toward the end of the session that may bode well for the cost estimating community writ large in terms of the recognition that there's a need for this activity in the Government more broadly. You will also hear a panel that talks about current cost research activities in each of the services and in OSD. I think you will get the impression that various organizations are dealing with the external environment in very different ways. But, it's not obvious how this will play out in the long-term.

There are some common themes, however, that I think you'll hear throughout the day. The first is that reorganization has occurred and continues to occur at both the OSD level and the service level. The Department seems to have become enamored with reorganizing itself during the past decade or so. Some of that's necessary. It's not obvious that all of this activity is necessarily beneficial, in terms of what we're trying to get done, but it has indeed become a fact of life.

Second, there is a move towards outsourcing cost estimating, and having government personnel managing contractors doing the work, rather than preparing it ourselves. Good or bad, it's a theme I think you're going to hear from several organizations represented here today.

A third theme I think you'll hear today is that the cost community is being asked to serve a more diverse set of customers than it did in the past. This tends to move cost research activities towards those that are more applied and less theoretical and less developmental than they were in the past, because organizations are struggling to meet the demands of more diverse sets of customers.

Another theme I think you will hear today—I don't know if it will come through in the presentations, but it is a huge issue throughout the Department—is related to the civilian personnel in the cost community, and the development of this talent for the Department overall. As many of you are aware, the Department continues to convert, wherever possible, positions that are currently filled by military personnel into civilian positions. This places additional urgency on the development of civilian personnel for the cost and other communities throughout the Department.

Several large changes related to personnel are ongoing in the Department. For example, right now the services are considering whether or not to civilianize the operation research career field. There is a vigorous debate as to whether or not this field should be civilianized, or whether we ought to keep military personnel in uniform in this field. The pressure to get military personnel closer to the tip of the spear continues, particularly with respect to the ongoing operations and ground forces.

Downsizing of personnel also continues. The pressure to downsize continues, primarily in the civilian workforce. But that pressure is starting to expand to contractor personnel as well. The Department has noticed that a large fraction of our budget has moved to what some call the "shadow workforce," and there is mounting pressure to downsize internal civilian and contractor support activities.

Civilian retirements in DoD are occurring at an ever-increasing pace—some just driven by demographics. “Demographics are destiny,” and if you look at the demographics of some of our organizations, they are poor at best, in terms of looking ten years ahead. The new retirement plan in the Federal Government is also resulting in real change and more rapid turnover for the senior people. The incentives to stay in the Government as long as you did in the past are not as compelling under the new retirement system.

These personnel factors are to the point where we’re actually getting calls from the private sector, concerned that they no longer have a pipeline for cost analysts because the Department has essentially eliminated the pipeline for providing trained personnel. There is a shortage of qualified cost personnel in the contractor community and in the Government right now. So talent will remain a key issue to the cost community for some time to come.

There is a bit of positive news on this front. When fully implemented —and it will be several years—the National Security Personnel System will give organizations more latitude in hiring. And it’s desperately needed. The Department is pushing very hard to get the new National Security Personnel System implemented as soon as possible.

The final common theme I've already touched on is that the discretionary resources for cost research are stable or declining. Some organizations I think have hit bottom, and you will see zeros in the amount of cost-related research sponsored by some organizations. Many are focusing on getting the mission accomplished, and using what used to be cost-research funding to do that. And this explains the current tendency to hire more cost-related support activities rather than doing cost research.

Finally, in some organizations there is a real focus on fundamentals, and I think you'll hear this from the CAIG, in terms of doing business and initiatives to collect data on actual costs for use in preparing cost estimates in the future.

We are all here today at a time of tremendous change. And if you'd like me to forecast how this is all going to play out with the next administration, and the new QDR activity that'll begin in the next year—I really can't. The only thing I can say is that this change is going to continue. We've been training our people to get used to the change and to adjust to like working in this environment. We're asking them to constantly be thinking of doing things differently to get the job done. We've been pretty good at that, I think, during the past few years, but, what about five and ten years from now? We'll talk about that topic some during the course of the day.

Finally, I encourage you to stay for the afternoon sessions, which include two interesting presentations. One is about the new Space Acquisition Process, and the cost research demanded for it. I think that cost estimating is the one aspect of the new space process that is working best. There are other problem areas associated with the new Space Acquisition Process that will become evident when it is measured by its outcomes. But cost estimating is one area that has been going pretty well so far.

The second presentation this afternoon on aerial refueling tankers could not be more timely. One could write a novel on this program and the proposed acquisition programs to re-capitalize the tanker fleet. We have been through two years of dynamics on this issue in the Department, and not all of it good. And it will affect us for the next few years. But the cost community should be proud of the way it performed, particularly the independent cost estimating community and IDA. IDA really did a superb piece of work that you will hear described this afternoon. They were responsible for it; they testified on the Hill about it; it affected the political process, and the final outcome is still to be determined, but the work actually has moved the Department into a much more favorable position for moving forward on this important issue.

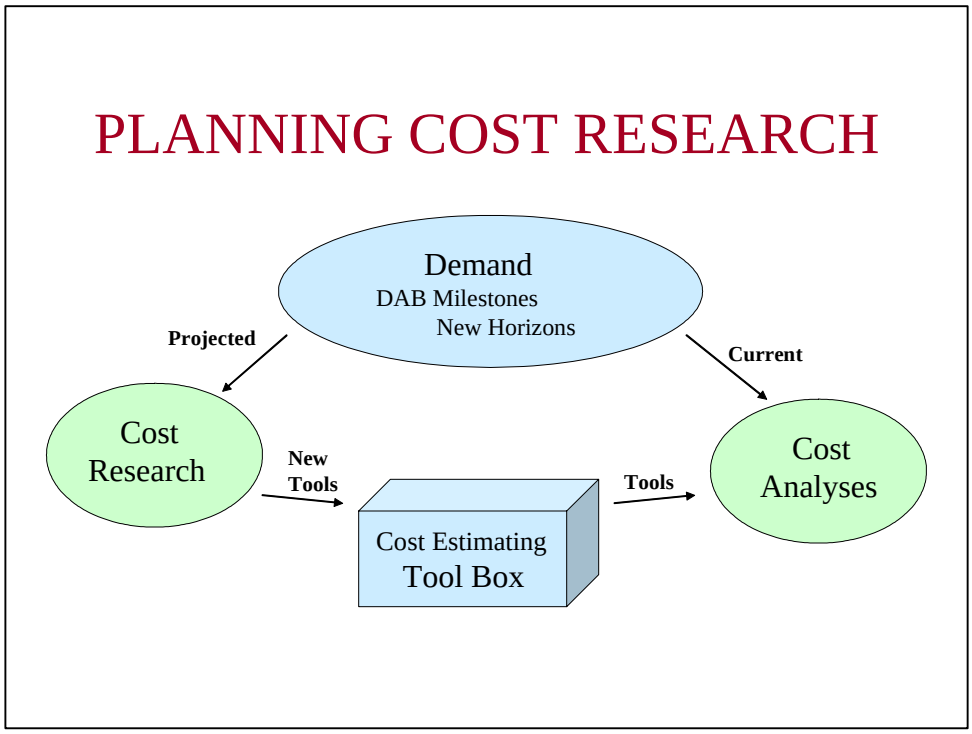
With that I'll close and turn it over to our IDA host again. Thank you once again for coming to this year's symposium. We do appreciate it.

IV. PANEL DISCUSSION: INVESTMENTS IN, USE OF, AND MANAGEMENT OF COST RESEARCH

The following sections contain transcriptions of presentations that were recorded during the symposium. Transcriptions were edited by the presenters.

A. DEFINITIONS, INTRODUCTIONS, AND TIMELINE (STEPHEN BALUT, MODERATOR)

For the rest of the morning we will hear the four CAIG Chairmen address investments in, use of, and management of cost research during their tenures. Before we do that, I want to do several things to put the discussions in context. First, I will define cost research so we're all on the same wavelength. Then I will briefly introduce the members of the panel. Finally, I will present a timeline containing key events that influenced the actions and decisions of these gentlemen.



It's my opinion that we cost analysts build a personal capability to do cost analyses. In doing so, we essentially maintain beside us or inside of us a box of tools that we can draw on to do cost analyses when needed. These tools support our ability to respond, in the short term, to requests for estimates or analyses. Cost research is the process that puts the tools in the toolbox. Cost research involves investments.

What is it that creates demand for both cost analyses and cost research? Well, it's actually the demand for estimates and cost analyses associated with Defense Acquisition Board (DAB) milestones, both current decision milestones that are upon us and the ones that are pending a few months from now. But projected demand is what drives cost research. It's forward-looking; instances when the Department chooses to make investments now to support future demands.

I'm delighted to introduce the members of our CAIG Chair Panel. Each of the four panel members will describe their experiences with investments, use and management of cost research during their tenure as CAIG Chairmen. After that, we will have a chance to ask them questions. We'll do this for the rest of the morning.

Let me tell you a little bit about these people. The first CAIG Chairman was Don Srull who held the position from '71 to '73. Don spent sixteen years in the aerospace industry before being CAIG Chair. His employers included General Dynamics and Convair. Prior to his time in the aerospace industry, he spent a tour in the Department of Defense. From '69 to '75 he was the Deputy Assistant Secretary of the Army for Manpower and Reserve Affairs. He later became the Deputy Assistant Secretary of Defense, Resource Program Analysis, in the office that then was called Systems Analysis. From 1980 to 1997, Don was Chief Management Scientist at LMI [Logistics Management Institute]. Since then, he has been consulting to the NRL [Naval Research Laboratory].

One important thing Don did for all of us was run a conference in 1997 at LMI that focused on the history of the CAIG. LMI published a volume titled *The Cost Analysis Improvement Group: A History* that described that meeting. It's an excellent source. I've used it ever since it's been published.

The second CAIG Chairman who started in '73 and continued for 15 years out to 1988 is Milt Margolis. As I mentioned earlier, I regret to report that he won't be here. Several months ago, and up until about a week ago, he planned on coming, but unfortunately he reportedly broke a bone in his pelvis. Because of the heavy medication prescribed after this unfortunate accident, his nurse and doctor didn't feel comfortable having him travel here.

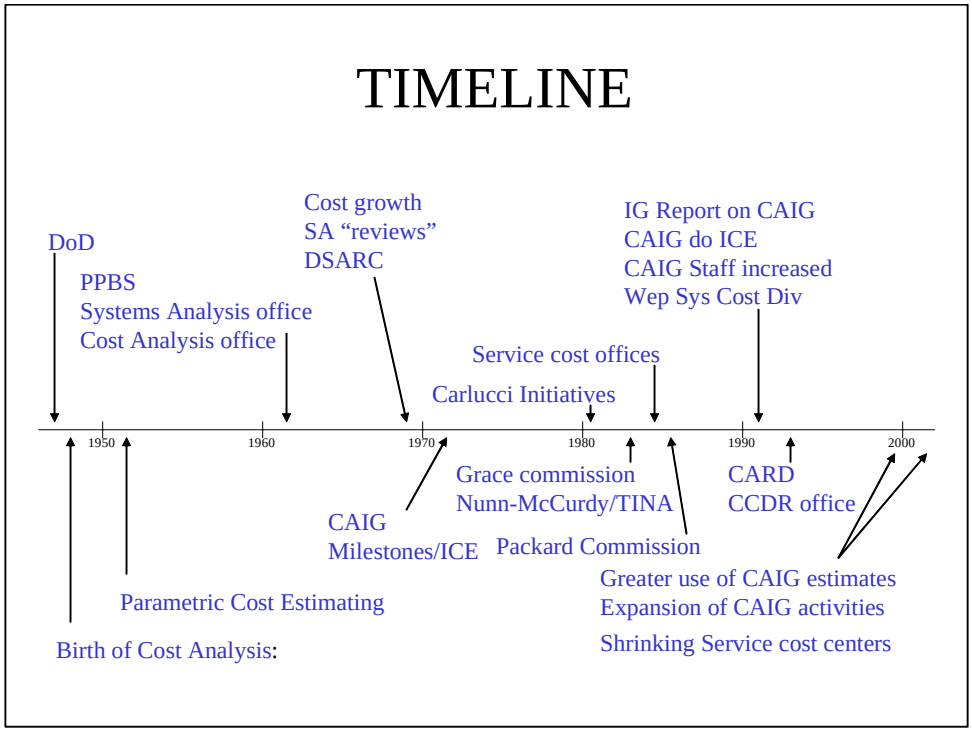
But we do have someone to stand in for Milt Margolis, and it's an old friend of mine and Milt's—Howard Manetti. Howard Manetti was a cost analyst in PA&E from 1965 to 1990. Those 25 years overlapped the period during which Milt Margolis was the CAIG chair. During that period, Howard worked closely with Milt Margolis. In addition, Howard essentially managed weapon system cost research activities for Milt. There were other research activities going on during that period as well. We had research projects addressing operating support costs and resource management, but the weapon system cost research activities managed by Howard represented the bulk of the research investments made by this office during that period.

Howard was in the Cost Group at the RAND Corporation from 1953 to 1957 during the period when RAND was inventing cost analysis. He also spent a stint at North American Aviation from '59 to '65. Since 1990, Howard has been helping us here at IDA. And I do want to mention one more time, Howard is an old friend. We first met when I walked into his office in 1977, just after agreeing to work for Milt Margolis. I took a very small windowless office next to Howard's, and he taught me cost analysis. His method was learning by doing. I thank him for that as well.

The next chairman was David McNicol whose tenure lasted from '88 to September '02, a period of fourteen years. Prior to that, '82 to '88, David was the Director of the Economic Analysis and Resource Planning Division in PA&E. Prior to that, Dave had stints in the Department of Energy, Department of the Treasury, he was a professor at Cal-Tech, and he supported the Council of Economic Advisors. Dave earned a Ph.D. in Economics and Finance from M.I.T.

The current CAIG Chairman just gave the keynote address. Rick Burke has been the CAIG Chair since October '02. This has been an exciting period for the people in the CAIG and Rick in particular. Rick actually started working in PA&E in 1988. He earned a Ph.D. in Nuclear Engineering from M.I.T.

Now that introductions are over, I'd like you gentlemen to stay seated for a moment. I'm going to present a timeline, or backdrop, against which you will give your presentations. And, as Rick mentioned earlier, I'm going to start all the way back in the late 1940s and bring us up to the current time. I will mention events that had an affect on the CAIG's propensity to invest in and conduct cost research.



The first event is the Key West Agreement and the establishment of the Department of Defense and the Joint Chiefs. This was a period during which the Department of Defense was trying to capture the expertise of the scientists that helped win the Second World War. Analysis-type organizations were formed to support both the OSD and the Military Departments. One such organization was the RAND Corporation.

In 1948, the year after the establishment of the DoD, the RAND Corporation invented what came to be known as Weapons Systems Analysis. That title was quickly shortened to Systems Analysis. We'll hear more of that as we go along.

During this period, systems analyses actually took the form of cost effectiveness analyses. This gave rise to the need to be capable of estimating, or forecasting the costs of future weapons systems.

Charles Hitch was at RAND at the time and Alaine Enthovin worked with him. Charles Hitch appointed David Novick to be the head of the newly formed Cost Analysis Department at RAND. David Novick came to be known as the "Father of Cost Analysis." He spearheaded the invention and development of cost analysis as we know it today. For example, David Novick and his group invented what we refer to now as parametric cost estimating, in which estimates are based on designed parameters.

Through the 1950s, the RAND Corporation actually prototyped what came to be known as the Planning, Programming and Budgeting System (PPBS). They accomplished this for the Air Force. In 1960, a milestone event, in my opinion, saw the publication of a book by Hitch and McKean called *Economics for Defense in the Nuclear Age*. This seminal work stressed the need to consider economic efficiency when allocating defense resources.

In the early 1960s, Secretary McNamara asked Charles Hitch to come to the Pentagon and be the OSD Comptroller. Hitch brought Alaine Enthovin with him into the Comptroller shop. A Systems Analysis office was created within the office of the Comptroller, and then a Cost Analysis office was created within the office of Systems Analysis. The 1950s was a period that saw increases in efforts to collect cost data. Cost Information Reports (CIRs) succeeded Defense Contractor Planning Reports (DCPRs); Cost/Schedule Control System Criteria (CSCSC) was started; and Military Standard 881-A, Work Breakdown Structure, was written and promulgated.

The year 1969 became known as the "year of the cost overrun." Twenty-seven of thirty-five major defense acquisition programs experienced very large cost overruns and the Congress got hopping mad. Half of those problems were attributed to faulty cost estimates. An example was the C5A total package procurement debacle.

In 1969, Secretary Laird de-emphasized the role of Systems Analysis and returned decisionmaking authority back to the services. This action changed the role of the Systems Analysis office to one of review. Another factor, just a few years later, was the release of the Pentagon Papers by Daniel Elsburg, a RAND employee. This event had a profound effect on the cost department as well as other departments at the RAND Corporation.

In January 1972, the CAIG was established by a memo written by Secretary Laird. The CAIG was chaired by the Deputy Assistant Secretary of Defense for Resource Analysis, and the role of the CAIG was to evaluate the Program Office, and I quote, "independent service cost estimates for the DSARC," the Defense Systems Acquisition Review Council. In 1969, just before, Deputy Secretary Packard formalized the milestones to be used in the DSARC process, he also required SARs (Selected Acquisition Reports) to be submitted quarterly on major acquisition programs. He also directed that independent parametric cost estimates be produced for the milestone meetings. He added fiscal guidance to the PPBS. In 1972, the name of the System Analysis Office was changed to Program Analysis and Evaluation. At that time, Congress and the American people were upset with the cost overruns and blamed these bad experiences on the analytical technique called Systems Analysis. As a result, the term "Systems Analysis" was erased from DoD documents and the term "Economic Analysis" was substituted in its place. This substitution was cosmetic and resulted in no effective change on what actually was practiced.

In 1981, Deputy Secretary Carlucci made changes called the Carlucci Initiatives that were aimed at correcting procurement ills. You see here a laundry list of some of the main initiatives he initiated at the time, including multi-year procurement; the requirement to budget to most likely or expected costs, to include predictable cost increases due to risk; increased efforts to quantify risk and uncertainty; budget more realistically for inflation; and forecast business base at defense contractor's plants. The source selection process was strengthened with added emphasis on past performance, schedule realism, and cost credibility, and greater incentives were created on design-to-cost goals by tying award fees to actual costs achieved in production.

Following that, we got some help from a number of commissions. The first was the Grace Commission in the mid-1980s. The real name was the President's Private Sector Survey on Cost Control. President Reagan's direction to this commission was: "Work like tireless bloodhounds to root out Government inefficiencies and waste of U.S. tax dollars." The commission came up with 2,478 recommendations documented in 47 volumes and 21 thousand pages. That was quite a bit of help.

Also during this period we saw the Nunn-McCurdy Amendment. Unit cost reporting was initiated in the 1982 Defense Authorization Act, with the 15 and 25 percent thresholds that are so dear to our hearts now. The 25 percent threshold is the one that really seems to have been significant. That is, when we have a cost increase in Acquisition Program Unit Costs (APUC) in excess of 25 percent, the Secretary of

Defense must certify the acquisition to be essential to national security, that there are no alternatives to this system, the new unit cost is reasonable, and in addition, certification that the DoD can in fact manage the program to that new unit cost estimate.

At about the same time, we saw TINA (Truth in Negotiations Act). That statute required cost and pricing data to be submitted by contractors, and, not only that, it required the contractor's certification that the data were accurate, complete, and current. In 1984, the Defense Authorization Act had several important provisions. It said that the Secretary of Defense must consider an independently derived life cost estimate before approving EMD (Engineering and Manufacturing Development), production, or deployment. And the ICE (Independent Cost Estimate) was to be prepared by an office external to the acquiring service. That important requirement was not complied with at that time. We'll hear more about that as we go along. At the same time, the Secretary of Defense was directed to ensure that the ICE offices had adequate resources. The Department assigned responsibility for conducting ICEs to the CAIG in DoD Instruction 5000.2. However, the direction was interpreted to allow the CAIG to use parts of Component Cost Analyses. That is, the CAIG did not do independent estimates from scratch. In 1985, all the service cost centers were either expanded or established.

Then we got some more help from the Packard Commission. President Reagan established the Commission with the purpose of reducing inefficiencies in the defense procurement system. You see here some of the things that were recommended: streamline the acquisition process; increase tests and prototyping; change the organizational culture; and adopt a competitive firm model.

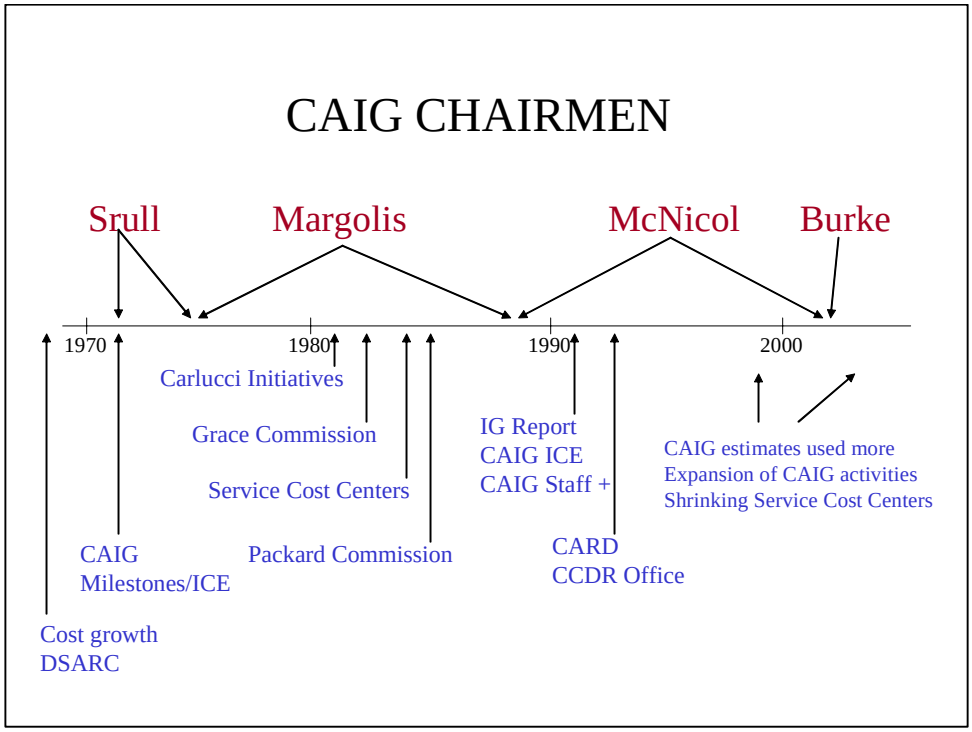
A re-issuance of DoD Instruction 5000.2 in 1991 specified responsibilities for COEAs (Cost and Operational Effectiveness Analyses). Remember, the term Systems Analysis fell into dispute back in the 1960s, became a bad word, and was erased from DoD instructions. The term reappeared in a different form mainly through the efforts of David Chu, in my opinion. It came back into DoD documents with the title Cost and Operational Effectiveness Analysis, or COEA for short. Starting at that time, the CAIG was required to review COEA plans and also to review the COEAs completed by the Services, and report their assessments to the DAB at milestone decision meetings.

The year 1992 was an important moment for defense cost analysis in my opinion. That's when the DoD Inspector General (IG) Report on independent costing in the DoD was published. As a result of this report, the CAIG was directed to do the ICEs from scratch. Also, the IG found that the CAIG was not adequately staffed to perform this function. The

size of the CAIG staff was increased by 19 in little over one-year's time. A Weapons System Cost Division was added to the Resource Analysis Division at that time, mainly for the purpose of conducting independent cost estimates. In addition, the CAIG was reestablished. It was no longer an intra-OSD organization as it was originally established in '72.

Now on to the early 1990s. I think that the implementation of the CARD (Cost Analysis Requirements Description) is one of the most significant events that we've seen in cost analysis in many years. The idea was borrowed from the Missile Defense Agency and, when implemented in the DoD, it brought a great deal of improvement to our process. In addition, after a thorough, careful review and assessment of the CCDR system by IDA through the 1980s, the CCDR Office was established in 1992. This was another giant leap forward.

Finally, as Rick mentioned, the late '90s and up to the current time has seen much greater use of CAIG estimates. This resulted at least in part from Pete Aldridge's practice of requiring CAIG estimates be used in service planning documents. Through this period, the activities of the CAIG continued to expand, including the number of cost reviews. As Rick mentioned, this was also a period that saw the staffing at service cost centers and agencies decline. That trend continues. We will hear more about that this afternoon in the presentations to be made by the services and the agencies.



This last slide shows the tenure of each CAIG chair on the timeline along with key events during each period.

That completes the timeline we will use as a backdrop for our CAIG chairman presentations.

With that, I'm going to ask the CAIG chairs, if they would, to come up to the front. We'll start the panel with Don Srull. We will now have four presentations, after which I will open the floor to questions. We will start with a presentation by the first CAIG Chair, Don Srull.

B. 1971 TO 1973 (DON SRULL)

Good morning. What I thought I'd do is make a few comments related to the timeline chart Steve Balut just showed us in his presentation. My comments will be based on recollections of the context within which cost analysis and cost research existed during those early years—1950 through the 1970s.

The most significant cost analysis work in the early '50s certainly must include the pioneering RAND efforts in building parametric weapon system cost models. Much of the original RAND work involved both creating cost models and collecting cost data. Concurrently, there was an emerging and growing urge within the Defense Department to manage weapon system costs better and bring spending under control. Surprisingly, it wasn't clear to many at the time how closely related the two were.

As an aside, back in early 1950, at the University of Michigan Willow Run Research, some of the earliest parametric cost research was going on. I was working there alongside a young graduate student named Milt Margolis. He couldn't attend this cost research symposium today unfortunately, but if he were here, Milt could have talked about some of his hands-on, groundbreaking cost research. At the time, Milt was building some of the first parametric cost models of electronic systems, including the earliest automatic computing devices (one called MIDAC), as well as missile defense systems (including WIZARD I and BOMARC). Because of that work, when he left the University of Michigan, he went to RAND to continue his cost research as part of their cost analysis group. It was there that a critical mass of cost analysis people had been assembled, where they wrote and published some of the most influential, definitive weapon system cost analysis material. Better, more professional cost analysis procedures were beginning to take hold, and it was spreading within the aerospace weapon system community.

As the aerospace industry began using cost analysis groups as an integral part of their engineering activities, I had joined Convair in San Diego. One of my jobs was to help set up an operations research group within the advanced engineering department. Borrowing from earlier experience at Willow Run, I was allowed to set up a small cost analysis group within the operations research group. Our capability grew, and we shared ideas, as well as cost and technical production data among the Convair divisions and with RAND.

Throughout the aerospace industry at that time, there were quite a number of small but competent cost analysis groups. These were often part of the engineering department, and were usually staffed with competent engineering-oriented cost analysts. Since they often had access to a great deal of internal historical cost data, very good special purpose cost models were common. Sharing these cost analysis tools among competitors or clients, however, was not common. Nevertheless, my impression remains that industry had much better cost estimating capability than is usually recognized. How and when they used that capability is another matter. At Convair we had built very good aircraft cost models, which were first based on Convair's very elaborate weights model which was extensively used in the advanced engineering department as an integrating device during system preliminary design. As such, our cost model had good credibility within Convair and was used for internal technical and management purposes.

Though not as broad or deep as the aircraft models, we also had some fairly extensive missile cost models. Their sophistication was due in part to the fact that Convair had inherited a number of the project Paper-Clip German missile scientists and engineers after WWII. And with them, they brought a lot of experience and knowledge concerning missile advanced technology and the associated manufacturing experience.

Allow me to say a few words now concerning the broad political and public context within which cost analysis existed during that period. There tended to be a belief, as there might still be in Washington, that at the root of the so-called cost growth problem that became visible during program execution was the fact that contractors really didn't know much about program management, and/or the capability to predict weapon system costs with any precision was not really possible. Nevertheless, in my view most aerospace companies, large aerospace companies at least, starting in the early '50s, had the capability to make reasonably good estimates of how much any new weapon system program would probably cost. Having a substantial amount of historical data, and various cost models available, most companies and their military department clients were certainly able to avail themselves of reasonable estimates. In most cases, therefore, there

were people in the large aerospace companies who knew roughly what programs would likely cost, and how long it would realistically take to carry them out.

Why then, were their bids invariably and greatly under the actual, eventual costs? What were the reasons for all this "cost growth"? Theories and discussion abounded. How much was it simply poor estimates, or purposeful underpricing, or government interference, or faulty program mismanagement, or contractor incompetence, or unforeseeable acts of God, or just that costs cannot be predicted? There were even proponents of the idea that this cost growth was perfectly normal and OK—"not to worry." All theories had their supporters.

It may be difficult now to imagine the culture and the environment in which program competition and acquisition took place during that period. From my experience, competitors were normally given hints, or were informally told what unit price, total program cost, and important program milestones were acceptable. This was strictly informal, since it was not legitimate to leak price targets in competitions where program price was to be a heavy determinant of the winning proposal. So, given a detailed set of system specifications; and then at a later point a set of financial and schedule constraints, competitors basically had an over-constrained problem. Also, in virtually every case the cost targets, when given, were impossibly optimistic, and the schedule targets required "no program problems and no surprises." Competitors had little choice but to play and try to win; the ones who knew or suspected that their "best estimate" numbers were close to right had to somehow rationalize low bids or withdraw from the competition; the competitors with management who may not have known much about cost could more easily rely on sheer optimism or invent a new management slogan to challenge historical experience. Most participants, however, usually knew quite well what was going on and what the rules of the game were—you had to under-price proposals to win programs, and, hopefully, and more than likely, payments would eventually grow to meet actual costs. Program changes, requirements escalation, and short memories all would help.

It was very difficult, in my experience, to find examples where a valid, reasonable cost estimate, based on good cost research helped win a program. To the contrary, it was quite possible for a company to underbid, say by 20%, but then lose to a competitor who underbid by perhaps 30%. Under those circumstances the perceived utility of good, realistic cost estimates could obviously be damaged.

An interesting phenomenon our early cost research showed was that actual costs of programs for which good early estimates existed, often grew well above the earlier best estimate. Investigating several of these cases we found the obvious. If a program started with a substantially underestimated budget and schedule, the early commitment of resources could be totally wasted. A simple analogy would be starting to build a million dollar house, but beginning with a foundation allocation suitable for a 300 thousand dollar house. You may eventually wind up re-digging and rebuilding the whole foundation, delaying all future work and spending more than a reasonable estimate would predict in the first place. I have seen little research concerning this phenomenon, but it may be important to properly quantify this added cost risk due to unreasonable early underestimates.

I left Convair and came to Washington in 1969 to work for the Department of the Army. As you may recall, that was a tough period for the Defense Department—we were in the middle of the Vietnam War, and things were not going all that well—there or here in the United States.

One of the reasons an aerospace person like myself was brought in as a Deputy Assistant Secretary of the Army in the Manpower Office was to help unravel some manpower management difficulties. It was a complicated and sensitive set of interrelated problems involving forces and manpower around the world—including Europe, Korea, and Vietnam- plus trying to manage an increasingly unpopular draft call. Integrating all the manpower processes and complying with a bewildering array of congressional and

legal constraints, while making the process transparent and as fair and accessible as possible was a challenge. Army Secretary Stan Resor and SecDef Melvin Laird were incredibly supportive and determined to let the numbers and facts fall as they may. Because of that high level support, in about 2 years a reasonably integrated manpower system, including an automated draft call, helped defuse many issues and lay the groundwork for ending the draft and moving to an All Volunteer Force. Enthusiastic high level support and the unqualified availability of large amounts of relevant historical data made it possible.

While I worked in the Army, I also occasionally sat in on some of the very early DSARC and pre-DSARC planning meetings. The Army at that time was having problems with a group of new major weapon systems, which, as I recall, were called the "Big Nine." It was a large number of simultaneous, massive new weapon system development programs on the Army's plate. One was the Cheyenne helicopter, a high performance rigid rotor helicopter. It was hoped the Cheyenne would help win in Vietnam, but unfortunately never made it through development. By all historical standards, it was severely under-priced, and its target schedule was equally unreasonable. A quick review of those programs indicated that if all program cost and schedule estimates were as optimistic as they appeared, these programs in total would eventually have a devastating effect on the Army's programmed force structure and modernization hopes.

It was disappointing to find there was little to be done to head off these problems at an early stage. And nothing much was done until catastrophic program failures began to occur. It seemed there was no established function, no group responsible and capable of providing independent cost/schedule review at critical program decision points.

During that period, the problem of "cost growth", as you might imagine, was significantly damaging the DoD's public and ccongressional credibility. There were almost daily cost growth headline stories. Added on top of Vietnam, the cost growth issue seemed to be escalating out of control at the worst possible time. There were a large number of major programs that never came to fruition and were cancelled because of cost overruns. Most programs were late, costs were exploding, new weapons were not coming on line as expected, and additional funding requests were too common.

The problem of program "cost growth" was one of the issues that preoccupied the Secretary of Defense and much of the leadership in the Department and the White House and Congress as well.

As new programs were reviewed, many management people thought the initial estimates might be overly optimistic, but had no mechanism to follow-up. Others who also might suspect bias would eventually rationalize in some way that things would work out OK. A common and peculiar management rational was that if you give a program sufficient money to do a job, it won't be provide the incentive to be very creative or efficient. On the other hand, if you under-fund seriously, there will be a strong incentive to work harder to be efficient and save money. It follows, under this belief, that underestimates are actually preferred to realistic, probable estimates. How such an approach might affect the DoD program, the budget, and Congress was overlooked.

Another rationalization used to tolerate the usual optimistic appearing estimates was that they were, after all, supplied by the best experts available—industry. If the contractors who build this equipment don't know the costs, who does? How can we question the cost proposals of the engineers and scientists who will design, develop and build the stuff? It's hard to imagine that the expert proponents of a program both inside and outside the Pentagon wouldn't know best—cost and schedule-wise.

I was frankly surprised that so little attention was paid to trying to correct the obvious and principle cause of most "cost growth" and the frequent failure of important major weapon system programs—poor initial cost estimates.

I joined Systems Analysis in OSD in the early '70s. Cost growth was still a very important issue. Secretary of Defense Laird had appointed David Packard as his Deputy Secretary—a very bright and honest man, who bore the brunt of criticism at that time about lack of program cost control and "cost growth." I worked for Dr. Gardner Tucker, the Assistant Secretary for Systems Analysis. The DSARC was in its infancy, and high level people were beginning to systematically and periodically review major programs at each important milestone, trying to bring program acquisition under control.

The ASD for Systems Analysis was a member of the DSARC at that time. Systems Analysis' role was to review and make comments on the mission effectiveness of the weapon system under review, plus [to] bring up any operational or programmatic concerns they might have. Cost and manpower estimates as delivered by the program manager could also be commented on, but reviews were not necessary or always welcome. I would attend occasionally with Dr. Tucker.

The system acquisition culture inside DoD at that time was such that if you dared question or challenge the "official" program costs at an important forum like the

DSARC, you had better have a tough ASD and a good story. It was unusual for anyone to do so.

At the same time, even though there was rarely a serious discussion of program cost, there often were discussions about contract problems. Basically, when you ran out of money before a scheduled program phase was completed, there was considerable discussion about how to adjust funding with minimum program disruption or impact.

Dr. Tucker was asked by Secretary Laird and David Packard several times to come up with ways to help….“get this cost growth thing under control.” They desperately and honestly were searching for some way to calm the criticism and controversy created by the continuing cost over-runs and program failures. They feared that Congress would carry out their threats to legislate solutions. At the same time they were afraid that Congress would, in some way, actually take control of the program acquisition process. And they didn’t want that. The administration wanted to get the “cost growth” issue cleared up and off their back.

Dr. Tucker asked if our cost group had any ideas—had we done any research to point the way to a fix. I had recently joined Systems Analysis, and fortunately Milt Margolis was also in Systems Analysis at the time. Milt was the head of our cost group, so I had him and his staff go through their files and pull out historical records of recent program cost estimating experience. Basically a “who made what estimates when, and how did the estimates and actual costs change over time” overview. Fortunately, the cost group had kept track of many of the prior and current programs as they passed through various acquisition phases.

As a side comment: I often found it possible to extract important lessons simply by collecting and laying out historical data such as this. Trivial sounding, I know. But too often, there is a tendency to overlook such simple historical reviews. We are kept too busy with day-to-day activities, and anxious to get on with current and future events. Another factor may be some trepidation of tracking and clearly showing someone’s (including your own) past performance.

In any event, when Milt brought in some summary tables and charts, my reaction was: “Eureka!” It was more than I could have hoped for. The raw material was right there for explaining in a logical, overwhelmingly clear, understandable way the major problem plaguing the defense acquisition process! Nothing less. I was convinced that, put together properly, it was a presentation one could successfully give to a PTA audience; or to the DSARC principals, the DoD leadership, even congressional committees. And they would

see, before you gave them the punch-line, what was going on. The information could even suggest some obvious reform actions. It would prove somewhat tougher than I imagined, however, to convince all important DoD players of the story's logic; but the basic power was there and eventually won out.

The information showed that for a very large number of programs, going back almost 10 years to the present, in a hundred percent of the cases program cost estimates by program proponents (both in the Military Departments and industry) were seriously and consistently too low. As actual costs were incurred, in all cases the costs and cost estimates rose dramatically. Initial errors were often in multiples of 100%! Perhaps even more astonishing was that the independent parametric model estimates (based on historical information) made by Systems Analysis were significantly better than 100% of the time. Their estimates were also always low, but their errors were much smaller—usually 2 to 3 times smaller. It seemed to clearly show that the widespread notion of "cost growth" was not cost growth at all! "Cost growth", in fact, was a misnomer. The main culprit was not poor management, sloppy or lazy contractors, or lack of clever contract details that led to costs growing above the original estimate. It was simply unreasonably low beginning estimates. One could not after all, buy the new Cadillac automobile for $5,000. When it turned out to cost $25,000 it was not "cost growth"—it was an unrealistic, poor initial underestimate!

I did have some mixed reactions. The results were expected—after all, most everyone in the real world of weapon system procurement knew that proponent proposal underestimates are the norm; it was part of the competition process. I was also amazed that so much good acquisition management data had been so readily available. Finally, I was baffled that this gold mine hadn't been found and used before to help control a very serious political, management and national security shortcoming.

In a way, you could look at the Systems Analysis independent, parametric cost estimates and say, they're not all that great either. Nevertheless, they were at least twice as good as the proponent's estimates in every case, since their error was consistently much smaller. It's also interesting that even the parametric estimates were always low. And when the technology of a new system was very different, our underestimating errors tended to be even larger.

I showed the cost estimating presentation to Dr. Tucker, and while he agreed with its significance, he wanted to fill in more details before we approached Mr. Packard or Secretary Laird. He also wanted it to get a real scrubbing and critique, so had me brief it

through Systems Analysis and various other OSD offices, including to the DDR&E Dr. John Foster, the ASD for Logistics Barry Shilito, and the OSD Controller and his cost analysis group. We spent months doing so. Howard Manneti was in Milt's cost group at the time, and was there to help and guide us.

Along with good suggestions and comments, a common reaction to the briefing was one of cynicism. Many people indicated they believed what we were saying, and the numbers were convincing, but, so what? That's just how things work: the services are competing; the mission areas are competing; companies are competing; and the way program winners are selected depends upon who advertised the lowest price—no one seems to know or care about underpricing. Congress plays in it, too. So even if we found that everyone competes with underestimates, it did not mean there was much chance for reform. The problem was felt to be too entrenched; too difficult.

Nevertheless, Dr. Tucker still believed we could give our bosses some of the help they had asked for.

During these practice runs, we were also exposed to many of the most common and clever rationalizations for continuing to accept the status quo. These included:

- If you fully fund a program, they'll sure spend it all and not look for savings.
- Higher, more realistic estimates can kill important programs
- Contractors have hundreds of pages of cost detail, compared to your few pages of analysis.
  - The contractor signed a fixed price contract.
  - This program has adopted a new, modern cost/schedule control system (Cheyenne had one of the best).
  - We're using new, more powerful contract cost incentives
- And many more.

So we tuned and simplified the presentation and, being very busy, put it aside and waited. The magic, accidental moment arrived when Mr. Packard had just been thrashed by some congressional committee for what I recall was the 2nd or 3rd sequential cost overrun of the Navy's F-14 program. Mr. Packard and the Navy had promised the overruns would not occur. "Abnormal escalation" and other creative but peculiar explanations did not set well in Congress. In any case, Mr. Packard was distraught. He was essentially being personally blamed for the lack of control, not just in the F-14 program, but within all the DoD programs currently in trouble. Having been one of the

most respected giants in the business world, he was hurt by a congressional committee questioning his competence.

Shortly thereafter, Dr. Tucker and I got an opportunity to show Mr. Packard our cost analysis briefing. He politely sat and listened, but obviously had other important things on his mind. One of the slides used the F-14 as an example, and got his attention. It illustrated how Navy/Grumman cost estimates compared over time to simultaneous independent, parametric estimates, and to actual program costs. It clearly documented how a few years earlier, the OSD cost group had predicted that F-14 program costs would grow to at least the current actual levels—something DoD had assured Congress would not happen. We showed that the in-house Systems Analysis cost group apparently knew the earlier Navy/Grumman estimates used in programs and budgets were badly underestimated. In addition, the briefing documented that numerous other programs had suffered or would likely suffer the same fate.

The simple, basic principals of the thesis came across—and that independent, parametric cost analysis was the one of the potential keys to better management oversight. Independent cost analysts were essential because the pressures on program proponents would inevitably lead to estimates being unrealistically low, parametric, because it was obvious we needed to base important cost projections on the best available, real world cost experience. Mr. Packard quickly grasped and embraced the ideas, and launched into action.

To paraphrase, he said: "Okay, we're going to use this idea quickly to help us come to grips with the cost growth problem. We need a structured, periodic independent parametric cost review, done at and for the DSARC, to make sure we are all at least aware of what historical experience tells us." He sat down on the edge of his desk and wrote the CAIG memo you are all probably aware of, and persuaded Secretary Laird to write his subsequent memo establishing the initial CAIG system. The fundamental organizational change was the establishment of the CAIG as a permanent staff resource reporting to the DSARC chairman. As the first CAIG chairman, I was required to brief the DSARC on the CAIG review, and critique of the program's official cost estimate.

It was a great lesson. I'm personally convinced that neither Mr. Packard nor Secretary Laird knew or suspected that the numbers they were given by the military departments, and presumably reviewed and scrubbed by the DSARC and other reviewing bodies, were so consistently and often purposely underestimated. Neither of them hinted that they "…knew everyone underestimates costs, and we really can't or shouldn't try to do anything about it."

Looking back at our early cost analysis group research activity, it seems to me we were not able to adequately fund external or in-house cost research. Our efforts to build new cost models and to improve existing models to extend coverage and improve precision did not keep up with the increasing demand for cost analysis. We had a small, overextended staff. The good news, I think, is that it made us much more selective and careful about the research and tool building work we did undertake. We were able to fund a number of important research programs at RAND, for example, and continued to make use of portions of their internal cost and manpower work.

Having said that, it's difficult to remember many important cost debates we engaged in at DSARCs or during POM/budget reviews that suffered directly from lack of cost research or good cost tools. Having our independent, parametric cost numbers taken seriously was not usually challenged because of inadequate cost models. An overwhelming, numerical argument with large amounts of relevant and supporting data would certainly have helped in most cases. But the pressures to underprice systems and get management to accept overly optimistic costs, performance and schedules had existed for too long to disappear quickly. Powerful coalitions of program proponents still fought for unreasonably low estimates and sometimes prevailed, though less often. The battle continued, but the playing field was now a bit more level. It was becoming more difficult to accept proponents unreasonable cost assurances in the face of contradictory historical data now with the CAIG as part of the DSARC process. Progress was at times spotty, but had started.

Overall, I believe our principal challenge was to simply get most managers to accept the notion that reasonably accurate, independent cost estimates are both possible and useful for system selection and resource allocation. Conversely, overly optimistic estimates will seriously undermine the entire planning/programming/budgeting process.

As the CAIG's work continued, its existence became known outside DoD. Congress, the GAO, and other government agencies, even some outside the US including Great Britain, began to ask questions about this new DoD activity. As a result, we continued to brief a modified version of the original cost presentation. Later versions did not specifically identify many of the programs and their associated cost errors. The program data was aggregated into "statistical" tables. Considerable time was spent briefing congressional committees, GAO, Congressional Budget Office, and the other federal agencies, describing the basic ideas behind independent, parametric costing, and how it was being used within the DoD acquisition process. I think these visits did some good in building a wider, more open discussion and eventual acceptance of these

concepts. And indirectly the wide exposure and "good press" even helped to convert some within the DoD. Many Federal agencies eventually copied in some form the DoD cost analysis/review paradigm.

Educating the important people who continually rotate in and out of the DoD management structure regarding the value of using realistic independent cost estimates is a very important, continuing requirement. These people need to be reminded of the consequences of returning to the proponent dominated system. Human nature is such that, while competent and aggressive proponents for new systems are essential, both in DoD and in industry, for healthy technology growth, you can't rely solely on their estimates of costs and schedule. Their natural optimism and urge to win the race will inevitably bias their judgment and interfere with rational resource allocation. Unfortunately, proponents with heavy financial stakes in winning can also be "optimistic" for less noble reasons.

As time went on, the independent, parametric cost idea continued to slowly gain credibility. The various members of the DSARC became more confident with it as a useful tool, and the Military Departments cost estimates improved substantially. Simultaneously, the environment within DoD, and Congress' attitude toward the department's acquisition management moderated. DoD's cost analysis expertise meanwhile, exemplified within the CAIG, became increasingly professional and grew dramatically under Milt Margolis' and later Dave McNicol's leadership.

One last thought I would like to add before closing. The important contribution provided by the kind of cost analysis and research we're talking about today, and in which you are all involved, is a fragile enterprise. Continued hard work, vigilance, and good luck are all needed to assure its continuing contribution. The sides of human nature and the political tendencies of large, powerful organizations that led to the earlier culture of accepting (almost expecting) biased, harmful underestimates of weapon system resource requirements are still with us. People want to hear good news, and can be creative in rationalizing impossibly high expectations; and there will always be stakeholders and promoters there promising to fulfill those expectations. It will take real effort to fend off those tendencies, and to promote the ultimate value of using the best forecasts of resource needs. It also, of course, takes plain good luck to be blessed with a top level management team, your ultimate customer, that wants and values truth and facts, both good and bad.

Thank you for inviting me to your 2004 Cost Research Symposium, and allowing me to share a few thoughts with you. Be vigilant, and continue doing the very good cost work and research you are all rightfully respected for. Thank you.

C. 1973 TO 1988 (HOWARD MANETTI FOR MILT MARGOLIS)

Introduction

I am going to discuss cost research sponsored by Milt Margolis from 1973 to 1988 when he was chairman of the CAIG. Since I was in PA&E during that time and was aware of most of the sponsored research, I will present my recollections on various topics.

Costing Environment

First, let's talk about the acquisition environment during this period.

During 1973 through 1988, the CAIG prepared independent cost estimates, compared them to Program Office estimates, and reported to the Defense Systems Acquisition Review Council (DSARC), now the Defense Acquisition Board (DAB).

In the early years, the DSARC just listened without much comment. Then as the Congress and the Government Accounting Office (GAO) started to raise cost growth issues, the DSARC became more interested in the costing community's ability to accurately estimate the cost of major weapon systems. Congress got involved through the Inspector General (IG) or the Congressional Budget Office (CBO) on controversial issues

like canceling the B-1A or A-12 aircraft programs where cost estimates played a large role.

With cost becoming more important as a DSARC issue, the CAIG became more heavily involved in important and complex cost estimating and associated source-selection tasks. For example, we were asked to estimate the cost of the source-selection alternatives for the Army's Apache attack helicopter proposed by Hughes and Bell. It became clear that the "most likely" estimate should be used in DoD budgets and the President's budget submitted to Congress rather than the Program Office estimate.

Program cost growth, recurring cost, and scheduling problems in high profile programs continued to plague the Defense Department's management ability and fueled congressional criticism. Because the data upon which parametric methods were based included non-expected changes, parametric cost analysis was starting to be taken more seriously.

So, in the early days of Milt's tenure, we started to see a significant need for increased cost-estimating capabilities as programs became more complex and cost growth started to cause concern.

Capability

Now let's briefly review the CAIG's capability during the early part of Milt's leadership as CAIG Chairman.

Cost analysis is highly dependent on the data you have at hand to perform the analysis. At times in the '70s, we were having two DSARC reviews per week and only 30 to 60 days lead time between the military services CAIG briefings and the DSARC meetings. We had to rely on Contractor Information Reports (CIRs)—the precursor to Contractor Cost Data Reports (CCDRs)—Selected Acquisition Reports (SARs), service data, and contractor data collected on plant visits.

The CAIG at that time had about 15 people with varying backgrounds, including economics, engineering, mathematics, and statistics—some with industry experience. To meet the increasing need for responsive estimates, we augmented the staff by developing very capable military candidates. We were fortunate to be able to recruit talented personnel who had to learn and become productive very fast.

Since we had limited funds for cost research and we needed much more study money for processing historical data and developing cost estimating relationship (CERs) and cost models, we convinced other departments that could use the results to share some

of the cost burden. And during those early years, having something better than a four-function calculator was a big deal; getting a computer model developed and utilized was a real big deal.

Demand

I'll now quickly mention some programs of the '70s and '80s in which the CAIG was a player because of breaches in cost thresholds. These programs reinforced the need for more cost research.

There were cost issues with almost all major DSARC acquisition programs, especially at Milestones I and II. The program office's estimate (usually based on contractor's estimates) versus CAIG's estimate (based on parametric CERs) was an early major issue. (Guess which was lower?)

The major programs in the early to mid-'70s were the Lightweight Fighter (F-16 versus F-17), Competition C-5A, A-10, and F-15 acquisitions, which led to researching and backfilling of data of all major aircraft and the development of CERs and other cost-estimating tools.

Some other programs we dealt with were:

- The operating cost of the M-1 tank gas turbine program versus the proposed Army's diesel program became an issue.
- In the '80s, the AAMRAM missile development cost became an issue. Procurement funds had to be used to complete the development pushing up the cost of the first production lot and breaching the Development Concept Paper (DCP) cost goals.
- The replacement of the B-1B with the B-2 was based on the Air Force's projection of lower operating cost for the latter. Stealth issues related to the B-2 led to studies of the cost of stealth.
- Competitive cost issues between Hughes and Bell required review of the Apache (AH-56) helicopter acquisition and led to development of parametric measures for helicopter cost estimation.
- In the late '80s, the development cost issues with the C-17, B-2, and A-12 arose and required study of aircraft research and development costs.

Investments

Now I will review some of the investments the CAIG made to improve its capability. The total annual CAIG research budget at the time was about $2 million.

In the ‘70s, we spent most of our research money on understanding direct costs and we ignored overhead costing issues. With the industry consolidations (e.g., McDonnell Douglas and Boeing), overhead or its fixed cost portion was becoming a more dominant element, especially when estimating changes in production schedules. The need to understand and model these costs became prevalent so we shifted some of our limited research funds from direct cost issues to addressing overhead cost. By the way, we’re still trying to totally understand this.

In order to improve our capability in this area, and to cover the total aircraft industry, we had to fund this task over several years and were sometimes monetarily supported by other DoD divisions. In the meantime, we also did some research surveys with industry (e.g., fixed cost allocations over alternative production schedules)

Throughout the time period we also made specific investments to improve capabilities such as those that resulted in costing models, backfill of aircraft cost data, improved Contractor Cost Data Reporting (CCDR), and making CCDR data available electronically.

Application

As a result of the investments made in cost-research, we improved our capabilities in such efforts as the following:

- Based on the research on developing helicopter CERs that were used to do the cost analysis of the Apache helicopter, the DSARC raised the Army’s design-to-cost figure by about 40 percent.
- Overhead cost models were used in estimating the many changes of production rates in the summer review cycle in preparation of the proposed DoD budget.
- Aircraft development cost models were used for CAIG estimates for the B-2 and the A-12.
- Tactical aircraft cost models and CERs were used for CAIG independent cost analyses in many cost-effectiveness studies done during this period.
- Limited research on Operating and Support (O&S) costs led to a handbook in this area, which became the model for CAIG O&S cost estimation.

Summary

How well did we do and what can we do to make it better? In most cases, the benefit derived from these studies was significant just because of time saved and improved accuracy. Such benefits are difficult to quantify; however, I would like to say that without these results, we would have been hard-pressed to present credible numbers.

Actually, we would have not been able to complete some estimates in time for DSARC review if it were not for the CERs or models available as a result of the cost research that was performed.

My opinion is that cost estimators should be involved in associated research efforts. They are the ones who best understand the problems in developing a credible number. As for centralizing research, I might add that certain types of research like monitoring and collecting CCDR data (already centralized) and making it available electronically should stay centralized since they are continued over time and cover a broad spectrum of activities.

In summary, during Milt's chairmanship, we saw a significant improvement in the CAIG's ability to deal with cost-estimating issues, much of which can be credited to the cost research that was performed. Symposia such as this one can better help to define cost research needed now, and I know that Milt would challenge this audience to do that.

D. 1988 TO 2002 (DAVID MCNICOL)

I'll speak directly to cost research eventually, but let me sneak up on that topic. I propose to briefly go over the crises that hit independent costing in the DoD during my watch as CAIG chairman. I'm not thinking of "crisis" here in the sense of somebody running around the office with their hair on fire. What I've got in mind is a more specialized meaning of the word: a situation in which the old rules or the old ways of doing business aren't working anymore or are under serious challenge in one way or another. On my watch the CAIG had three crises in that sense.

The first was the Inspector General's (IG's) review of independent costing in the DoD. The IG's review of this topic was begun in 1990, was greatly intensified by the cancellation of the A-12 early in 1991, and culminated in a report issued in early 1992. As a consequence of the IG report, the CAIG was tasked with making its own cost estimates. You've heard from Don Scrull that early on the CAIG did make its own estimates. But by the late 1970s, as the service cost centers emerged, the CAIG drifted away from making its own full-up estimates. In all but exceptional cases, the service cost

centers did the bulk of the work that went into the independent cost estimate. The CAIG analysts would do an independent review of the estimates made by the program office and the service cost center, draw on the service cost center estimate and their own work to challenge the part of the service cost estimate they found to be unrealistic, write up a report summarizing the amended estimate, and send it forward.

At least that is how the process was presumed to work. We had one year in which one CAIG analyst handled seven cost "estimates" by himself. You don't do a great deal of cost estimating when you're doing seven estimates in a year. (The rule of thumb we used post-IG report was that on average eight-tenths of a man-year is required to do an estimate.) I heard a somewhat unflattering description of the CAIG activities in this period as being like a man running alongside a taxicab shouting instructions. I'm afraid in most cases that characterization had more than a little truth to it. In fairness to my colleagues from those earlier times and myself, we had very few people doing the costing and the taxi analogy wasn't apt in every case. The CAIG did independent estimating in the really critical cases, but those were exceptions.

That changed over the two years after that Inspector General's report was completed and acted on by the Deputy Secretary of Defense. It was made clear to us that that the CAIG was in the future to do its own complete estimates. The lawyers went so far as to explain to me the chart that must go in every CAIG briefing in order to satisfy the statute. There was a grace period of a year or two as the CAIG filled the additional slots it had been given, but by 1994, the CAIG was making complete estimates in all cases.

The flip side of the CAIG itself doing the independent cost estimates required by the statute was that the service cost centers lost the central part of their mission. Those

who were most closely involved understood that would happen, and it is a fact we've been living with for the last decade now.

The changes forced by the IG were taking place as the second crisis began in 1994. This crisis was brought to us by acquisition reform and infrastructure reduction. You probably all remember that in the early to mid-1990s, the administration was anxious to increase the funding for acquisition, which had fallen by more than 50 percent. The hierarchy of priorities then was readiness first; second priority was avoiding further cuts in force structure; and third priority was increasing funding for procurement. The DoD top line was not going up, so the only source of funds for increased spending on acquisition was reductions in infrastructure. People looked around and asked, "Okay, where can we get resources out infrastructure?" And then: "I've got an idea; we'll fire the cost analysts." I'm exaggerating, of course, but the cost analysts were among the first out the door. There was a period of three or four years during which the cost-estimating staff in the Department of Defense as a whole, as best I could gauge, was reduced by approximately 50 percent. That reduction seems to have been permanent and, in my judgment, has sharply degraded the DoD's ability to make realistic cost estimates.

The effects of acquisition reform were not so clear-cut. On the one hand, there was clearly less interest at senior levels in OSD in grounding weapon system budgets on realistic cost estimates. Along the same lines, the political leadership had a sharply lower inclination to listen to the CAIG and a greater willingness to listen to people who had more attractive stories to tell. You can see the effects of this policy shift in the data. When the CAIG was formed, cost growth went sharply down. It stayed down for two decades, but it went up substantially at the start of the first Clinton administration and stayed up through the 1990s. That is a point that I'll come back to.

On the other hand, during the Clinton years, the CAIG got vastly improved access to the program information required to do good cost estimates and longer timelines to do the costing. These, and the staff increases the CAIG got after the IG report, enabled it to do a better job.

There was one other change during these years that people by and large don't recognize, but should. In the 1970s and 1980s, cost estimates were briefed to the Defense Acquisition Board (DAB), and its predecessors, the Defense System Acquisition Review Council (DSARC), but in my experience, the DAB chairmen usually did not themselves act on even major disagreements between the CAIG and the service cost estimate. The cost estimates were primarily for information. The estimates often were used, however,

by PA&E and Comptroller staff during the program and budget reviews. I've heard it suggested that most of the enforcement of realistic costing at the OSD level took place in a closet, in PA&E or Comptroller spaces, in the dead of night. There was some of that, but most of the effort on realistic costing of weapon systems was done in the open. Realistic costing had a substantial place in the programming process during this period. The centerpiece was a paper on realistic costing of major systems, which reflected the results of 25 CAIG reviews done to support the program review. We also always had papers on economic reduction rates and on multi-year procurements, and we might have a paper on industrial base considerations. Moreover, in my experience, during the budget review, the Comptroller was usually receptive to major realistic costing issues.

After 1993, the venue for realistic costing issues decisively moved to the DAB from the programming and budgeting processes, and realistic costing of major programs disappeared as a major part of the program and budget reviews. This reflected an explicit agreement made at the level of the senior leadership that the costs that went into the budget would be those adopted in the DAB milestone authorization and written into the Acquisition Program Baseline (APB). That distribution of decision-making authority within the administration was consistent with statutory provisions adopted by the Congress six years earlier, in response to recommendations of the Packard Commission. DoD had been using something very much like APBs since at least the early 1970s. The Congress in 1986 required APBs for all major weapon system acquisition programs, and the intent was clearly that the cost figures in the APB were those to which the Department would budget. It was not until the first Clinton administration, however, that it was conclusively established in DoD practice that the resource allocation process would ordinarily defer to the cost figures in the APB. That's a change that I think the DoD probably still has not fully assimilated. Budgeting for major systems seems to me to be a place in which significant pressures are building on the tectonic plates of resource allocation and acquisition.

In summary, the crisis for costing during the Clinton years associated with acquisition reform and infrastructure reduction brought the following changes: the costing capabilities of the services fell as the number of cost estimators employed was sharply reduced; the capabilities of the CAIG increased; the senior leadership was less interested in realistic costing; and the venue for realistic costing issues shifted from programming and budgeting to the DAB. I do not see any hidden pattern here. In my opinion, we are looking at four consequences for the DoD cost community produced by four different sets of causes.

I date my own recognition of the third crisis to the mid-1990s. By then, the weapon system costing problems we faced were clearly different, and harder. I say this with 20/20 hindsight. I don't think I really understood this fact until fairly late in the decade. Of course, we saw some novel and particularly challenging costing problems well before then, but I marked these down as one-of-a-kind exceptions. It wasn't until I had been whacked alongside the head a few times that I finally realized that these unusual cases were the new norm.

The first case in this line that stands out in hindsight was the Strategic Defense System (SDS), Phase I. SDS Phase I was the first example I recall seeing of a system of systems. Laying aside the issue of the cost implications of getting the various systems to work together, we see that most of them had no precedents, so we didn't have a lot in the way of historical data to use. Moreover, simply understanding what these systems involved took a considerable amount of study and technical expertise.

In the years just after SDS Phase I, we saw stealth—B-2, A-12, F-22—which none of us had ever dealt with before; more software-intensive programs; systems-of-systems, especially those for C4ISR; and space systems. We also increasingly saw programs in which joint features were crucial. These tended to be more complicated systems and to require more effort to cost if only because there were more firms and DoD (and often foreign) organizations involved. On top of all of these considerations, we also had to try to discern the implications for cost of the decline in the size of the defense sector and the wave of mergers it experienced in the mid-1990s. It made me nostalgic for the good old days when all the CAIG had to contend with were systems like the Abrams tank, the F-15, and the DDG-51.

We did three things in response to the increased difficulty of weapon system costing problems. First, we tried to hire as cost analysts highly capable people with engineering degrees and relevant experience in program offices or private industry. We put a great deal of effort into this, and had some success, but not much. The combination of the professional interests of capable engineers, what we could offer such people, civil service pay levels, and a booming private sector largely defeated our efforts.

Second, we put more effort into keeping our data fresh. The decay rate of our historical data is something that the cost community has lived with since the start of parametric costing. From this perspective, the major technological advance in weapon systems from the late 1980s on was not a change in kind, but a change in degree. The decay rate of cost data is very high now, and there is a large premium on capturing the

data from ongoing programs and getting it in people's hands much more quickly than we used to do. That was a large part of the motivation for the greatly increased attention we paid to the Contractor Cost Data Reports (CCDRs). A well-functioning CCDR process will help, but it will not be enough. We also should start using the Acquisition Decision Memorandum at Milestone A to require development data during the early part of the program to help make a realistic cost estimate to support the Milestone B decision. Along much the same lines, we need to consider capturing data relevant to costing from the technological base, which is a possibility we have never paid any attention to before.

Third, we tried to support and initiate research directed to the main costing challenges presented by systems a few years down the road. A characteristic example of what I have in mind here is a study that was initiated in the Naval Air Systems Command (NAVAIR) early in the Joint Strike Fighter (JSF) program to get on top of commonality—what definitions we were going to use; how we were going to measure commonality; and the initial implications of the early designs for commonality. That study, which the Navy has refreshed at least twice, has been fundamental to the costing of the JSF program. Without the results of the NAVAIR study, at Milestone II we would have been reduced to taking a key cost driver—the degree of commonality—varying it, and concluding that JSF unit costs were going to be somewhere in the range modest to pretty high, depending upon what commonality is achieved. That would not have been a terribly helpful observation. Similarly, staff in the Office of the Under Secretary of Defense (Acquisition, Technology, and Logistics) working with the CAIG kicked off a study of the cost of stealth well before we got into costing the JSF. Again, we could not have made a reasonably well-grounded estimate of the costs of the JSF program at Milestone II without first having done that study.

Another example is what I remember as the C-17 "doors and floors" study. Around 1994, the C-17 program was visibly struggling with cost growth and schedule slippage that were widely attributed to poor contractor performance, which, in turn, reflected an ill-advised Government choice of contracting strategy. John Deutsch, then Deputy Secretary of Defense, decided to compete the C-17 against commercial alternatives. The CAIG put up its hand and said, "You're going to have to do something to the doors and floors for the commercial aircraft to be a viable alternative to the C-17." The initial response from the proponents of the competition was, "Not a problem; don't worry about it; been there, done that." Our rejoinder was along the following lines: "Could you give that to us in dollars please?" We did not get a crisp answer, so we launched a study of the

question of what modifications to door and floors would be necessary and what costs they would entail.

This is an example of a technical consideration that the cost analysts indicated was crucial to making a realistic cost estimate. We did not have the expertise in the CAIG to do the study; we had to go outside to get it done. But the point there is that DoD cost estimators are increasingly seeing cases in which they need to define—and then understand—some technical issue in order to make a solid cost estimate. In my opinion, situations like this are coming to be much more important than the sort of classic cost-estimating problems concerning such things as developing cost-estimating relationships (CERs) or estimating learning curve slopes.

I think we need to ask how we identify sufficiently early problems like those of my examples, how we get studies of them launched, and how we get the studies funded. Studies like those I have mentioned can be expensive, much more expensive than work of the traditional sort on cost databases and CERs.

As these comments may suggest, I do not think that the steps we took in response to the increasing challenges of weapon system costing were entirely successful or adequate. In my view, this third crisis remains as pending business for the DoD cost analysis community.

This introduces my last topic, leading indicators of the next crisis. I mentioned earlier that cost growth was higher during the 1990s than it had been during the preceding twenty years. In 2001, Pete Aldridge, the new Under Secretary of Defense (Acquisition, Technology, and Logistics), adopted the policy of using the CAIG estimate unless the service could convince him that it was flawed. The new policy, if sustained, marks a major shift in the process through which the DoD costs and budgets for major acquisitions. The ability of the CAIG to support the new policy effectively may be sharply constrained, however, for a combination of three reasons. First, as already noted, weapon-system-costing problems have become more challenging. Second, apart from this factor, the CAIG's workload has increased sharply, and the increase seems to be permanent. Third, the CAIG staff has not been increased, nor have steps been taken to increase the ability of the CAIG to hire engineers as cost analysts.

The increase in workload warrants further comment. Much of the increase can be traced to increased involvement of the CAIG in Missile Defense Agency programs and space systems. In both cases, the increased demand reflects, in part, congressional action and, in part, decisions by senior DoD officials. In addition, over the course of my tenure

as CAIG chair, we were under pressure to track costs of programs almost on a continuous basis. The CAIG was set up to do costing for the DSARC (later, the DAB), primarily at Milestone reviews. The staffing decisions made in 1992 in response to the IG report also rested on that assumption. From the late 1980s on, however, when large programs got into trouble, the Office of the Under Secretary of Defense (Acquisition, Technology, and Logistics) typically had annual, or even quarterly, reviews of the program, and these usually involved the CAIG. As I recall, for example, we had four people working nearly full time on the F-22 for much of a of three-year period. The C-17 story was almost as extreme.

This is a good illustration of a more general point: DoD senior leadership tends to have little insight into the foundations of good costing. Consequently, even though they may see the CAIG as something that is working, and they may like its products, they may, without intending the consequence, do things that undercut the foundations of good costing.

Some of the problems that I have mentioned are likely to eventually turn out to have been problems less difficult or important than they now seem to be. I am not at all confident that the DoD has cost growth on major acquisitions well in hand, however. Consequently, I'm inclined to believe that another crisis in DoD weapon system costing within the next few years is a distinct possibility.

What is the likely direction that the next crisis will take if and when it does occur? History will probably matter because, while people in the DoD tend to have amnesia on such matters, in my experience, the Congress does not. Furthermore, I think congressional expectations are higher now than they used to be. Don Scrull mentioned the charts that led to the formation of CAIG. Fairly early in my tenure as CAIG chairman, we pulled those charts from the files and looked at them. As Don suggested, the estimates the CAIG made in the mid-1970s, which were then a real step forward, would not today be regarded as good enough for Government work. People not only want estimates that are more accurate than those were, they also have come to expect that they can get them.

My sense is also that the Congress is increasingly willing to act on such an expectation. The first time the Congress mentioned independent costing in statute was 1983, when it required the preparation of an independent cost estimate for major acquisitions at Milestones II and III. The next time was, as I recall, in 1988, when the Secretary of Defense was directed by statute to have an independent estimate made of

SDS Phase I cost. That statutory provision did not tell the Secretary to send the estimate to the Congress; then Senator Lowell Weicker (R-CT), who wanted the estimate made, did not insist that it be sent to the Congress. A couple of years later, I was directed to explain the CAIG C-17 estimate to congressional staff, and a year or so after that, to explain our V-22 estimate. The next instance in this sequence, and as I recall the first in which the CAIG was explicitly named in the statute, was in 1996, when the Congress required the CAIG to make an independent estimate of F-22 procurement costs and required the Secretary of Defense to provide the estimate to the Congress. By my count, between 1996 and the end of September 2002, when I left the DoD, there were five instances in which the Congress by statute required the CAIG to make an estimate and required the Secretary to provide the estimate to the Congress.

This history suggests to me that there are grounds for concern about what the Congress is likely to do the next time it comes to suspect that cost growth in weapon systems has become a systemic problem. I don't believe that the DoD could walk the dog back. The DoD implemented independent costing (1972); the Congress required it by statute (1983); the DoD strengthened the CAIG (1992); and the DoD adopted a policy presumption in favor of the CAIG estimate (2001). What is a plausible next entry in this sequence? It's not obvious, and in my opinion the Department should not be eager to find out what "next" could be for independent costing.

E. 2002 TO PRESENT AND BEYOND (RICHARD BURKE)

I've been referring to Biblical analogies today, and I think Don Srull started with "in the beginning." The rest of the CAIG story is still to be written. Over the 30 to 35 years the CAIG has been around—I've been chairman of the CAIG for only two years, and that short time doesn't merit more than a comma at this point—there's been quite a bit of change in activities and what I will talk to you about are three areas of major influence I've seen during the past few years.

The first topic I will speak to you about is 9/11. And it really does deserve, I think, some serious consideration in this context. It had a notable and observable effect on the Department that lingers to this day. Those of us in the building that day will probably never forget it, and the days after were even harder to forget. Working in a burning building for the few days following 9/11 was certainly quite a challenge. But it's had a real effect on the Department. And this Secretary of Defense has been quite controversial in really challenging the Department to think hard about what it needs for the future. In his view, he really believes the threat has changed, and that the Department of Defense was slow to

realize it, and that we should have realized it long ago. The early signs were there in the 1980s, in the kinds of events that were going on in the world, and it became apparent that the world isn't going to go back to being what it was, a nice, clean, bipolar Soviet Union versus U.S. model. And that change has an effect on what our business is about.

How has the change affected the CAIG? Well, the Secretary has, of course, reorganized. I put up a chart of the OSD organization, and the most important thing I wanted to point out is at the bottom. There is now a new Under Secretary of Defense for Intelligence (USDI). This has also been very controversial, there's no question about it. The question I've asked myself quite a bit is: Is this organization going to remain through the 2020 time frame or not? Is the Department serious about this change? I think the current Secretary would argue that we should have been paying more attention to the intelligence area, and we need to pay more attention in the future.

You know, the country really has changed a lot. And I think people forget that. We all have been keenly attuned to it in the post-9/11 era. And as I'll show you in the next few slides, I think there's some need to update our charts, because the Congress is certainly aware of it, and once again the story here really isn't completely written. The 9/11 Commission hasn't reported yet, but the bottom line is that 9/11 has had a big effect on changes in the Department and in the CAIG organization.

What am I talking about? We have a new USDI. He wants work done on costs of intelligence-related programs. Not an area in which the CAIG has historically had a big

portfolio of work. Also not an area in which the Department had ever applied costing tools to a high degree much before. We also had not collected historical cost actuals vigorously before.

He also reorganized space programs. He has delegated oversight of Space Programs to the Air Force. There are no DAB reviews for Space Programs, unless there are major program problems. Instead there are Defense Space Acquisition Board reviews, and they're run by the Air Force. In addition, the Missile Defense Agency has been removed from DAB oversight. There are no DAB reviews for Missile Defense Agency programs. These programs are exempt and considered separately.

All of that's had a real effect on the CAIG, because it means we essentially have new customers. We deliver products to many different people. There's not just the Under Secretary of Defense for Acquisition, Technology, and Logistics anymore, but there are several other customers. And a second effect that the change has had—which really is painful—is that the volume of our classified work has gone up enormously. And I think that's true throughout the Government. Organizations are passing more intelligence information, requiring personnel with clearances. Clearance backlogs in the Department of Defense, the Federal Bureau of Investigation, the Intelligence Agencies, and other Government agencies, are growing and becoming more problematic. And we're part of and affected by that.

Dave McNicol mentioned in his talk the 1983 CAIG statute. It has been in effect for two decades and it seems unlikely to change anytime soon. What you may find interesting is that a new statute on Intelligence Programs has been written, Title 50, actually modeled on the CAIG statute. And it has some interesting components to it.

The administration was very concerned about this statute, and you may note the intent that "you must budget to the independent estimates," which drew constitutional lawyers to argue whether such a requirement was even constitutional. What's shown in red on the chart has an effect on the CAIG because there are programs that are jointly held between the Secretary of Defense and the DCI. This statute requires ICEs for major intelligence programs with dollar levels even lower than they are currently established for the major weapon programs. The statute requires ICEs for intelligence programs with greater than $500 million total development and production costs.

What I sense here is that the intelligence committees must have thought there was a crisis in their program costs, they started to look around for how to address the crisis, and pulled out the existing CAIG statute as the model. This will have a real effect on the

CAIG workload. We are at the point now where the Department of Defense can't really comply with this new statute. We in the CAIG don't have the resources. We are in no position to do that work. And we have informed the congressional staffs of that. We're currently working with OMB to sort out the administration's position on how the DoD will comply with the statute in the future. But when Dave McNicol mentioned crises looming, I'm not sure they're looming anymore. Some of them are already here. So this is a big part of what the CAIG is worrying about right now in having to allocate resources between tasks and customers.

And you can have an interesting debate about this, and at some point it may come up before Secretary Rumsfeld. What's more important: costing the next tank or costing the next intelligence programs? I'm not sure where he would come out on that. But it's an interesting question. I don't really have an answer, but I've thought about it quite a bit.

What does all of this mean to the CAIG? Well, our customer list has grown a little bit. It used to be we wrote CAIG reports for either the Deputy Secretary if he wanted something done, or perhaps the Secretary, or the Under Secretary for AT&L. It used to be that we could cover all of the major acquisition programs that way—no more.

Space Programs: we now provide reports to the Under Secretary of the Air Force. For intelligence programs, it depends on the program, but some of them actually are provided to USDI, who may or may not have authority (DAB-like authority) for providing oversight. For Missile Defense Agency (MDA) programs we've established a memorandum of understanding (MOU). MDA is not required to have any independent cost estimates prepared, but General Kadish wanted to keep the CAIG involved in MDA activities and saw it as a significant value added. And so we do have an MOU with MDA regarding procedures and terms for preparation of ICEs for MDA programs.

We still serve the Director, PA&E, whenever he wants costing work done. In addition, as Dave McNicol mentioned, we have what I call the "order book." We get memos frequently from outside Government agencies—particularly from people at the Administrator of NASA—essentially saying, "We need help." Two years ago he sent a note to Under Secretary Aldridge saying, "I need the CAIG to come tell me what the space station program is really going to cost." In the end, Under Secretary Aldridge lent people to NASA to help cost the space station correctly. There's more of that going on, and it's a recurring theme.

The second topic I'm going to speak briefly about here is what I call the hangover from the 1990s. Dave McNicol's drinking has given me a tremendous hangover.

[Laughter] There are two areas I wish to speak about. Acquisition reform is actually the first topic, which I still experience the hangover for, and the second topic is, again, a Biblical reference to The Last Supper.

Acquisition Reform: In the 1990s, the short story for acquisition reformers was, "anything goes." You didn't need to do all of the bureaucratic things, just go out and procure items. That's the short version of acquisition reform. Well, as you can guess, that meant cost reporting was not very important. It didn't rank very high on the list. And in fact, if you look at the rate of Contractor Cost Data Reporting (CCDR) compliance, that is, programs actually collecting and reporting actual costs, we were running somewhere between 11 and 30 percent of Major Defense Acquisition Programs. That's what this chart is about. The chart shows as of March, a list of pre-MDAPs, all the way through post-MDAP programs.

During the 1990s, the acquisition reform movement indirectly undermined cost reporting requirements. This is despite the fact that the requirements were never eliminated, that the regulations and requirements are still there for the same and even better cost reporting than the DoD has always required. Very recently we've strengthened reporting requirements, we've added software cost reporting into the CCDR, which is now known as CSDR (Cost and Software Data Reporting), and this problem has been identified to the leadership of the Department. The mechanism we're using to correct reporting deficiencies is to report this slide at every DAES (Defense Acquisition Executive Summary) review. The plan is to improve the situation enough so the Department could possibly put this report into the Selected Acquisition Reports that go to Congress, so we will report to Congress on whether or not we have cost reporting in place on contracts in the future.

This has actually not been such an easy problem to solve. It involves the contracting community, the acquisition community, and the cost community. And I'm happy to say we're working a little bit better with these organizations, but we do have major problems in reporting that we are addressing. The good news is, when we raise this to the leadership of the services, we seem to now be getting attention. Thanks to Gary Bliss's and the Navy's work on a number of the ship programs, we now have CSDR reporting in place and will have it going forward for a number of ship programs. We no longer have a general waiver for ship programs. Secretary England saw the waivers were not a good idea, so he leaned forward to get CSDR requirements and reporting in place for ship programs. The Army also has undertaken an initiative to get all their programs in shape for cost reporting. We are working with the Air Force and have begun asking many

questions: Where is the cost data reporting that should be in place for major programs? So the story here is that our CCDR compliance was miserable. So, we can only go up from here. But the real metric shows that somewhere less than 20 percent of all the programs are currently in compliance, and we've got a long way to go to improve that. This actual cost information is the future of the cost community. Without the data, we don't need a cost community. And that is my view—if the cost community is not going to collect actual costs of programs, we ought to downsize it and get rid of it in the Department.

The Last Supper: I would just make one remark on the Defense Industry in general, and The Last Supper, which happened under Bill Perry even prior to Acquisition Reform. As you know, this was the activity leading to the consolidation of the defense business, and many of the small businesses going. It looks to me like, in the end, that's going to be an unambiguously bad thing for the Department of Defense. Right now we deal with very large industrial conglomerates. They tend to be very un-innovative. It's like we have to hire Microsoft to compete against Microsoft. Unfortunately, that's not where the real innovation comes from, it comes from the smaller firms. We've also gotten to the Microsoft model where if they see a small competitor who is pretty innovative, they'll buy him up. So the big defense firms are getting bigger, and the DoD has this notion that we're going to compete the two goliaths and get a really great, innovative solution. I think the evidence will bear out ten years from now that we may have worse performance than we did in the past, particularly from a cost perspective. We may actually see worse performance than we've seen for cost estimates historically.

The other important point is these large organizations have a hard time attracting new, young talent. In several of the industrial sectors the Department deals with, there isn't the talent base out in the private sector to execute the programs we have planned. Space is a good example of that, where the Space industrial sector in the United States is really hurting right now, and the Department has a large number of large programs we'd like to begin to execute. There's going to be an inevitable clash in certain sectors going forward.

Finally, I'll leave you with a few comments on how the CAIG actually operates today. We've begun to consider the CAIG more business-like. People have questioned why we don't outsource this thing, and there's been talk about that. How do we clone it? How does it work?

What are our inputs? Well, if you think about it, our inputs are really the historical cost actuals in the CCDRs (now CSDRs), a description of the planned program in the CARD as Dave mentioned, and talent. That's really about it.

Outputs? What are our products? We provide documented life-cycle cost estimates, and estimated annual funding requirements through the Future Years Defense Plan. We do projections of program schedules, which are very important these days. We observe that, in many cases, the Department starts programs on schedules that are unrealistic. Regardless of your estimate and funding profile, I cannot get a program executed successfully on an unrealistic schedule.

And Costs? What does it cost to develop a CAIG estimate for a program? Well, we just completed a study for our last calendar year and found that the average cost of developing a CAIG estimate for a program last year was $256,000. That includes all costs—personnel, travel, office space, computers, cost data, pencils, etc. This is a remarkably low figure. We found that the estimates we worked on last year ranged in cost from about $80,000 to about $750,000, depending on the system. The bottom line is that this is a remarkably low figure to use as a benchmark. And, if you're in the private sector, the CAIG is not an organization that you would like to compete with on a cost basis.

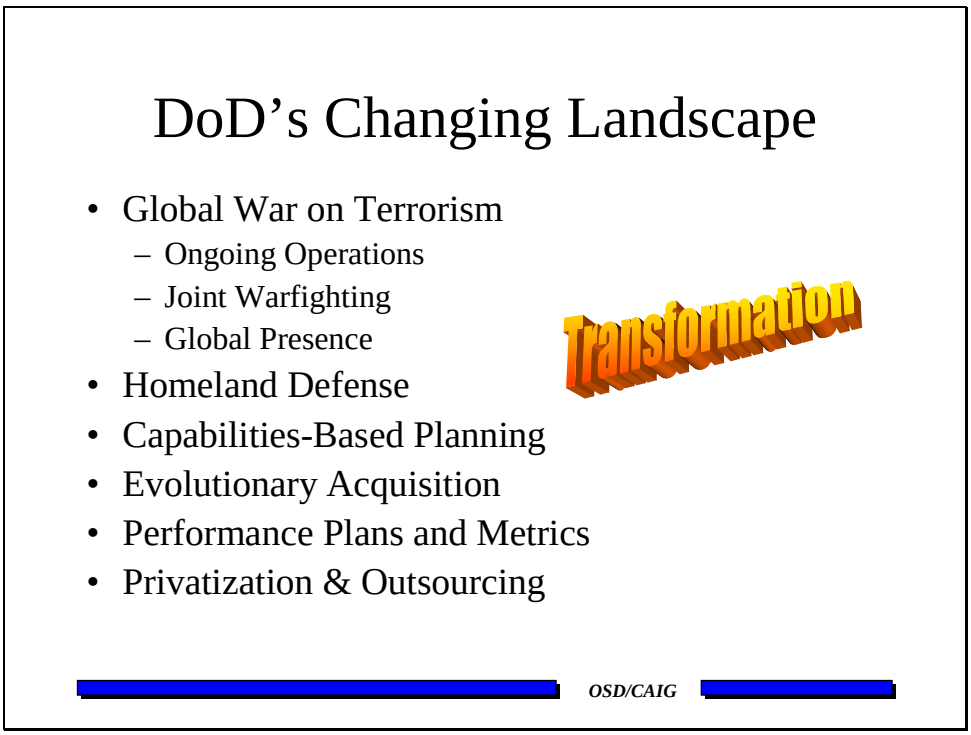
And with that, I'll end my remarks. Thank you very much for your attention.

V. PANEL DISCUSSION: SERVICE/AGENCY MANAGEMENT OF COST ANALYSIS AND COST RESEARCH

The following sections contain charts, some annotated, from briefings presented by the panel members.

A. DEMAND FOR COST ANALYSES: OSD HISTORY AND PERSPECTIVE (RUSSELL VOGEL, MODERATOR)

Good afternoon, I'm Russ Vogel of the OSD CAIG. The CRS panel this year is going to capitalize on the morning session which gave a historical review of the CAIG by each of its four different chairmen. Our panel will review the details of historical funding and projects and give a current perspective of required or recommended areas for research.



To give a backdrop of the current environment facing the different cost analysis organizations, I've listed, in my priority order of impact on the need for research, the major activities of the DoD. We're now in our third year of the GWOT and there is no end in sight on the level of operations of our forces, some supporting Joint and Coalition activities, around the world. Our contributions to the Homeland Security Department is reflected in our numerous and extensive Homeland Defense activities and programs. As the Combatant Commanders and warfighters conduct operations in support of the above and our other regional and worldwide commitments, a new system of defining necessary combative capabilities or defining gaps in existing capabilities and forces is being formalized—the Joint Capabilities Integration and Development System. At the same time JCIDS is becoming the basis for defining the Department's needed capabilities, the Acquisition process is changing to reduce the time new systems are developed and fielded. Evolutionary Acquisition is changing everything about the way weapon systems are acquired and managed. While all these activities are straining our forces and the processes are changing, the DoD's organizations and agencies are being asked to develop performance plans and performance metrics for baselining and future reference. And of course, virtually all DoD operations must consider the impact of privatization and outsourcing.

Panel Composition

- Russell Vogel - Moderator, OSD CAIG
- Jay Jordan - AFCAA
- David Henningsen – DASA-FM
- Robert Hirama – ASN/FMB-6
- Janet Young – MDA/PIE

OSD/CAIG

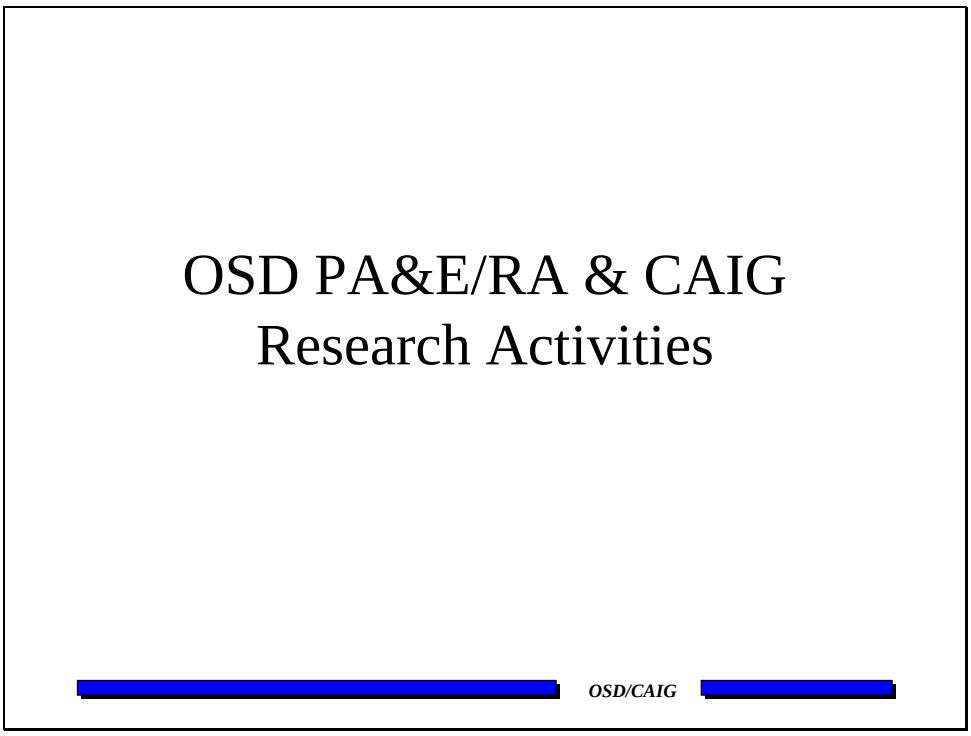
Today's panel consists of representatives from the cost analysis organizations of the three services and the Missile Defense Agency. I will be the panel moderator and will ask the panelists a few probing questions at the end of the prepared presentations. Since Dr. Burke went into great detail about the many issues facing the OSD CAIG, I will lead off the presentations with a short summary of the OSD CAIG research history and issues. I'll then discuss at a summary level the recommended areas of research for consideration by all of the attendees at this CRS and the community as a whole. I will be followed by Mr. Jay Jordan of the Air Force Cost Analysis Agency. Next will be Mr. David Henningsen of the Deputy Assistant Secretary of the Army for Cost and Economics (formerly called the Army Cost and Economic Analysis Center). David will be followed by Mr. Bob Hirama of the Navy Cost Analysis Division (formally called the Navy Center for Cost Analysis). Last will be Ms. Jan Young of the Missile Defense Agency.

Outline of Cost Analysis and Research Challenges

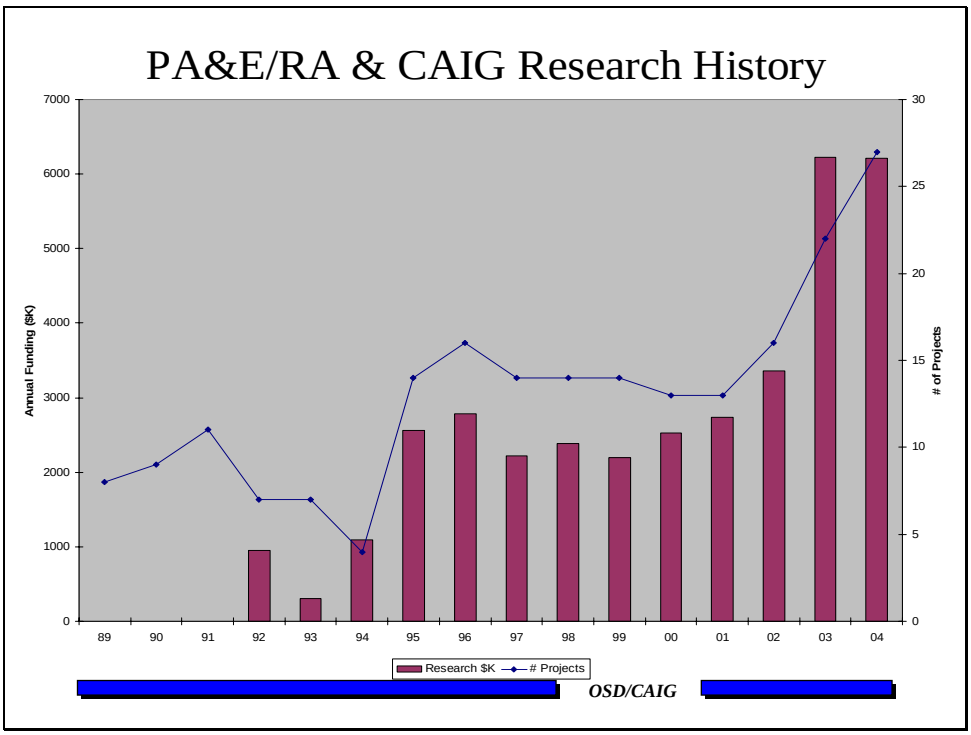
- History
  - Responsibilities
  - Capabilities
  - Resources/Staffing
- Current Status
  - Organization Changes/Mission
  - Issues/Challenges
  - Research Activities
  - Funding/Use of Previous projects
- Prognosis

OSD/CAIG

As I mentioned earlier, each panelist, especially the three service representatives, will draw upon the foundation laid in the morning panelists presentations to address the historical and current status of their respective cost analysis organizations with an eye focused on their research activities. We've asked them to address the evolution of their assigned responsibilities, the capabilities delivered, and the resources (in dollars and manning) they've had. Next they'll discuss the current status of their organizations and current issues and major challenges affecting their day-to-day operations. They'll then discuss their research process and a summary of approved and or funded projects. Finally, each will give a prognosis of their organization given the current state of affairs.



The rest of this presentation addresses PA&E Resource Analysis and the CAIG. I'll fill in a few of the areas not discussed by Dr Burke, such as the number of research projects and the requisite funding, and a discussion of the most important research topics and the processes we use to fund those projects.



The chart shows a historical summary of the funds expended and the number of annual projects funded by PA&E Resource Analysis and the CAIG. For the period 1989-1991, no data exits on the funds expended on research projects. The primary increases in funding in both 1995 and 2003 reflect the additional O&M resources added to enhance the CCDR Project Office (now the Defense Cost and Resource Center (DCARC) data collection and analysis efforts. Another major contributor of the 1995 increase was the addition of a study to develop Defense Force capabilities and resource requirements model for allied countries. The modest 1996 net increase reflects a large investment in the VAMOSC data collection and analysis efforts. The FY2004 projection of $6.2 million is a virtual straight line of the FY2003 amount.

Summary of Current PA&E/RA & CAIG Costing Challenges

- Acquisition and Support Strategies
- Software
- Electronics/avionics
- Payloads
- Integration and testing

OSD/CAIG

For PA&E RA and the CAIG, the five most significant areas needing research to understand the constant state of changes or to analyze or assess the actual development and/or production are:

(1) Acquisition and Support Strategies

(2) Software

(3) Electronics/avionics

(4) Payloads

(5) Integration and testing

Acquisition and Support Strategies

- Spiral Development/Evolutionary Acquisition
- Use of Commercial systems to satisfy DoD system requirements
- Contractor Logistics Support
- Mission, Bases and Forces Models
- Military Medical Capability

OSD/CAIG

Extensive opportunities exist for research into the new acquisition approach to development and production of weapon systems.

- Spiral development of systems shortens time to field but also suggests each spiral/block requires separate milestone reviews (e.g., Global Hawk)
- Need models/methodologies to reflect this shift in acquisition strategy
- Generalized Activity Network System (GANS)
- History of true use of COTS and savings/costs incurred
- Modification of commercial systems to satisfy DoD requirements
- Standardization of cost structure
- Collection of historical data and current actuals
- New defense strategy requires reassessment and realignment of missions across Departments, Services, and Agencies
- Worldwide infrastructure to support global presence
- Forces (combatant and support)
- New models/methodologies to reflect shift in policy and strategy
- Readiness versus costs
- Peacetime versus wartime
- Member care versus family care

Software

- Large software development efforts are common across all DoD programs
- Software database and analyses
  - Captures baselines
  - Block/spiral upgrades
  - Size, productivity, schedule, etc.
- Estimating relationships needed
  - predict software coding productivity and schedule as a function of software complexity and integration requirements (number of subsystems)

OSD/CAIG

Network-centric and intelligence-gathering operations are the largest growing sectors of DoD's acquisition programs. Ship, aircraft, ground, and ballistic-missile defense programs all have complex, highly integrated combat and battle management C3 systems. Satellite systems generally include large ground-support C2 and mission-processing systems, with complex software architectures. Major Automated Information Systems (MAIS) often manage architecture for multiple systems.

Electronics/Avionics

- "Small" IT Group B Items
  - MDAP status: JTRS, MIDS-LVT, MilSatCom Terminals
- "Large" Sensor Installations
  - MP-RTIP/E-10, AEGIS, JLENS
  - Integration, networking and installation activities
- Obsolescence
  - Architectures maintenance vs constantly changing commercial products
  - Do DoD systems benefit from "open-system" architectures?

OSD/CAIG

Often individual Group B equipment items are fairly small and inexpensive; however, the quantity and number of platforms they must be integrated with drives them to MDAP status (e.g., JTRS, MEADS, MIDS-LVT)

- Need updated tools for estimating platform integration and installation activities
- Designing, building, integrating and installing large sensors into airborne and sea-based platforms, for example.

What are the costs of maintaining architectures with interfaces to constantly changing commercial products? Do DoD systems benefit from "open-system" architectures?

Payloads

Missiles and Satellites

- Missile seekers
  - Hit-to-kill seekers vs proximity fused seekers
- Satellite payloads
  - Multi-spectrum development
  - New sensors and new phased-array antennas
  - DoD/other agency and commercial experience

OSD/CAIG

Research on missiles and satellites is needed to address the increasing complexity and uniqueness of these systems. Hit-to-kill seekers appear to be significantly more challenging to design and build than predecessor proximity fused seekers. New communication systems are under development across the RF spectrum (wideband SHF and Ka, protected EHF, and narrowband UHF). New generations of meteorological and infrared sensors and new phased-array antennas for RF-based applications (e.g., GPS) are under development. We need updated models for satellite payloads that incorporate not only DoD/other agency experience but also commercial experience.

Integration and Testing

- Discrete estimating relationships vs “Factors”
  - SoS & FoS
  - Open architectures
  - Automation, modeling, and simulation analysis
- Collection and analyses of integration and testing cost data
  - cost drivers and cost estimating relationships
    - hardware cost, software size
    - test sites and facilities, test vehicles and duration
    - Modeling and simulation efforts and effectiveness

OSD/CAIG

Integration and testing research is needed to reflect added complexity for system of systems and family of systems:

- to represent growing application of open architectures
- to address increased dependency on software
- to represent expanded reliance on automation and simulation
- to understand nature and scope of associated work

Integration and testing cost data is needed for analysis to determine cost drivers and cost estimating relationships.

OSD PA&E/RA & CAIG Research Process

- Propose: Major in-house review of Research topics
  - –Call for topics to Deputy & Division Directors -Jul/Aug/Sep (All)
  - –Call for cross-cutting topics with OSD Staff – Aug/Sep (All)
  - –Migration of topics from Combined Program & Budget Review Aug-Jan (All)
- Review/Select: Resource Constrained review of existing and new projects
  - –Begins w/ analysts, screened and prioritized by Div & Deputy Directors
  - –Selected on individual merits and prioritized by PA&E Resources Board
  - –Approved by PA&E Director/Principal Deputy Director
- Fund: O&M and R&D funds
  - –OSD/PA&E and OSD Staff (OUSD(AT&L), OUSD(P&R), OUSD(I), etc)
  - – Prioritized topics executed as funds are available

OSD/CAIG

The method for identification, review, approval, and funding of PA&E research projects has evolved into a formalized annual process. In the fall, cross-cutting and in-house projects are proposed by analysts and submitted for review by the PA&E Resources Board. Topics emanate from previous research projects and new research initiatives—including Program/Budget Review issues. Division Directors review and prioritize projects and the PA&E Resources Board ranks and approves for the O&M and RDT&E funds available. For those projects that are cross-cutting, other OSD staff organizations, such as OSD/AT&L or OSD/P&R, will contribute funds to these joint interest research projects.

OSD PA&E/RA & CAIG Research Activities-FY04

- ***Avionics & Mission Systems Cost Estimating***
- ***O&M Program Balance and Cost Related Drivers***
- ***Cost Drivers for Transformation Forces (FSC related)***
- ***Aircraft Cost Study – Remanufacture, Upgrades, Mods & SLEP***
- ***Software Development Estimating Techniques***
- ***Software Resource Metrics and Database***
- ***Software Sizing Database***
- ***Sizing the Medical Readiness Capability & Managing Beneficiary Demand***
- ***DoD Spectrum Auction Market Analysis***
- ***AFIT/NPS Cost Research***
- ***Improved Methodologies for Estimating Space Systems Development costs***
- ***Cost Research Symposium***
- ***Training Course for Newly Assigned Resource/CAIG Analysts***
- ***MDAP Cost Growth Study***

OSD/CAIG

The list shows FY2004 approved and funded PA&E Resource Analysis and CAIG projects. Most all are continuations of projects begun last year or previous years and add to the ongoing research. A few, such as Sizing the Medical Readiness Capability and Managing Beneficiary Demand and DoD Spectrum Auction Market Analysis, are intended to assist the PA&E/RA or CAIG analysts in their analysis of the respective program.

B. AIR FORCE HISTORY AND PERSPECTIVE (JAY JORDAN)

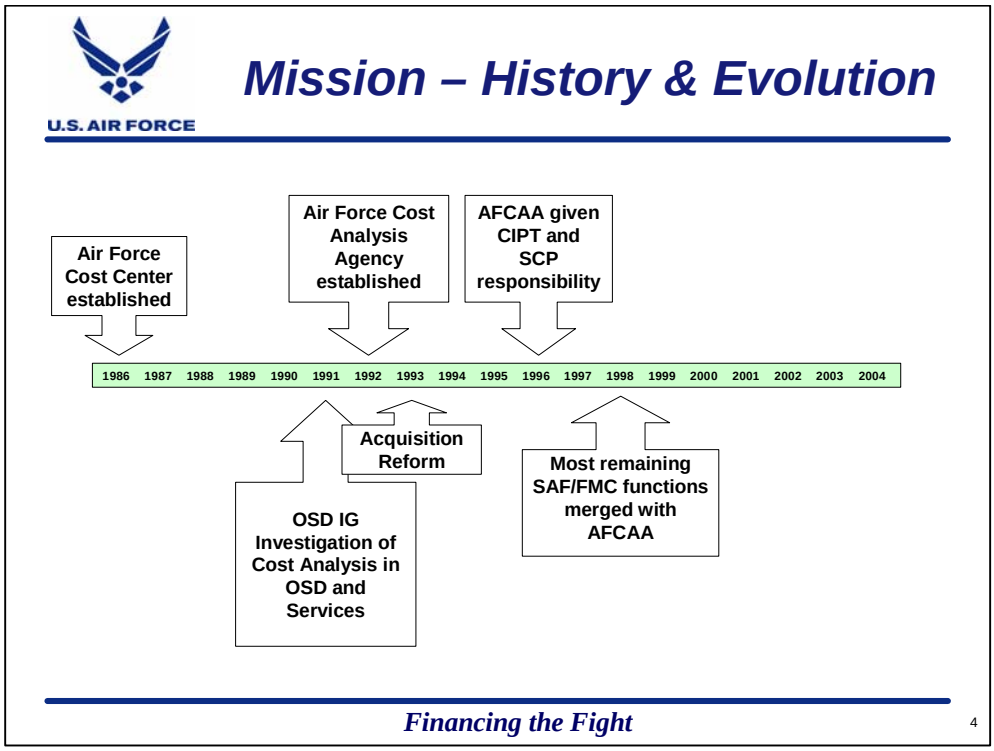
U.S. AIR FORCE

Overview

- History
  - Mission
  - Staffing
  - Research Investments
- Current Status
  - Organization / Mission
  - Issues / Challenges
  - Improvements
  - Research Activities
  - Utility of Past Projects
- Prognosis
- Closing Remarks

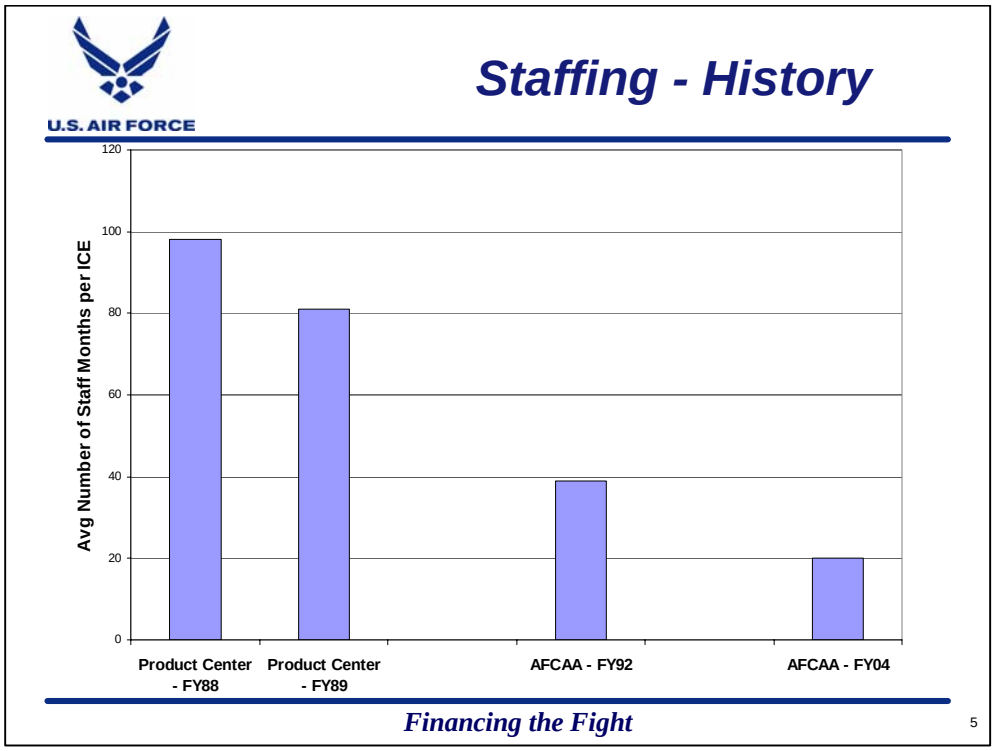
U.S. AIR FORCE

History

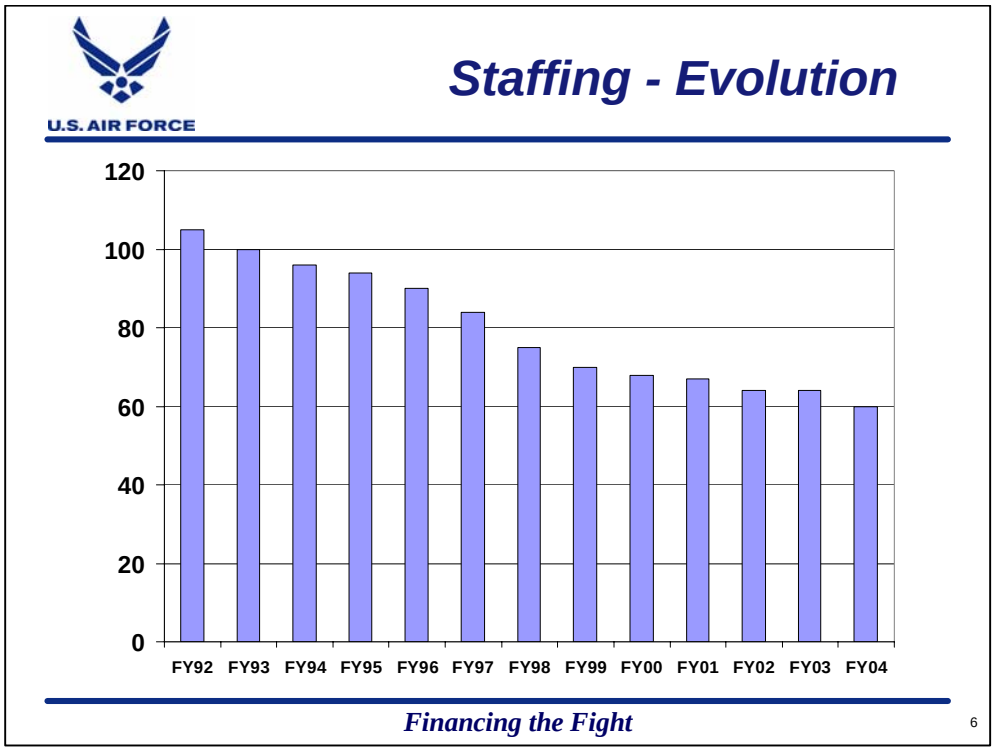


- In 1986, the Air Force Cost Center was established
  - Served as Center of Excellence in Cost Analysis
  - Mission—develop the most advanced means possible to predict cost accurately
    - Devoted a significant amount of effort in developing, improving and distributing cost models, databases and reference materials—did not do much cost analysis
    - Staffing—49 analysts
- 1992 DoD IG report raised many issues with service ICEs
  - Perceived that ICEs prepared at Product Centers were not truly independent
  - Major reorganization—Air Force Cost Analysis Agency born from Air Force Cost Center
    - Centralized Component Cost Analyses (formerly ICEs) within AFCAA
  - Created major change in way of doing business
    - Independence of AFCAA paramount
    - Personnel at product centers formerly assigned to perform ICEs would help SPOs develop better estimates
- Almost immediately, pressures were applied to shrink in size and scope of work—cross-check key system elements

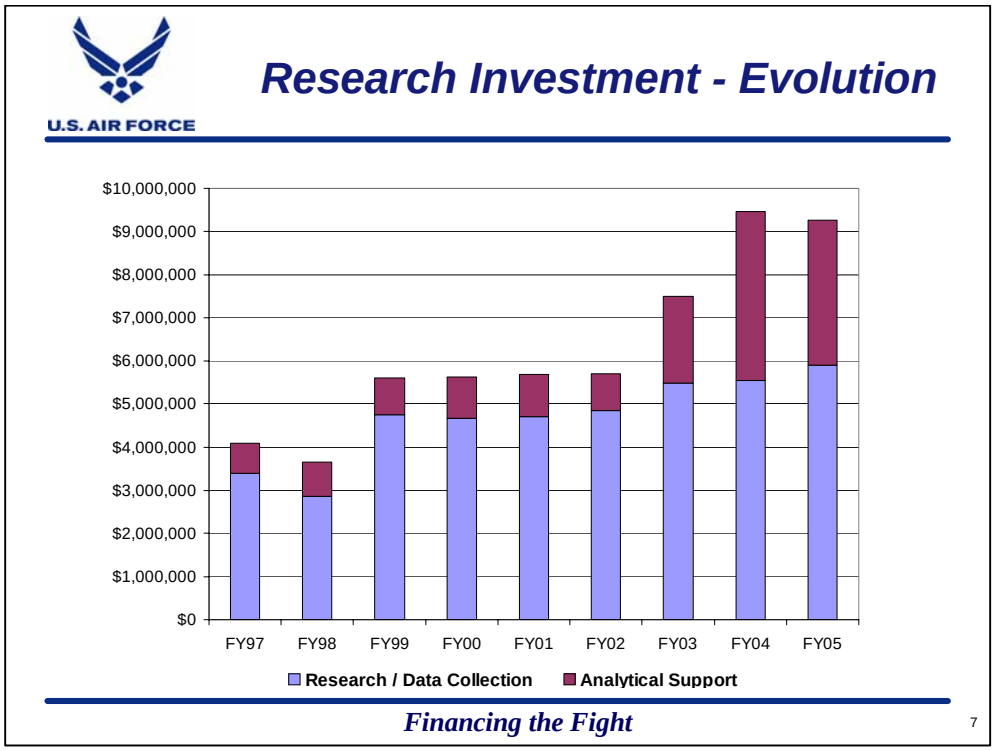
  - CCAs tailored to independently estimate only high risk/high dollar elements and review the remainder of the POE
- In 1996, AFCAA was re-organized and given the additional mission of developing the Service Cost Position (SCP)
  - Division Chiefs responsible for leading multi-organizational Cost Integrated Product Teams (CIPTs) and reconciling competing POE and CCA into unified SCP
- In 1998, most remaining SAF/FMC functions merged with AFCAA
  - AFTOC, Cost per Flying Hour development, long-range planning (AFCIS) support, etc.



- The average number of staff-months spent performing an independent estimate at the product centers in FY88 and FY89 was 98 and 81, respectively
  - These were complete, fully documented, life-cycle cost estimates
- AFCAA initially manned assuming the same type of independent estimates could be done utilizing 39 staff-months
  - Assumed synergies from centralization
  - Assumed AFCAA only performing independent estimates
  - Assumed AFCAA populated with highly skilled, high-grade analysts
- Currently, less than 20 staff-months of effort are applied per independent estimate



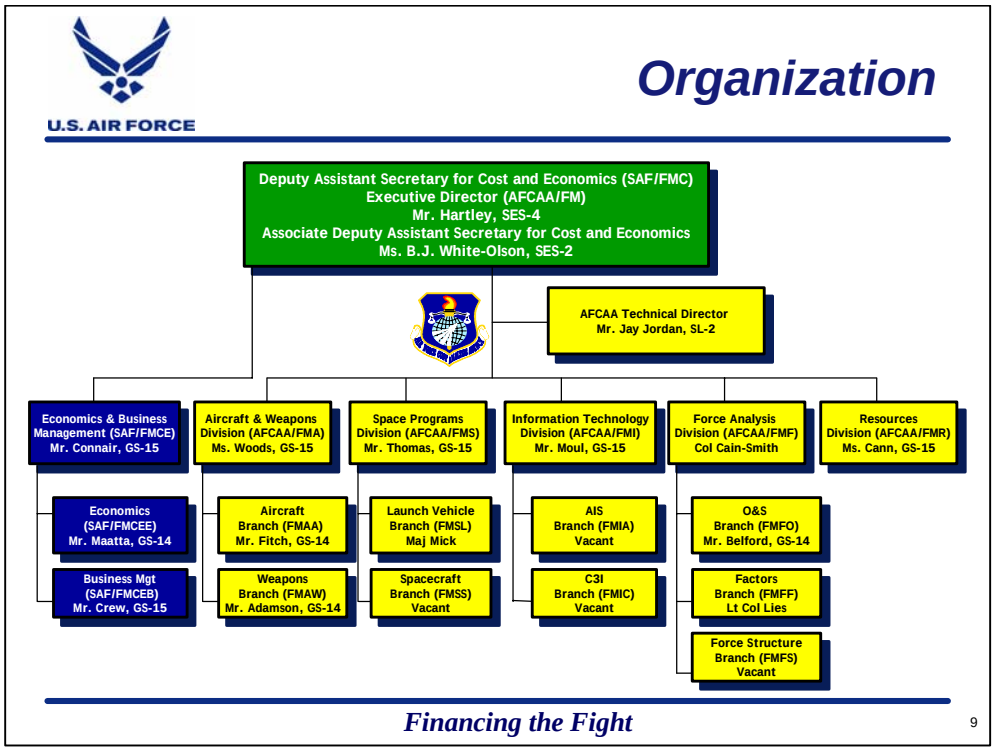
- The chart represents the numbers of military and civilian analysts only
  - Historically, most of AFCAA's support was provided by military and government civilian analysts
- In FY 2000, in-house contractor support began to increase



- The amount spent on research and data collection has remained fairly stable for the past five years, while total dollars have sharply increased.
  - As I mentioned in the last chart, there were increases beginning in FY 2000 for analytical support, with drastic increases beginning in FY 2003

U.S. AIR FORCE

Current Status



- Boxes in yellow—AFCAA organizations—FOA reporting to SAF/FMC
- Boxes in blue—Economic analysis side of SAF/FMC—resident in Pentagon
- Rich Hartley is dual-hatted as Deputy Assistant Secretary of Cost and Economics and as Executive Director of AFCAA

U.S. AIR FORCE

Mission

- Supports the Air Force Secretariat by
  - Conducting independent component cost analyses (CCAs)
  - Development of Service Cost Position (SCP)
  - Provides cost analysis expertise to support Air Staff requirements for special cost reviews
    - Defense planning efforts
    - Long range planning exercises
  - Performs research to improve the state of the art of cost analysis
    - Significant effort developing cost models and databases

Financing the Fight 10

- Our main product is information
  - This is often misunderstood, but as all of you know, our analysis can provide much more than mere numbers to senior leaders
  - Dr. McNicol alluded to this in his remarks—the questions we ask in order to perform cost analysis usually leads to a much better understanding of the program, and its risks

U.S. AIR FORCE

Issues / Challenges

- **Manpower below critical mass**
- Skill erosion due to constant downsizing
- Increased competition for analysts
- Acquisition reform and other new ways of doing business (e.g., spiral development, capabilities-based acquisition)
  - Erosion of requirements definition; Obtaining data
- Increased demand (number and scope) for cost analyses
  - Requests for support (because few remaining analysts)
  - More decision-making events requiring support
  - Alternative financing approaches; e.g., leasing

Financing the Fight 11

- Though legitimate, AFCAA often has to turn down requests for support
- AFCAA is only playing minimally in broader DoD cost analysis projects, research efforts, and working groups
  - Earned Value initiatives; Software Costing metrics; etc
- Unable to share data and/or cost research efforts that benefit entire cost estimating community
- AFCAA less able to work effectively with the academic community (AFIT and Naval Postgraduate School) to further our understanding of cost estimating methods
  - The faculties steer students away from organizations who don't actively support student research (money and manpower)

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1992 - 96 Analysts	1997 - 85 Analysts	2002 - 64 Analysts
• ACAT 1C / 1AC CCAs – complete LCCE	◀ ACAT 1C CCAs – tailored LCCE	◀ ACAT 1C CCAs – tailored LCCE
	+ ACAT 1AM and 1AC - Clinger Cohen Act	+ ACAT 1AM and 1AC - Clinger Cohen Act
• AFCAIG reviews – SCP determination	• AFCAIG reviews – SCP determination	• AFCAIG reviews – SCP determination
• Policy Development	◀ Limited Policy Development	◀◀ Very limited Policy Development
• ACAT 1D / 1AM CCAs – complete LCCE	◀ ACAT I CCAs – tailored LCCE	◀◀ ACAT I CCAs – tailored LCCE
• Economic Analysis (EA) policy and review	• Economic Analysis (EA) policy and review	• Economic Analysis (EA) policy and review
• Economic impact of bases on local community	• Economic impact of bases on local community	• Economic impact of bases on local community
• Competitive sourcing & privatization initiatives	• Competitive sourcing & privatization initiatives	• Competitive sourcing & privatization initiatives
• Defense Industry Analysis / Financial Health	• Defense Industry Analysis / Financial Health	• Defense Industry Analysis / Financial Health
• Oversight and analysis of AF Services	• Oversight and analysis of AF Services	• Oversight and analysis of AF Services
		+ Risk analysis development
• Resource Allocation Team Panel Support	◀ Resource Allocation Team Panel Support	• ~~Resource Allocation Team Panel Support~~
• Support to Long-Range Planning	◀ Limited Support to Long-Range Planning	◀◀ Limited Support to Long-Range Planning
• EVM / EVA	• ~~EVM / EVA~~	• ~~EVM / EVA~~
• SAR / DAES Oversight	• ~~SAR / DAES Oversight~~	• ~~SAR / DAES Oversight~~
• PBD Support	◀ Limited PBD Support	◀ ~~Limited PBD Support~~
• Research program	◀ Research program	◀◀ Research program
• CCDR reviews	◀ Limited CCDR reviews	◀◀ Very limited CCDR reviews
• Air Force inflation indices	• Air Force inflation indices	• Air Force inflation indices
• Track economic developments affecting AF	• Track economic developments affecting AF	• Track economic developments affecting AF
	+ AFTOC development and maintenance	+ AFTOC development and maintenance
	+ Activity Based Costing (ABC) policy and training	+ Activity Based Costing (ABC) policy and training
		+ AFCAIG Factors development
• Quick-turn studies – AQ/FM requests	• Quick-turn studies – AQ/FM requests	• Quick-turn studies – AQ/FM requests
• AoAs – moderate support	◀ AoAs – guidance, limited support	◀◀ AoAs – very limited support
• Source selection support	◀ Limited Source selection support	◀◀ Very limited source selection support
	+ SAF/FM website development and maintenance	+ SAF/FM website development and maintenance
		+ Special studies, e.g. leasing
• Summer Budget Reviews	• ~~Summer Budget Reviews~~	• ~~Summer Budget Reviews~~
• Respond to outside requests for support	• Respond to outside requests for support	• Respond to outside requests for support
	+ Long-term studies – AQ/FM requests	+ Long-term studies – AQ/FM requests

text - required by law | text - required by regulation | text - supports mission | text - requested | text - adds value
~~text~~ - lost capability | ◀ - diminished capability | ◀◀ - severely diminished capability | + - added responsibility

- This single chart, though complex, tells a compelling story
  - The columns represent 5-year increments of time, from 1992 to 2002. At the top of each column, you can see the staffing levels, and how they decreased over time.
  - In each column, the tasks performed by AFCAA are listed, and are coded by color
    - Black—required by law
    - Blue—required by regulation
    - Green—supports the SAF/FMC mission
    - Purple—requested efforts
    - Brown—our involvement adds value to the effort
- As you go across the chart, you can see that, though our staffing was declining, the list of things we were asked to play in has increased (represented by the red crosses as bullets)
- The items that are crossed through are those tasks that we were forced to remove from our plate because we no longer could perform them—EVA/EVM and PBD support are examples
- The items with the yellow arrow replacing the bullet are tasks for which we are suffering from a diminished capacity to fulfill—tailored estimates and policy development are examples of this starting in the 1997 timeframe

- And those items with the red arrow replacing the bullet are tasks for which we are suffering from a severely diminished capacity to fulfill—our research program and AoA support are current examples

U.S. AIR FORCE

Improvements

- Sharing data between Services and agencies, and jointly funding research projects, has allowed us to spend our increasingly limited research dollars more wisely
  - ACE-IT
  - Tri-Service Missile Database
  - NAFCOM
  - USCM/PSCM
  - MACDAR
  - Overhead Study
- Submission of Software Resource Data Reports to Defense Cost and Resource Center (DCARC)
- Increased collaboration with NRO, SMC, OSD CAIG on Space systems estimating improvement
  - Access to additional databases and sources

Integrity - Service - Excellence

13

Research Activities

U.S. AIR FORCE

- Increasingly turning to Support Contractors to assist in cost and technical analysis (vice pure research)
- Obtaining support from other Government Agencies
  - Software Technical Support Center (STSC) for software cost estimating support

Dollars spent on support come at the expense of pure research!

- Increased emphasis on Space cost estimating and data collection
  - Expansion of current databases
  - Development of training courses
  - Greater emphasis on ground segment costs

Integrity - Service - Excellence

14

- I worry that our budget for cost analytical research will be increasingly squeezed in order to pay for increased contractor support to perform day-to-day cost estimating efforts
- Increased emphasis on Space cost estimating and data collection
  - Space Systems Ground Segment Study
    - Standard WBS for ground segments
    - Feasibility study to determine whether data exists
  - Space Systems Training Course
  - USCM/PSCM
    - Collecting additional unmanned space system program data
    - Developing CERS for spacecraft and communication payloads at subsystem and component levels
  - Performance Activated Cost Electronics Relationship (PACER) model improvements
  - COTS Ground Antenna Systems
  - Ground Satellite System Architecture Support
- NAFCOM—NASA / Air Force Cost Model
- USCM—Unmanned Space Cost Model
- PSCM—Passive Sensor Cost Model

U.S. AIR FORCE

Projects Utilized

- Aircraft / Missiles
  - MACDAR
  - Aircraft & Missile Sufficiency Review Handbooks
  - Airborne Avionics Database
  - Tri-Service Missile Database
- Electronics
  - PACER
- Space
  - USCM/PSCM
  - COTS Ground Antenna Systems
- Operations & Support
  - AFTOC

Financing the Fight 15

- MACDAR—provided useful data for estimates of F-22 and JSF, specifically for learning curve analysis
- Aircraft Sufficiency Review Handbooks—used to develop below-the-line costs, learning curves and risk ranges for F-22 and JSF
- Airborne Avionics Database—electronic availability of data significantly reduced data collection time—F-22, JSF, MP-RTIP
- Tri-Service Missile Database
  - Extensively used; immensely valuable in developing below-the-line costs, learning curves and risk ranges for JASSM & JDAM
- Electronics
  - PACER database has significantly improved our capability to cost electronics, especially COTS
- Space
  - USCM/PSCM helped considerably with NPOESS and SBIRS spacecraft bus estimates
  - COTS Ground Antenna Systems—aided in costing of ground antennae and C2 systems integration, test and install activities
- Operations & Support
  - AFTOC—tremendously successful based on requests for use and expansion of capabilities—AFFVB analysis of C-5A

Projects Under-Utilized

- Some ACE-IT Upgrades
- Knowledge Management studies
- Most software research efforts
- Integrated avionics study
- Composites database

Financing the Fight 16

- Some ACE-IT Upgrades
  - Changing AFCAA mission means we don't often use higher-order analytical techniques as often as in the past
- Knowledge Management studies
  - Below critical mass > less ability to make focused effort
- Most software research efforts
  - We have not come very far in S/W cost estimation
- Integrated avionics
  - Have not been able to crack this nut yet
- Composites
  - Some use for missile; haven't seen the next aircraft yet
- Overhead studies
  - Limited analytical time to address this

U.S. AIR FORCE

Prognosis

U.S. AIR FORCE

Organization / Manning / Mission

- Strongest support by SAF/FM in recent memory
  - Re-organizational options are periodically discussed due to staffing challenges and changes in environment
- Staffing likely to diminish further, though not at same rate
- AFCAA likely to be in greater demand
  - More decision points; new, non-traditional types of decisions; harder decisions
  - More responsibility for cost analysis research
    - Less cost research initiated by field

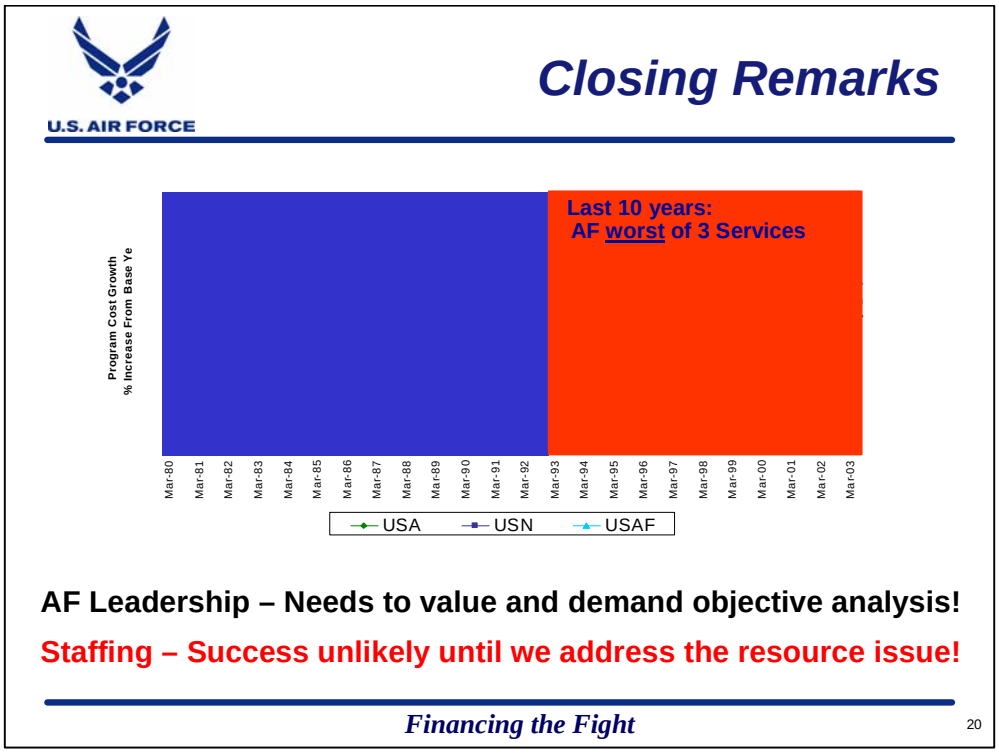
U.S. AIR FORCE

Research Activities

- Additional funding for Support Contactor analytical support
- Spacecraft payloads (optical sensors, radars, communications, etc.),
- Space payload integration, system engineering/program management
- Spacecraft software (space, payload, and ground)
- Aircraft and missile below-the-line cost data
- Risk process and policy formulation
- Software cost estimation

Financing the Fight 19

- As was mentioned last year, the Air Force was going to focus on cost risk policy. Well, we finally have placed some funding against that effort and hired RAND to help the AF formulate cost risk policy and make recommendations for the best procedures to be used at AFCAIG.
  - They will recommend a policy for use in the AF focusing on general cost risk and then on space cost risk.
  - Our intention is to eventually coordinate with the other services, OSD and NRO and form a corporate risk policy.



- Comparison of current estimate reported in each SAR versus the baseline estimate recorded at the EMD or Production Milestone.
- AF has major problem in cost analysis!
  - Inadequate attention given to the AF Cost Community
- Current leadership unsatisfied with cost roles and products
  - They desire cost realism (X% confidence level); focus on building solutions; earlier/constant involvement; less stove-piping
- Current status
  - Processes already bare-boned—forced efficiency due to resource cuts, years of Acquisition Reform
  - Tools—continually improved but sporadically used; research budgets increasingly diverted to cost analysis
  - Data—non-standard; stifled by Acquisition Reform and lack of AQ support
- How to satisfy this desire?
  - Leadership—Needs to demand objective analysis!
  - Culture—Needs to value and use objective analysis!
  - Staffing—Other efforts won't succeed until we address the resource issue!

C. ARMY HISTORY AND PERSPECTIVE (DAVID HENNINGSEN)

Deputy Assistant Secretary Army (Cost & Economics)

2004 Cost Research Symposium

History and Future of Cost Analysis and Cost Research

27 May 2004

Office of the Deputy Assistant Secretary of the Army for Cost & Economics (ODASA-CE)

Presenter: David Henningsen

Deputy Assistant Secretary Army (Cost & Economics)

Agenda

- History of Army Cost Analysis
  - Timeline
  - Manning
  - Investments in Cost Research
- Current Status
  - Organization
  - Mission
  - Research
- Prognosis? Where We Go From Here
  - Organization
  - Mission
  - Research

Deputy Assistant Secretary Army (Cost & Economics)

Chronology

Cost Analysis Directorate
Office of the Comptroller

Cost Analysis Division
Army Finance &
Accounting Center

Field Operating
Agency - CEAC

CRB Established

DODIG Review – CRB
moved to K Street

CRB IPT
Structure

CEAC → ODASA-CE
2 directorates
2nd SES
Increase GS14/15
Reduction in staff

1970 1985 1990 1995 2000 2004

@Pentagon

→ Buzzards Point

→ NASSIF Bldg

→ JP2

→ Pentagon & JP2

Deputy Assistant Secretary Army (Cost & Economics)

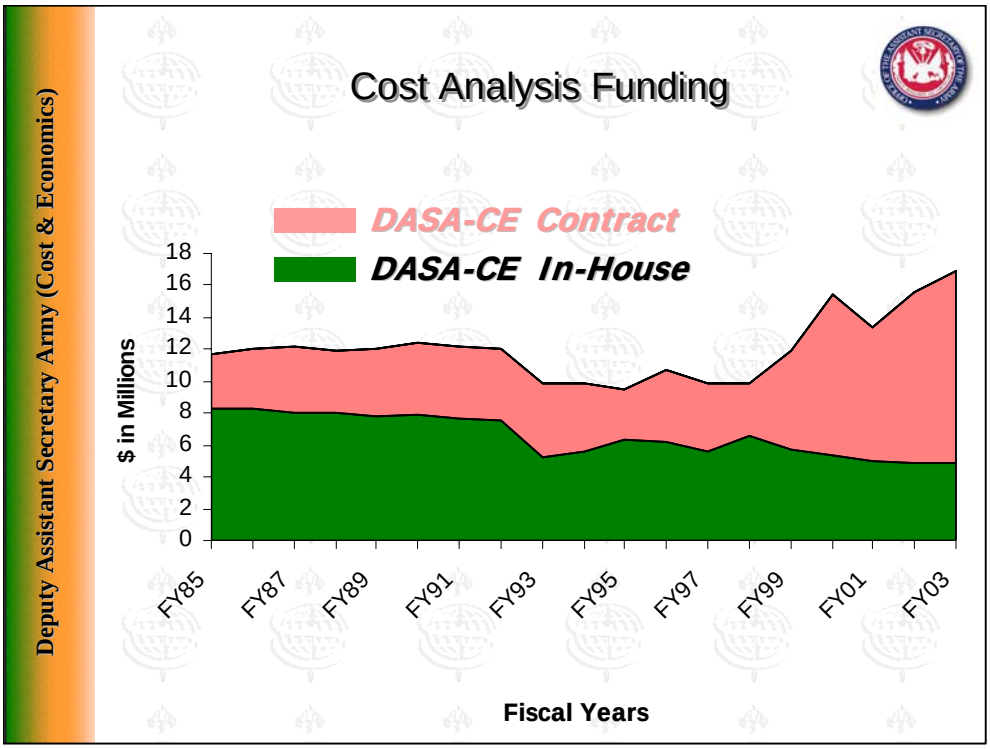
Staffing

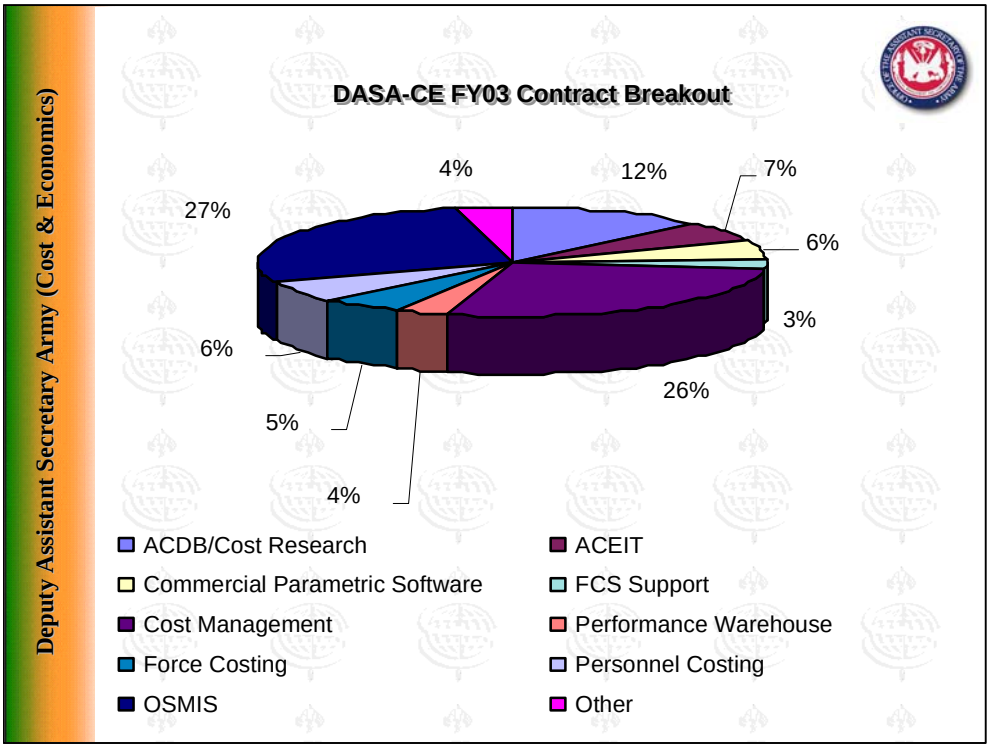
Organization	1990	1995	2004
CEAC	74	65	56
AMC	22	20	4
MICOM (now AMCOM)	32	57	44
AVSCOM (ATCOM)	56	48	x
TACOM	25	25	40
ARDEC (Picatinny Arsenal)	14	8	6
Rock Island (AMCOM/OSC)	28	12	6
SMDC	22	15	10
CECOM	45	30	28
Aberdeen	7	7	6

Deputy Assistant Secretary Army (Cost & Economics)

Army Historical Cost Research Sponsors

- ODASA-CE (Primary research proponent)
- Army Material Command and Subordinate Commands
- Space & Missile Defense Command
- Program Executive Offices/Program Offices


Deputy Assistant Secretary Army (Cost & Economics)
Cost Analysis Funding
DASA-CE Contract
DASA-CE In-House
$ in Millions
18
16
14
12
10
8
6
4
2
0
FY85
FY87
FY89
FY91
FY93
FY95
FY97
FY99
FY01
FY03
Fiscal Years


Deputy Assistant Secretary Army (Cost & Economics)
DASA-CE FY03 Contract Breakout
4%
12%
7%
27%
6%
3%
6%
26%
5%
4%
ACDB/Cost Research
ACEIT
Commercial Parametric Software
FCS Support
Cost Management
Performance Warehouse
Force Costing
Personnel Costing
OSMIS
Other

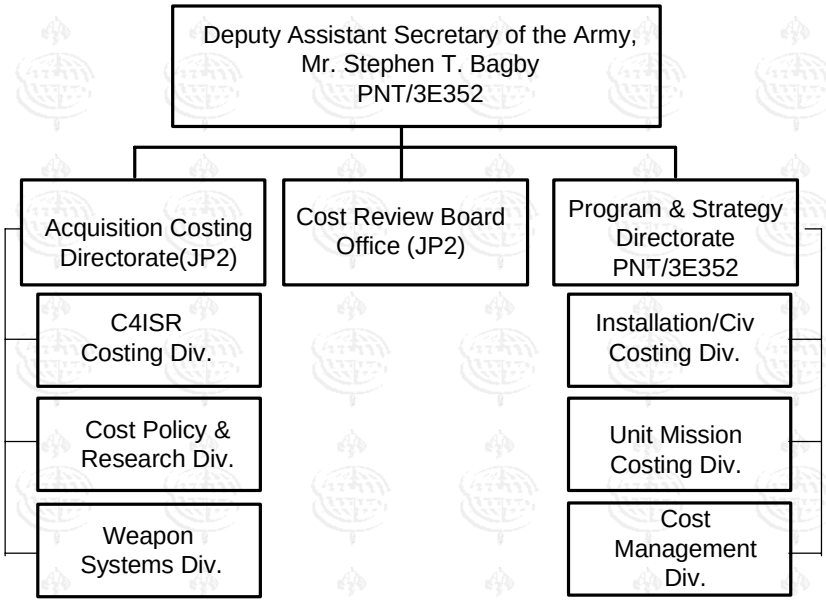
Deputy Assistant Secretary Army (Cost & Economics)

Army Acquisition Program Cost Estimating Resources Today

Activity	Primary System Types	Analysts
ODASA-CE	All System Types	56
AMC		
AMCOM	Missiles, Aircraft	44
CECOM	C4ISR	28
TACOM	Vehicles	40
SBCCOM	Soldier Systems	5
RDECOM		0
SMDC	Space	10

Deputy Assistant Secretary Army (Cost & Economics)

Office of the Deputy Assistant Secretary of the Army (Cost & Economics)



Deputy Assistant Secretary Army (Cost & Economics)

Current Mission

- Perform Component Cost Analyses, ICE, and POE reviews on Acquisition Category (ACAT) 1D,1C and selected ACAT II acquisition programs
- Perform ICE on ACAT 1AMs/1ACs for automated information systems
- Conduct Cost Review Board and develop ACP
- Develop and maintain cost analysis tools and models
- Provide training on tools and models
- Serve as focal point for Army Cost Research
- Perform economic analyses
- Support AoA
- Focal point for cost analysis policy
- Focal point for Army CSDR
- Focal point for Army Performance Measurement
- Other Analyses

Deputy Assistant Secretary Army (Cost & Economics)

Current Process for Initiating Research

- Research is centralized at ODASA-CE
- Development of cost tools (e.g., ACEIT, OSMIS) is centralized at ODASA-CE
- Licensing of commercial cost tools for Army centralized
- Semi-formal process
  - ODASA-CE requests research projects from field
  - ODASA-CE requests tool enhancements priorities from field
  - Research and/or tool enhancements also submitted directly to contractors
- Limited cost research initiated directly by field

Deputy Assistant Secretary Army (Cost & Economics)

Cost Research Resources

- Army research primarily centrally funded through ODASA-CE
  - FY2004 Funding ~$1M less than FY2003
  - Have not received all funding to date
- Army Material Command Major Subordinate commands no longer receive research funds
  - Majority of AMCOM, CECOM and TACOM Cost Analysts paid for on reimbursable basis by Program Offices
- SMDC obtains very limited research funding from customers
- Program Offices do hire cost analysts but conduct limited pure research
- Army Modeling and Simulation Office funds an Integrated Performance Cost Model
- Army Environmental Policy Institute
- Other HQDA Organizations

Deputy Assistant Secretary Army (Cost & Economics)

Current Research Initiatives

- Evolutionary/Spiral Development
  - SDD Development Engineering (DE) Methodology Research
    - Review existing DE Cost Estimating Relationships (CER)
    - Develop/update CER for DE under evolutionary acquisition
- Alternative Estimating Approaches
  - Government Test and Evaluation (T & E) Methodologies
    - Develop CER and Handbook to cost Government T & E
    - Develop T & E methodology based on Generalized Activity Networks (GAN)
  - Raleigh Analyzer
  - Commercial Parametric Models

Deputy Assistant Secretary Army (Cost & Economics)

Current Research Initiatives
(continued)

- Software Integration
  - Develop methodologies to estimate the software cost of integrating systems
  - Focused on Future Combat System (FCS)
- Military forces and missions
  - Update FORCES model to estimate Unit of Action/Unit of Employment in support of FCS
- O&S Contractor Support
  - Single Stock Fund Data Collection
  - Continue to expand Contractor Logistic Support (CLS) data collection in OSMIS
  - Provide access to CLS data on OSMIS website

Deputy Assistant Secretary Army (Cost & Economics)

Current Research Initiatives
(continued)

- Cost-Performance Estimating Relationships (CPER)
  - Integrated Performance Cost Model (IPCM)
    - Links cost models to requirements/engineering models
  - Unmanned Aerial Vehicle (UAV) CPER
    - System level, payload and command & control CPER
  - Vehicles CPER
    - System of System CPER (e.g., Stryker, FCS)
    - Composite materials CPER
  - Missile propulsion unit CPER
  - Turbojet/Turbofan propulsion unit CPER
  - Sensor CPER
    - Develop/Update research on IR, MMW, Laser, Acoustic, etc sensors

Deputy Assistant Secretary Army (Cost & Economics)

Current Research Initiatives
(continued)

- ACEIT
  - Enhancements
    - Major upgrade to COTS calculation/narrative engine
    - Improved narrative handling
    - Usability enhancements
    - Plug-ins for commercial parametric models
  - Army-wide distribution agreement
  - Army-wide training
- Automated Cost Databases
  - Missiles & Munitions
  - Aircraft (focused on rotary wing aircraft)
  - Vehicles
  - C^4ISR
- Army Military-Civilian Cost System (AMCOS)
  - PC based tool to cost personnel
- Sustainability Costing (water, energy, …)
- Performance Measurement

Deputy Assistant Secretary Army (Cost & Economics)

Future Mission

- Continue CCA/ICE/ACP development
- Other analyses will take more effort and resources
- Primarily short duration analyses in support of leadership
  - Examples:
    - Transformation
    - Chief's Focus Areas
    - Divestiture
    - Cost of the War
- Closer ties to engineering community
  - IPCM
- Closer ties to requirements analysis and POM process
  - Estimating technologies/programs prior to MS A
  - Support G8 in POM development
    - Review ACAT II and below programs

Deputy Assistant Secretary Army (Cost & Economics)

Future Organization

- Do not see change in reimbursable positions in field
- Expect staffing levels to remain fairly constant
- Some conversion of selected military slots to civilian slots
- More reliance on contractor support

Deputy Assistant Secretary Army (Cost & Economics)

Future Research

- POM includes an increase in research funding above inflation
  - However, still fighting to obtain FY2004 funds
- Army cost research and models will remain centrally funded
- Cost research primarily performed by offsite contractors
- More focus on:
  - New technologies
  - Software estimating
  - System of System/Family of System
  - Force structure
- Issues
  - Must bring in younger analysts
  - Hiring for mid-level positions in DC area is difficult
  - Funding stability

D. NAVY HISTORY AND PERSPECTIVE (ROBERT HIRAMA)

2004 Cost Research Symposium

History and Future of Cost Analysis and Cost Research

Naval Cost Analysis Division

May 27, 2004

Robert Hirama, NCAD
(703) 692-4898
robert.hirama@navy.mil

Outline

History of Naval Cost Analysis & Research

- Navy-wide
- NCAD

Current Status

- NCAD Roles and Responsibilities
- Cost Research Process

Prognosis & Plans for Future Cost Research

May 2004 Naval Cost Analysis Division (NCAD) Page 2

The outline follows this year's symposium theme.

Primary Navy Cost Research Activities

- Naval Cost Analysis Division (FMB-6)
- NAVSEA
  - Cost Engineering & Industrial Analysis Div. (SEA-017)
  - Naval Surface Warfare Center, Carderock (NSWCCD)
  - Naval Surface Warfare Center, Dahlgren (NSWCDD)
- NAVAIR
  - Headquarters Cost Department (AIR-4.2)
  - Naval Air Warfare Center AD – Pax River MD & Lakehurst NJ
  - Naval Air Warfare Center WD – China Lake
- SPAWAR
- Office of Naval Research (ONR)

May 2004 Naval Cost Analysis Division (NCAD) Page 3

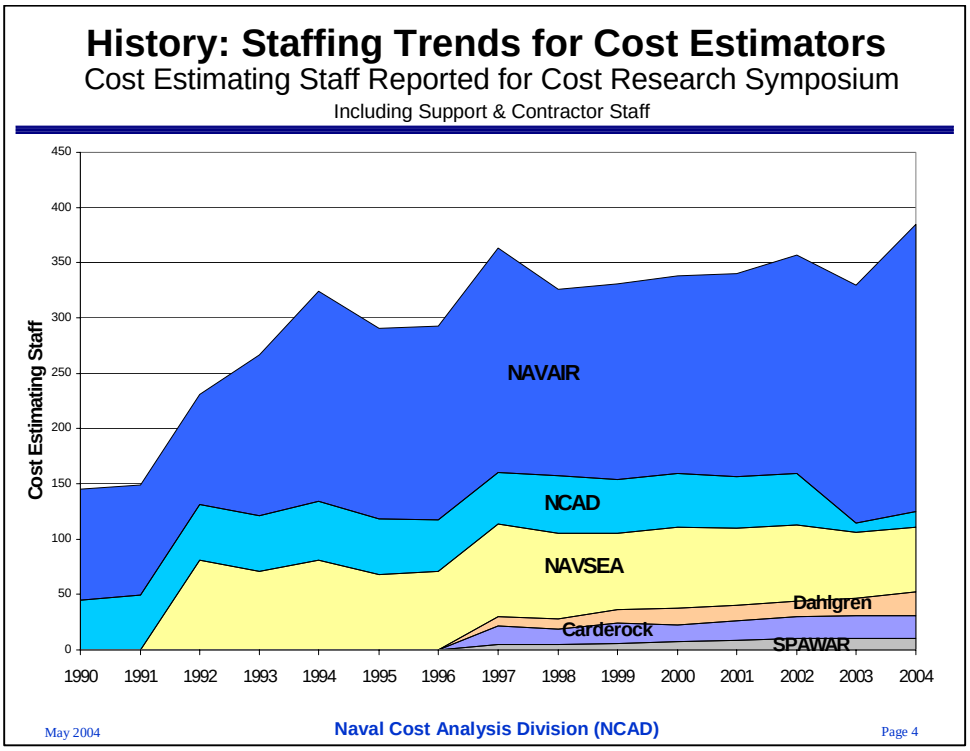
These are the organizations that sponsor and fund most Navy cost research.

They determine requirements, plan research, establish budgets, set priorities, fund and coordinate:

- NCAD
- NAVAIR and NAVSEA and their field activities
- SPAWAR conducts informal research in support of specific estimates
- ONR

Other organizations sponsor research occasionally and may provide funds, guidance or influence:

- CAIG, Marine Corps, OPNAV, ASN(RD&A), PEO/Program Office

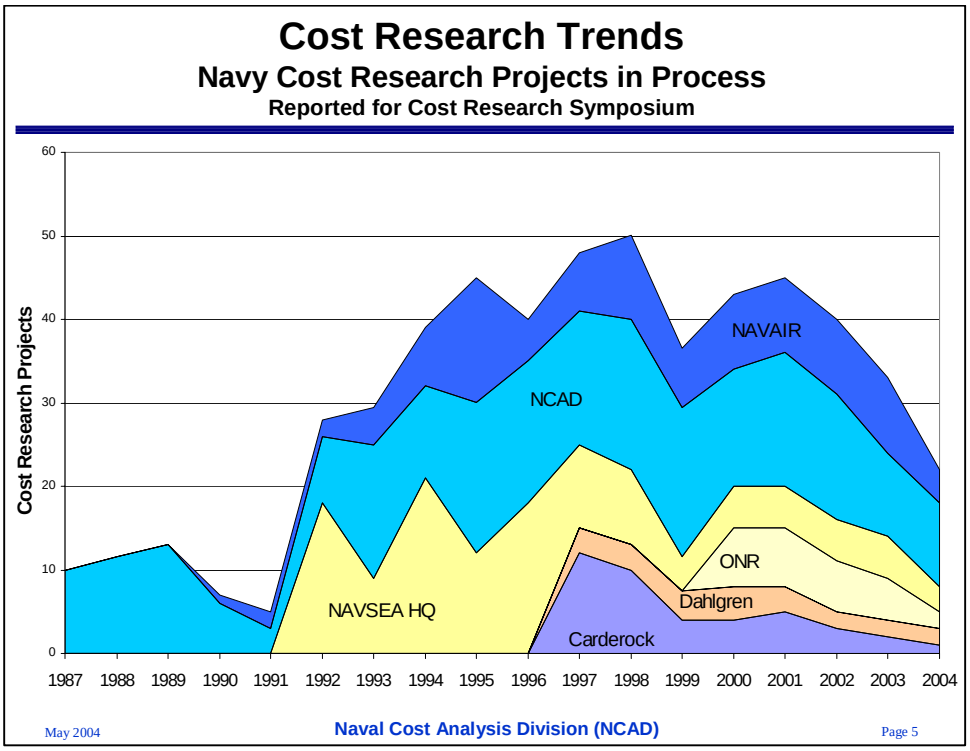


The historical data were extracted from the old cost symposium catalogs.

This is the total staff reported by Navy CR activities, including support and contractors on site. Ignore the first two years since NAVSEA did not report. The data indicate what's happened to cost estimating capabilities generally. The total staff is 250 to 350 with support and contractor staff.

The trend looks good at first glance; however, the upward trend is driven by NAVAIR. Otherwise, staffing is flat, except for the NCAD decline in 2003.

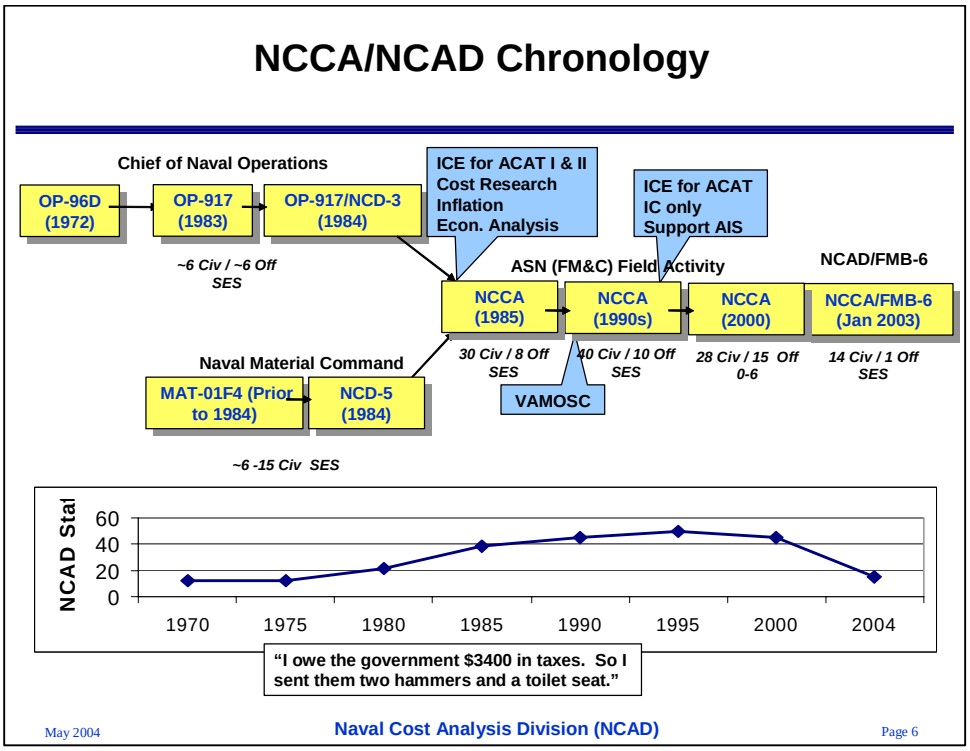
Also, NAVAIR growth is largely funded by PMs, not directly funded by the cost organization. The number of NAVAIR staff funded directly by AIR 4.2 has declined to 38. The consequences of this are on next slide.



This slide shows what's happened to cost research in the past 12 years. Ignore the first 4 years since data reporting is incomplete. This is the number of active cost research projects, extracted from the same set of old catalogs.

CR peaked in the late 1990s and declined sharply. Total CR in 2004 is less than half of its peak.

The increasing NAVAIR CR staff did not help CR since the PM-funded staff is doing ICEs and other work to support the PM, not cost research.



In 1985, NCCA formed from OPNAV and NAVMAT staffs. NCCA was stood up to perform independent cost estimates for all ACAT I and II programs, perform cost research, and maintain the escalation indices.

In the early nineties, we took on the responsibility of VAMOSC management.

In 1996, with the rewrite of the SECNAV instruction 5000.2B, we disengaged from performing independent cost estimates on ACAT ID and II programs.

We also got more involved in supporting Automated Information Systems and Business Case Analysis. It is interesting that this curve is congruent with the last.

Steve asked us to consider the underlying causes for these changes. I've already discussed some of them. The poor public attitude towards DoD cost controls may have resulted in more resources devoted to cost estimate in the 1980s and 1990s. Now that attitudes have changed, resources are declining.

Current Status
NCAD Responsibilities

Reorganization in 2003 focused NCAD's mission:

- Independent Cost Estimates
  - Weapon System ICEs on ACAT 1C programs
  - AIS ICEs on ACAT 1AMs/1ACs for automated information systems
  - Funding from PMs for contractor support
- Chair Navy CAIG
  - SECNAV Instruction for Navy CAIG just completed
- Maintain cost analysis tools
  - VAMOSC Database, Cost Models, Inflation Calculator
- Perform economic analyses
- Navy focal point for cost analysis policy and oversight

May 2004 Naval Cost Analysis Division (NCAD) Page 7

These are NCAD's current responsibilities. NCAD prepares memos to the Navy AE.

The new Navy CAIG instruction will be on our web site.

Current Process for Cost Research

- No formal process for starting cost research
- Research is decentralized
  - Activities determine and promote their own requirements
  - Usually begun in response to particular program requirements
  - Informal research is often not documented and distributed
- NCAD does not provide formal guidance
- Occasionally NCAD and SYSCOM staff will coordinate research on common issues
- No dedicated funds for cost research

May 2004 Naval Cost Analysis Division (NCAD) Page 8

This is the current state of Navy cost research. There is a significant amount of informal research performed, but it is not documented or made available to others.

Prognosis for Naval Cost Research

- Cost research staff and funds will remain limited
- SYSCOMS and program managers will determine and fund their specific requirements
- NCAD will encourage coordination. Historical database open to all .mil researchers

We do not expect significant changes in resources for cost research.

NCAD Research Topics…underway

- Review inflation rates and calculation methods across SYSCOMs and services
- Automated cost estimating library for Navy-wide use
- Expand depth and breadth of VAMOSC database and applications
- Historical ICE accuracy and lessons learned
- Review of Navy cost policy – FY05

May 2004 Naval Cost Analysis Division (NCAD) Page 10

The next two slides have specific examples of research that we hope to accomplish with improved cooperation.

Research Topics…for consideration

- Collaboration on software cost data collection and analysis by NAVAIR, NAVSEA OSD(CAIG), MC, Air Force, & Army
- Actual savings achieved from use of COTS hardware
- Risk and uncertainty estimating best practices
- Health care cost trends
- The effects of industry consolidation on overhead and profit
- Long term cost effects of improved design tools and methodologies
- Effects of improved reliability on system life cycle costs
- Effect of outsourcing with respect to our historical databases

These are areas of research we propose for coordinated efforts.

E. MDA HISTORY AND PERSPECTIVE (JAN YOUNG)

2004 Cost Research Symposium

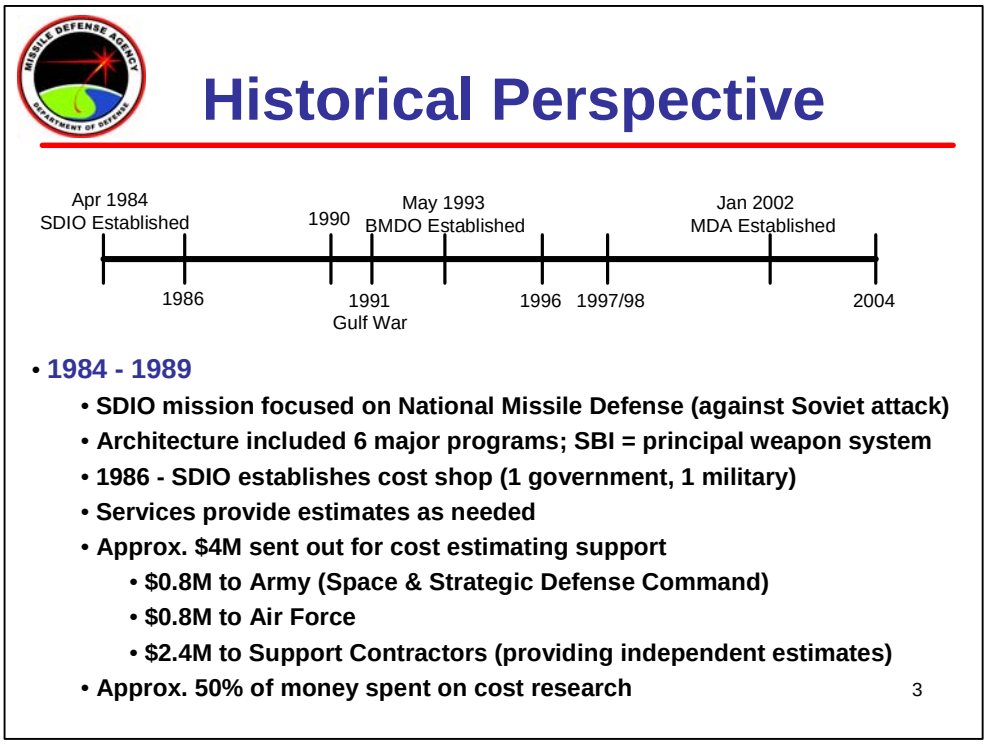
History and Future of Cost Analysis and Cost Research

Jan Young
MDA/PIE
May 27, 2004

Overview

- History
  - Organization
  - Manning
  - Investment in Cost Research
  - Focus areas
- Current Organization
- Research
  - On-going
  - Recently completed
- Our future
  - Organization
  - Challenges

2

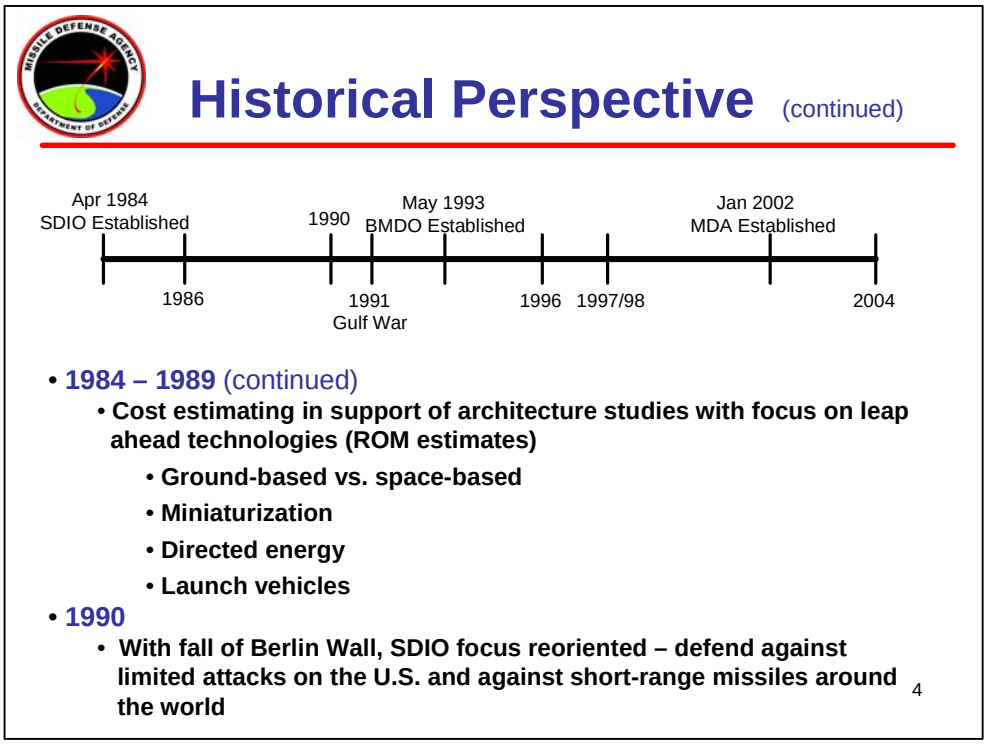


On March 23, 1983, the President announced his decision to launch a major program to see if missile defense was technically feasible. After a year of studies, in April 1984, the Defense Department chartered the Strategic Defense Initiative Organization (SDIO) to manage a consolidated and expanded missile defense program that was created in large measure by combining projects that were already underway in agencies like the military services and the Department of Energy.

Initial architecture (Phase I) consisted of six major defense acquisition programs, including the principal weapons system, the Space Based Interceptor (SBI). The overall focus of the SDIO program was defense of the United States against a massive Soviet attack.

In 1986, the first cost shop at SDIO was established with two people, one government and one military. The military services continued to provide cost estimates as needed.

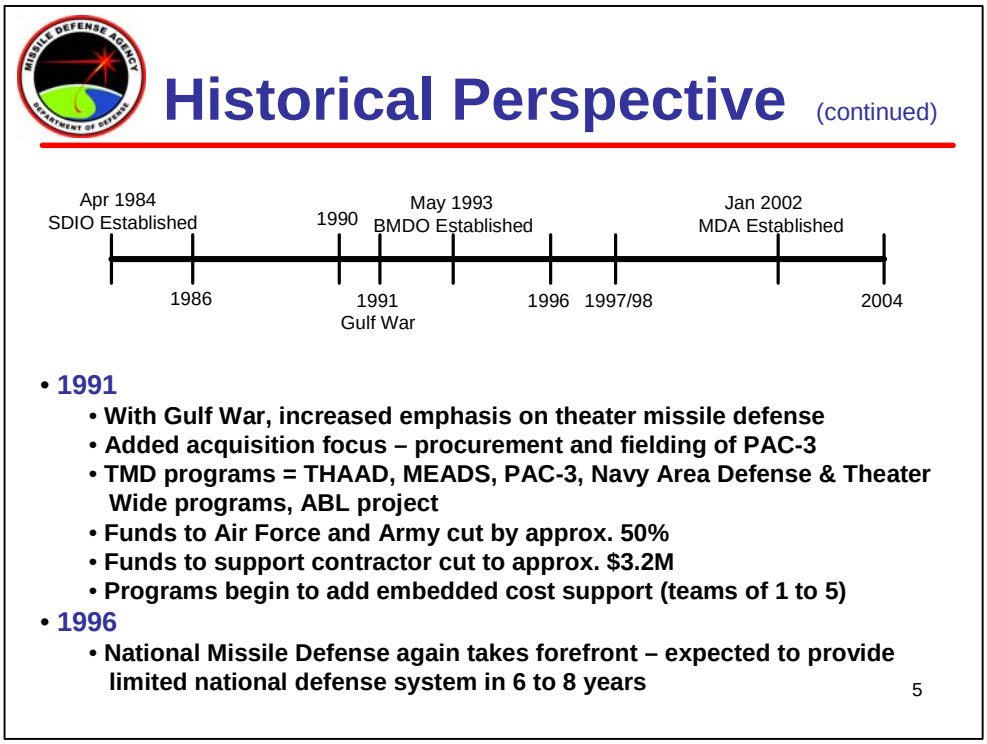
Approximately $4 million per year was provided for cost estimating support. Approximately $0.8 million went to the Army's Space and Strategic Defense Command, $0.8 million to the Air Force, and $2.4 million to support contractors, who developed the independent estimates for SDIO. Each year, approximately 50% of the total dollars were spent on cost research.



The majority of cost estimates would be considered Rough Order of Magnitude Estimates (ROMs) and were developed in support of architecture studies, many which were evaluating state-of-the-art (or leap ahead) technology.

For cost estimating purposes, focus areas included but were not limited to ground-based versus space-based systems, miniaturization of systems/components, directed energy, and launch vehicles, a major cost driver in space-based systems.

In November 1989, the Berlin Wall was opened. The following month, President George H. W. Bush ordered the conduct of a study to examine the appropriateness of the SDI program, given the new world order that was starting to emerge. The study was complete in March 1990, and called for a reorientation of the SDI program. Now, instead of attempting to defend against a massive Soviet attack, SDI would focus on developing defenses against limited attacks on the U.S. and against attacks by short range missiles in theaters around the world.



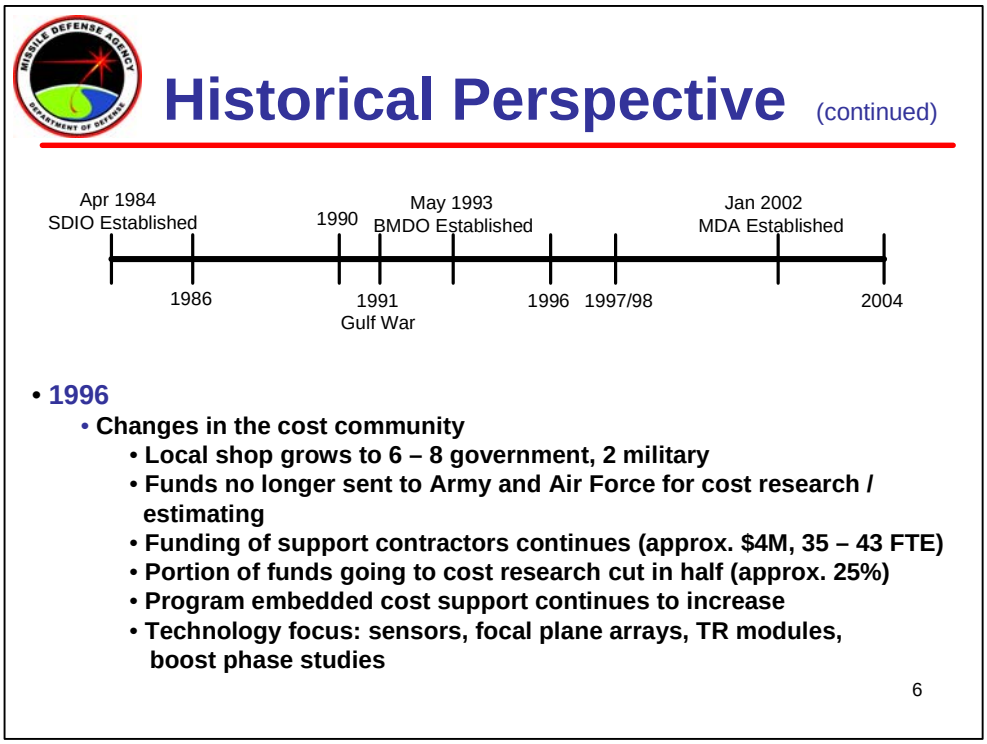
As this new approach/architecture was being considered by DoD and the President, the Gulf War of 1991 started. Featuring the world's first battles between ballistic missiles and missile defenses, the conflict tended to confirm the approach of the new architecture and encouraged greater emphasis on Theater Missile Defense (TMD). TMD programs included the Army's THAAD, MEADS, and Patriot (PAC-3), the Navy's Area Defense and Theater wide programs, and the Air Force's Airborne Laser Project.

In addition, more emphasis was placed on acquisition—particularly the procurement and fielding of PAC-3.

With this change in focus came a name change for the organization. In May 1993, SDIO became the Ballistic Missile Defense Organization (BMDO).

From the perspective of the cost estimating community, funds to the Army and Air Force were cut by approximately 50% to about $0.4 million each. Funds to contractor support for the development of independent estimates (and research) were cut to approximately $3.2 million. At the same time, the embedded cost support in each of the program offices grew to teams of one to five people.

By 1996, National Missile Defense once again returned to the status of a major defense acquisition program that was expected to provide a limited national defense system in six to eight years.



How did these changes (through the early years of the program) affect the cost community?

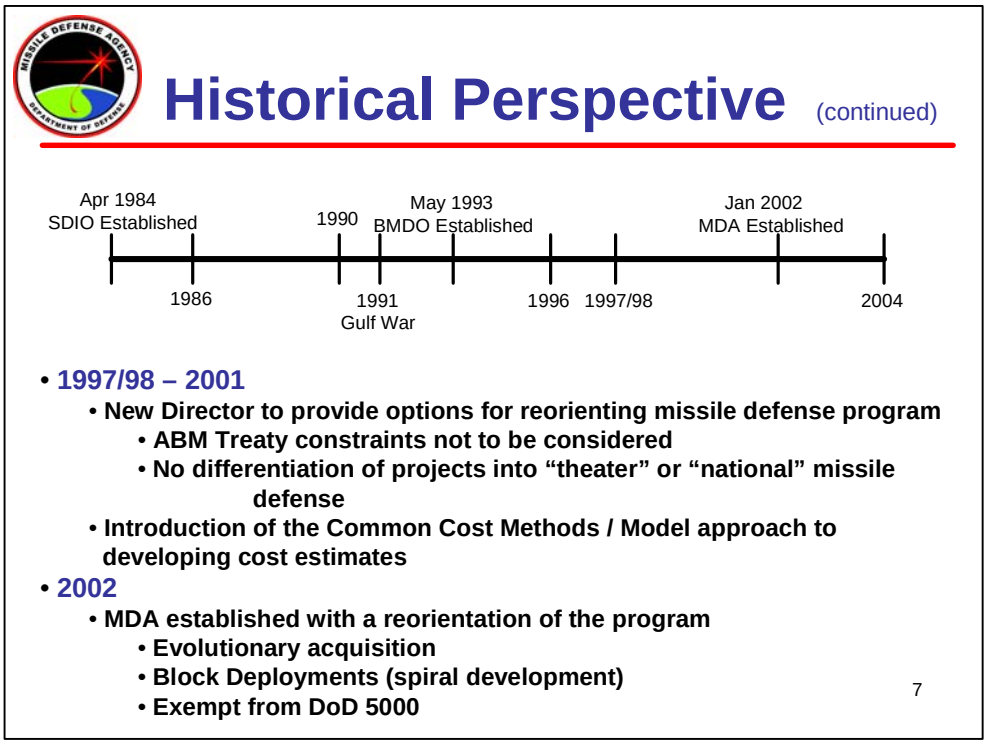
First, the SDIO cost shop grew to include six to eight full-time civilian employees, with two military.

Funds were no longer sent to the Army and Air Force for estimating/cost research.

Funding to support contractors continues (approximately $4 million, 35 to 43 full-time equivalents). Of this money, approximately 25% goes to cost research (a 50% cut).

Program Office embedded cost teams continue to increase in size.

Technology is still a major focus with added emphasis on focal plane arrays, TR modules, and boost phase studies. In addition, with an increased focus on acquisition and fielding, the cost community also had to develop new tools in order to support the analyses needed (e.g., production and Operations and Support estimates).

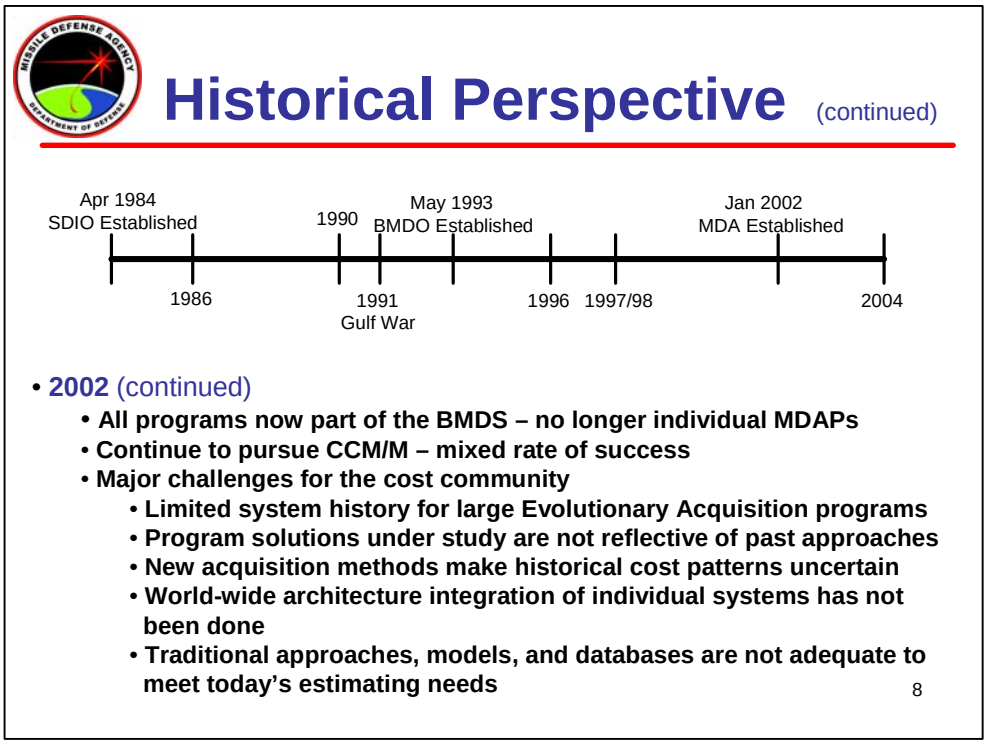


Under President George W. Bush's leadership, Secretary of Defense Donald Rumsfeld directed Lt. Gen. Kadish, the BMDO Director, to provide him a set of options for reorienting the U.S. missile defense program. These options were to be evaluated solely on the basis of technical and operational merit and were not to consider ABM Treaty constraints. Additionally, the General was told that the new missile defense program was to avoid breaking missile defense projects into Theater Missile Defense (TMD) and National Missile Defense (NMD) categories, for this seemed to pit U.S. interests against those of its allies.

General Kadish asked the cost community to discontinue its practice of developing more than one estimate (i.e., the program office estimate, a contractor/industry estimate, and an independent estimate developed by the BMDO cost shop). With this request came the initiation of the Common Cost Methods/Model (CCM/M) approach that is still being used in the organization today. The goal was for there to be only one estimate—one developed jointly by the Program Office analysts, BMDO analysts, and industry. Initial efforts were not always successful. Today, we have a mixed rate of success. With several Program Offices, we have a well-functioning CCM/M team. In others, we are still struggling to establish the team.

In January 2002, the BMDO was renamed the Missile Defense Agency (MDA). Earlier guidance to General Kadish was still largely in effect, although additional

changes were made. A major change was the creation of the Ballistic Missile Defense System (BMDS) as a major defense acquisition program (MDAP) with General Kadish as the Program Manager.



All of the programs that comprised the BMDS were moved from the services under the direct management and control of the MDA Director. These programs became elements of the BMDS and were no longer MDAPs in their own right.

Other significant changes that came with the establishment of MDA included:

- An evolutionary acquisition approach coupled with spiral development of 2-year Blocks (of capability).
- MDA was exempt from DoD 5000, although the agency did continue to follow many of the practices.

This new acquisition approach resulted in many challenges to the cost community including:

- A lack of historical cost data from two perspectives. First, sensing and destroying ballistic missiles is a mission area with little system cost history. Many estimates were developed using parametrics, scaling from tactical missiles (for example)
- Most of the program solutions under study are not reflective of past approaches.
- New acquisition methods make historical cost patterns uncertain, even where data exists.
- World-wide architecture integration of individual systems has never been done to this magnitude.

MDA Cost Community
FY 2004

Office	# Cost Analysts	
	Gov't	SETA/FFRDC
GMD	3	21
THAAD	1	2
STSS	5	5.5
ABL	1	2
KI	3	2
Aegis BMD	3	0.5
MDA/PIE (+)	11	11.5

9

Well, that ends our walk through history.

How many people support the cost estimating function at MDA today?

This chart breaks our headcount into government and SETA (support contractors)/Federally Funded Research and Development Centers (FFRDCs).

By far, our largest element is the Ground-based Midcourse Element. This program is actually comprised of a number of individual programs, including the Ground-based Interceptor (GBI) and Sea-based Radar (SBX).

MDA/PIE provides analysts that work with each of these Elements in cost working groups, implementing the CCM/M approach.

The MDA/PIE numbers are much smaller than they were just 2 years ago, although the government staff increased from 8 to 11. (With 2 of the billets being filled by interns, the SETA support was cut by approximately 65%.)

Included in the KI government numbers are two FTEs from NSWC, Dahlgren. These folks are Navy employees (not assigned to MDA). But we go where the expertise is.

On-going Research

Project	Source
• Missile Cost Model	MDA/PIE & NSWC Dahlgren
• Estimating Cost of Programs with Initial Capabilities (Spiral Dev)	MCR & Galorath
• Radar Cost Model Update	MDA/PIE & MCR
• MDA Cost Risk Methodology Update	MCR
• Estimating Costs of BMC3	CSCI
• Software Database	MCR
• Schedule Analysis for MDA Programs	IDA

10

These are the seven research projects we included in the IDA book this year. The details are there, so I will provide a few highlights.

Missile Cost Model: MDA/PIE and NSWC, Dahlgren, have initiated development of a missile cost model that will facilitate short-notice cost estimates for missile systems early in the development cycle. The model uses independent technical and performance data that are likely to be known prior to completing a Critical Design Review. The model produces recurring and nonrecurring development and procurement costs for broad WBS categories.

Spiral Development: The project is focused on understanding the cost analysis impact of fielding portions of programs as they become mature (spiral development) vice the traditional single-step acquisition approach. The challenge is to estimate the costs associated with inserting technology into existing capabilities or staggering the development and test process to allow for early release of program segments that have reached a higher level of maturity.

Radar Cost Model Update: The model provides a capability to estimate missile defense radar costs early on, before the specifics of the radar design are known. Planned enhancements include updating CERs, enhancing the graphical user interface, and adding a capability to estimate radar Operations and Support costs.

MDA Cost Risk Methodology Update: MDA will update the current MDA Cost Risk Methodology to keep it current. This effort incorporates new SAR and CCDR data, develops new cost growth equations, makes the risk model easier to use, and rewrites the User's Manual.

Estimating Costs of BMC3: Focus of effort is to develop methods and model for estimating the costs associated with System of systems level interoperability (i.e., Battle Management Command, Control, and Communications) for the BMDS.

Software Database: The purpose of this effort is to develop a database containing historical software data (e.g., lines of code, productivity factors, language) specifically for ballistic missile defense weapon systems.

Schedule Analysis for MDA Programs: This research project examines new ways for MDA to assess the adequacy of planned schedules to complete development activities. The analysis includes a review of program milestones and the time required to progress between them at varying levels of effort. It will identify schedule drivers and use the drivers to develop equations that predict development time. Each major MDA commodity area will be addressed in the study.

On-going Research (continued)

- Understand why historical CERs are underestimating recurring unit cost for hit-to-kill missiles
- Targets & Countermeasures database and model
- Cost driver analysis of T&E for MDA Programs
- Labor rate structure for typical European defense industry

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We also have a number of projects that are being worked in-house (i.e., by analysts assigned to MDA/PIE). Four sample projects are listed here.

Historical Hit-to-Kill CERs: The purpose of this project was to demonstrate if the CERs we used in the past (based on tactical missiles) tended to underestimate the cost of hit-to-kill missiles. The initial analysis clearly showed that they do.

Targets and Countermeasures Database and Model: This project is to establish a robust database of historical cost and technical data for the various targets/countermeasures developed for MDA use. This information will be used to develop CERs at a modular level.

Test and Evaluation Cost Driver Analysis: This project is designed to improve our understanding of the costs associated with MDA T&E, particularly as we begin to focus on BMDS level testing.

Rate Structure for European Defense Industry: We are responsible for supporting the development of estimates for our international partners. Direct labor cost estimates by U.S. defense analysts invariably are based on U.S. data and recognized historical cost accounting structure. This approach tends to bias the estimate and may introduce significant error in the cost of an annual full-time equivalent. This project will enable the

conversion of U.S. dollar estimates to Euros, based on actual cost structure of European industry and government.

Recently Completed Research Projects

- Projects Still in Use
  - Cost Improvement Curves for Missiles (2002)
  - Radar Cost Model (2002)
  - Missile DevEng CER (2003)
  - Nuclear Hardening Cost Study (2002)
- Projects Under Utilized
  - MDA Cost Risk Methodology (2001)
  - MDA Time-phasing Handbook (2001)
  - Technomics Missile Model (2003)
  - Deployable Optics CER (2003)

13

This chart provides some examples of previous research projects that are still being used today and a number of them no longer in use.

One of the more recent research projects that is often put to use is the Cost Improvement Curve for missiles. This has been an invaluable tool in selecting an appropriate learning curve for missile production. I mentioned that the radar cost model is currently being updated. In the meantime, we continue to use the existing model. The Missile Development Engineering (DevEng) CER will be replaced with our new missile model.

For those no longer used, they were either developed in support of one specific project and are no longer relevant for the technology or updates are required. For example, I previously mentioned that the MDA Cost Risk Methodology is currently being updated. We found a number of errors in the analysis as well as felt we needed to develop a method that more predominantly used MDA history.

Our Future

- Centralized / unified cost estimating community
  - Standardization and consistency of product
  - Less emphasis on point estimates
- Demand for cost estimating products is on the rise
- Cost research funds likely to be limited
  - Projects will have to be worked into day-to-day business
- Increased sharing of data & cost research
  - Filling Processes & Databases Team Lead
  - Establishing website for sharing of all research
- Continued emphasis on coordinating data collection and research across Agencies

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This chart is largely self-explanatory.

Because we are now focused on only one MDAP, the BMDS, we need to ensure we are consistent in how we develop initial point estimates and conduct risk analysis for all elements. Since each of these programs formerly resided with one of the military services, each came with different approaches.

We are seeing a marked increase in the demand for our cost products. This is putting a real strain on the cost community. We are not likely to see any growth in staff in the near future, so we need to focus on becoming more efficient through tool development.

In early Fiscal Year 2004, over 90% of the funds marked for cost research were cut. Unfortunately, I do not anticipate this will change in the near future, although we have already presented our case for FY 2005.

We are placing a major emphasis on data sharing, both within the larger MDA cost community as well as across agencies. Why pay for data collection more than once? To help us in this endeavor, we are putting a major press on hiring our last Team Leader vacancy.

Future Work and New Challenges

- Future Work
  - Modify our cost, performance, technical, and programmatic data collection
    - Paves the way for tomorrow's analogies and parametric CERs
    - Requires that data be collected by Block and possibly lower levels within
  - Collect incremental changes in performance with incremental changes in cost to find relationships
  - Collect schedule data at levels below a master schedule and by WBS
  - Continue to derive new methods where schedule is an important predictor of cost
  - Focus on estimating the incremental costs associated with Operations & Support (O&S)

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I've previously talked about some of our challenges. Whether we have money to hire outside expertise, or we have to figure out how to meet the future with only in-house assets, we must focus on:

- Improving/increasing our data collection efforts with an emphasis on Evolutionary Acquisition/Spiral Development. This includes understanding how increments of capability affect cost and schedule.
- We will continue to develop methods that are schedule based.

As we move towards the initial fielding of the BMDS, we must now place more emphasis on O&S, understanding both initial costs and how costs will be affected over time with the fielding of newer capability, but with only a small number of systems (i.e., hardware).

Future Work and New Challenges (continued)

- New Technologies
  - Miniature Kill Vehicle
  - High Altitude Airship
  - Advanced Discrimination
  - Advanced / Next Generation Radars
  - Micro Satellites

Our challenge is to develop methods to estimate costs for these technologies and for integrating them into the Ballistic Missile Defense System (BMDS) and Program Elements

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These are some of the technologies that we must develop cost estimates for. As you can see, these are pushing technology and in most cases, if not all, there is little historical data available.

And yes, we have a big challenge here in the MDA cost community.

VI. INVITED PRESENTATION: INDEPENDENT COST ESTIMATE (ICE) DEVELOPMENT UNDER THE NEW SPACE ACQUISITION PROCESS (STEVE MILLER)

Independent Cost Estimate (ICE) Development Under the New Space Acquisition Process

(National Security Space Acquisition Policy [NSSA] 03-01)

Steve Miller
OSD CAIG
May 27, 2004

Goals of NSSA Policy 03-01

- Streamline acquisition process for space program unique features
- Reduce impact to programs from oversight process
- Align DoD and NRO space acquisition and oversight processes
- Reduce acquisition timelines

2

Status

NSS Acquisition Policy 03-01

- National Security Space Commission Report
- 4 Mar 03 NSS Acq Policy 03-01 Interim Guidance issued
- 6 Oct 03 NSS Acq Policy 03-01 Signed
- Program reviews executed under 03-01
  - SBR KDP A
  - TCM KDP B
  - MUOS KDP B
- More info
  - http://www.safus.hq.af.mil/usa/index.html

3

Comparing NSSA 03-01 with DoD 5000

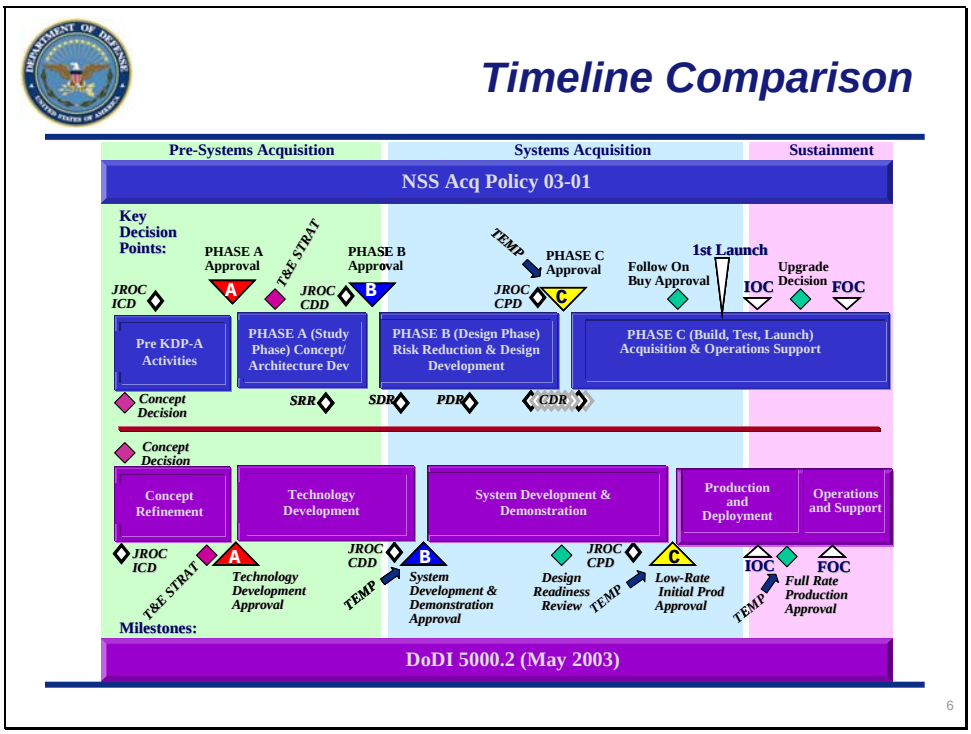
- New Acquisition Model tailored for space systems:
  - Emphasis is on Acquisition vs Life Cycle costs
- Acquisition Phase Reviews in NSS 03-01:
  - Key Decision Points vs Milestones
  - Earlier in process
  - Different entry/exit criteria
- Acquisition Phases Different

4

Acquisition Phase Name Comparison

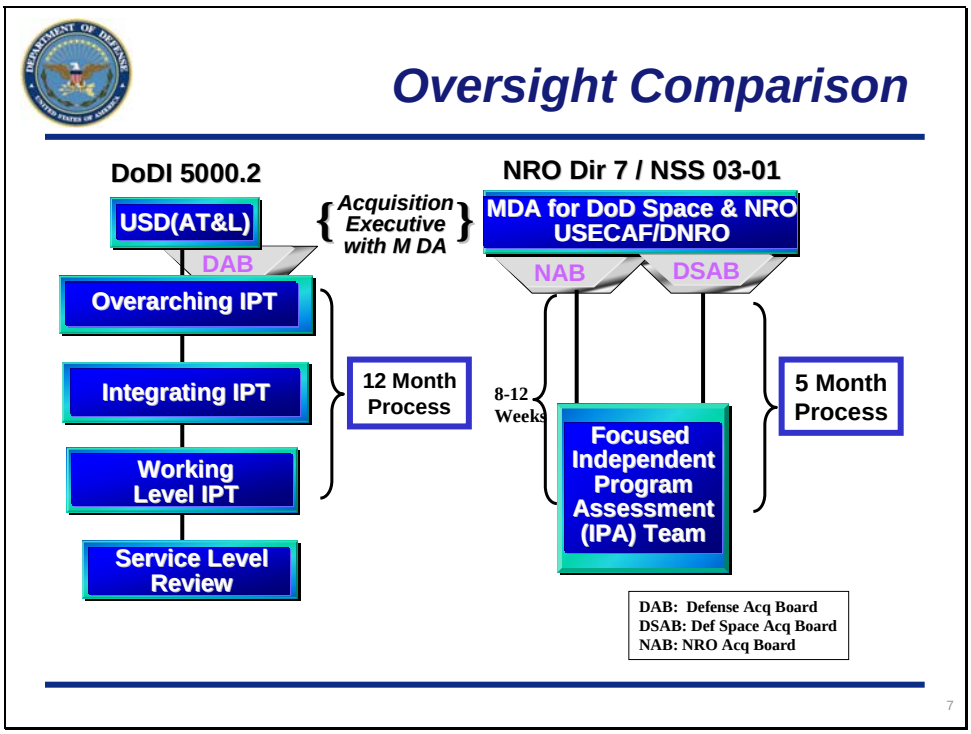
Very Old 5000	Old 5000	New 5000	NSS 03-01
MS 0 Concept Exploration	**MS A** Concept and Technology Development	Pre Acquisition Activities Rqmts Document, CONOP, AoA report	Pre KDP Activities Rqmts Document, CONOP, AoA report
MS 1 Prog Def & Risk Reduction	**DAE Review** Approves start of Component Adv Dev	**MS A** Technology Development Phase	**KDP-A** Study Phase (Ends with SRR)
			KDP-B (Prog Initiation) Design Phase (SDR, PDR & *CDR)
MS II Engineering and Manf Dev	**MS B** (Prog Initiation) System Dev and Demonstration	**MS B** (Prog Initiation) System Dev and Demonstration (Starts Sys Integ Sub-phase)	
	DAE Review	Mid-Phase Design Readiness Review (Starts System Demonstration Sub-Phase)	**KDP-C** Build Phase (*CDR, build, test launch, support
LRIP Decision	**MS C** (LRIP Decision) Prod & Deployment Phase	**MS C** (LRIP Decision) Prod & Deployment Phase	"Follow-on Buy" or LRIP decision as appropriate
MS III Full-Rate Production Decision	**DAE Review** Full Rate Prod Decision	**MDA Review** Full Rate Production Decision	Major Upgrade Decision or Full-Rate Production decision as appropriate

5



KDPs are placed at specific program maturity points. They are not tied to down-selection points since those are covered by Service Source Selection procedures and could occur at various points within a program.

Acquisition Strategy approval takes place before each KDP. ICA is done at KDP-A, ICE is done at KDP-B and KDP-C, and the T&E strategy and TEMP are approved by the Director, OT&E.



The above slide shows a comparison of the existing OIPT process and the DSAB/IPA process. Instead of multiple IPTs, the IPA process uses a single IPT, to conduct the independent review of a program

Conduct of an IPA. An IPA is a focused, short-duration, "peer review" activity that typically runs from two to four weeks depending on the program's complexity. An IPA Team is assigned to work the assessment full time for the IPAT Leader. The IPA activity is usually conducted at the system program office locale or at the contractor facility to facilitate easy, ready access to the system experts, the data, and the equipment under review. While the IPAT may discuss issues with various elements in conducting the assessment, the assessment is not a consensus process. Rather, it produces an unbiased, structured evaluation of the proposed space acquisition activity in order to provide the USecAF an overview of how well the program office has addressed problematic issues, and to identify areas of concern or potential risk.

IPA Review Scope. The assessment is not necessarily a detailed technical evaluation, and may or may not involve interaction with the program office's contractors. It is the type of high–level review and analysis that the USecAF would do if he had the time to determine if the acquisition activity was ready to proceed into its next phase. Program Managers will make necessary data available to the IPA Team conducting the assessment. The IPA Team is not required to gather raw data independently or to repeat

analyses performed by the Program Manager, except to the extent judged necessary by the IPA team lead, to answer specific questions/concerns expressed by the USecAF. The assessment will not involve equal depth in all areas. Instead, the process will include a first-order review of the entire program, followed by more in-depth reviews of those areas of particular criticality, controversy, or risk. It will address system segment synchronization.

IPA Assessment Focus

READINESS FOR KDP-X
AND ENTRY INTO PHASE X

- **FUNDING: Is the budget adequate for the X phase?**
- **PROCESS: Are processes, procedures and strategies adequate for the X phase?**
- **PEOPLE/ORGANIZATION: Is the manning and organizational structure adequate for the X phase**
- **REQUIREMENTS: Are the requirements established to a level sufficient to bound X phase studies?**
- **RISK: Have the key risk areas been identified and are plans in place to mitigate them?**

8

Example IPA Assessment Summary

NSS 03-01 Space Policy Assessment Areas	
1. Acquisition Strategy	Y
2. Execution Status of Program	Y
3. ADM Exit Criteria and Direction at Previous KDP	G-
4. Requirements Summary	Y
5. Systems Engineering Process Review	G
6. Alternatives Assessed and Results	G-
7. Most Promising Alternatives & Rationale	G
8. Cost Drivers and Major Trade-offs	G-
9. Risk Assessment and Risk Reduction Plans	Y
10. Support Issues	G-
11. Interfaces with and Impacts on Other Systems	Y
12. Program Protection Planning	G
13. Developmental and Operational Testing Approach	R
14. Life Cycle Cost Estimate and FYDP Implications	R
15. Program Environmental, Safety, and Health (PESHE)	G
16. Acquisition Decision Memorandum (ADM)	

G - Most items in place for Study Phase
Y - Issues exist that cause concern for execution
R - Critical issues exist that may severely impact execution

9

Independent Cost Estimate Development Process Under 03-01

- Goals
- Team Members
- Timelines
- Independence
- Responsibilities
  - ICAT Leader
  - ICAT Team Member
- IDA Support
- CCDR / SRDR
- Cooperative/Complementary Research
- Lessons Learned
  - What has worked and what hasn't
- Challenges Ahead

10

Goals of the ICAT Process

- Provide the DoD Space MDA with the most accurate, precise, and unbiased estimates possible
- Communicate the analysis results in a way that facilitates understanding and guides decision-making
- Establish sound, consistent cost estimating and analysis policies
- Combine the best practices across the space cost estimating community
- Provide the best use of limited number of qualified space cost analysts
- Cooperate in cost research

11

ICAT Supporting Organizations

- ICAT Responsible Oganization: OSD CAIG
- ICAT team members can be drawn from:
  - OSD CAIG
  - AFCAA
  - NCG
  - IC CAIG
  - SMC
  - CEAC
  - NCCA
  - SPAWAR

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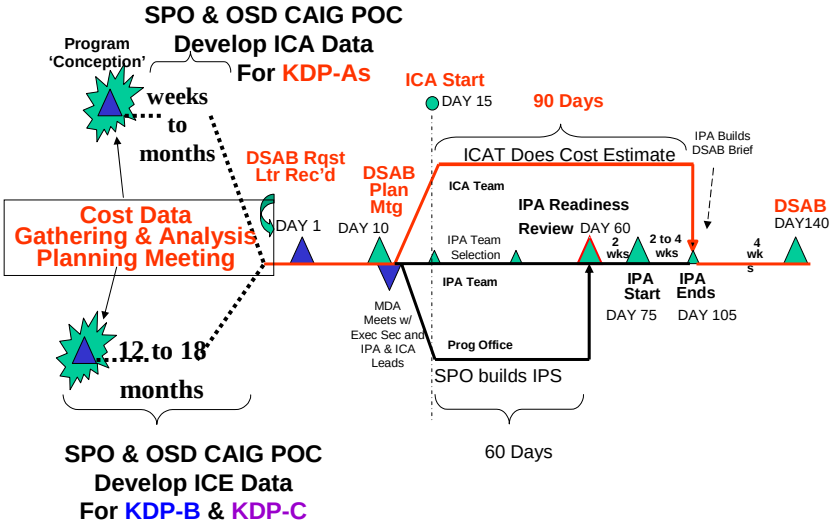
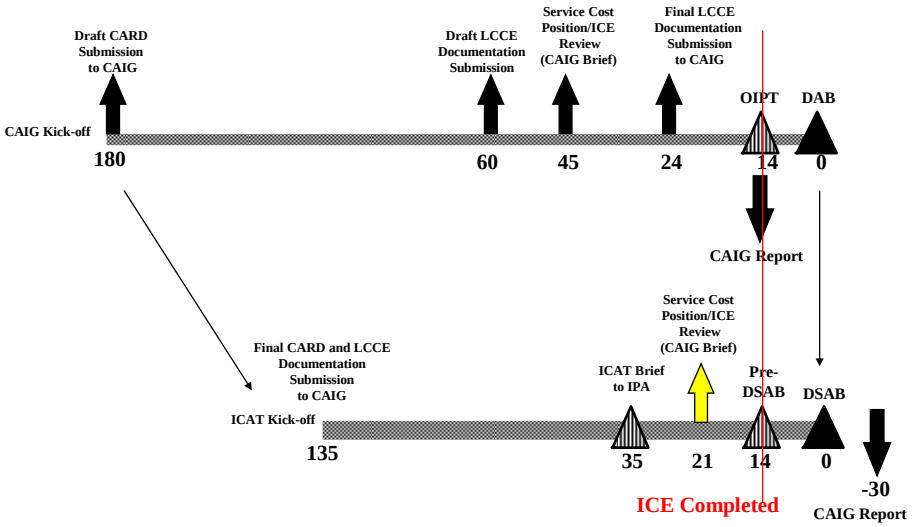
ICA/IPA Timeline



Comparison to ICE Process Under DoD 5000



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03-01 ICAT Requirements

- Independence: ICAT members must not have directly supported the program under review
- Leader Affiliation: ICAT Leader must be a government employee
- KDP-B and C reviews considered statutory; KDP-A regulatory
  - Statutory reviews must have government personnel playing all key roles
  - Regulatory reviews may have contractors playing some key roles

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ICAT Responsibilities

- Team Leader
  - Set-up/manage ICA team
  - IPA liaison
  - Brief results at CAIG, IPA, Pre-DSAB and DSAB reviews
  - Integrate ICE and develop overall risk assessment
  - Document findings
  - Work with program office between reviews
- Team Member
  - Develop estimate for responsible area
  - Provide input to risk analysis
  - Identify and determine drivers of the major areas of difference with program office estimate

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IDA Support Role

- Integrate team member estimates
- Archive data and estimates
- Develop standardized WBS, CARD, etc. for space programs
- Perform after-the-fact metrics analysis
- Provide technical support to ICAT
- Support DoD Space Cost Research meetings
- Other space related cost research activities
- Resourced thru a “tax” to program’s up for KDP reviews (~$250K per program per review)

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CCDR/SRDR

Contractor Cost Data Report / Software Resources Data Report

- NSSA 03-01 implements DoD's CCDR/SRDR cost reporting mechanisms
- CCDRs on all contracts over $50M
- SRDRs on all software contracts over $25M
- Plan required at DSAB planning meeting (ICAT kick-off)
- CAIG Chair approval authority
- CCDR plans are not yet synchronized with NRO cost collection

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Cost Research

- Goal: Improve the tools and databases for the DoD space community
  - Maximize use of scarce research resources
  - Eliminate overlap of research work
  - Standardize data collection processes
  - Identify needs for data and cost tools
  - Facilitate data and tool sharing
- Established a DoD Space Cost Research Forum that's meets tri-annually and hosted by IDA
  - Members include: AFCAA, SMC, IC CAIG, OSD CAIG, MDA, NCG, CEAC, NCCA
  - Next meeting planned for May 26, 2004
- Share lessons learned from recent ICAT reviews

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Take Aways from SBR, TCM, and MUOS

- One-on-one relationship early in the process with IPA lead is key
  - Convey to the IPA lead that the ICAT review process extends beyond just "cost"
  - Close ICAT/IPAT coordination necessary to ensure common program baseline presented to DSAB
  - Remember, ICAT is not a member of the IPA
- ICAT brief must clearly and simply identify differences with the program office estimate and their causes
- Resources provided through the team approach enabled a more robust data collection effort and more thorough analysis
- Clearance issues inhibited a some analyses

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Take Aways from SBR, TCM, and MUOS cont.

- 03-01 compressed timelines are extremely challenging
  - Strict adherence to 03-01 CARD and program prepared LCCE delivery dates is essential
- Consistent team in-place is necessary to meet 03-01 timelines, especially for statutory estimates
  - 03-01 assumes 12 to 18 months from KDP-A to KDP-B
  - TCM: Did not have a KDP-A
  - SBR: KDP-B will be at least 30 months after KDP-A
- ICA and IPA are interdependent and parallel processes, but much of the process must occur serially
  - ICA cannot wait for schedule and technical assessments from IPA
  - IPA cannot complete overall program assessment without cost estimates

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Challenges to Managing the ICA Team

- **Building an ICE and managing a team**
- **03-01 unrealistic that ICAT members will be "full time"**
- **Meetings (managing locations & schedules)**
- **What if major estimating differences arise within the ICA across organizations?**

22

Challenges Ahead

- **Operating more efficiently under the compressed time-line**
- **Supporting the continuous estimate updates**
- **Standardizing data collection processes**
- **Resources (people and dollars)**
- **Developing guidelines for a better "space" CARD**
- **Refining 03-01 based on what we've learned to date**
- **Executing the requirements of the FY2004 Intelligence Authorization Act**
  - **Developing long-term and short-term execution plans**
  - **Billets**
  - **Cleared work and storage spaces**

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APPENDIX A.
STUDY TITLES AND KEYWORD ASSIGNMENTS

Office of the Deputy Director (Resource Analysis), Program Analysis and Evaluation

PA&E–1	Major Defense Acquisition Program (MDAP), Cost Growth (CG) Study Support
PA&E–2	Special Studies to Support CAIG ICE
PA&E–3	Space Systems Cost Research
PA&E–4	Improved Methodologies for Estimating Development Costs
PA&E–5	Cost Drivers for Transformation Forces
PA&E–6	Software Resource Metrics, Databases, and Analysis
PA&E–7	Defense Cost and Resource Center (DCARC)
PA&E–8	Databases and Methods for Estimating the Costs of the Defense Systems Remanufacture, Upgrades, Modifications, and SLEPs
PA&E–9	Economic Drivers of Defense Overhead Costs
PA&E–10	Helicopter Plant Specific Overhead and Industrial Utilization Model
PA&E–11	USMA Special Studies to Support EMAD Analysis
PA&E–12	Spectrum Auction Market Analysis
PA&E–13	Integrated Global Footprint Costing Analysis
PA&E–14	Analyzing O&M Execution Data in Support of the Planning, Programming, Budgeting, Execution System (PPBES)
PA&E–15	O&M Program Balance and Related Cost Drivers
PA&E–16	Sizing the Medical Readiness Capability and Managing Beneficiary Demand
PA&E–17	Personnel Inventory Cost and Compensation Model (PICCM) Update
PA&E–18	Comprehensive Manpower Research and Analysis Database
PA&E–19	Resource Analysis of DoD Central Training
PA&E–20	Macroeconomic and Cost Data
PA&E–21	Defense Employment and Purchases Projection System (DEPPS)
PA&E–22	Cost Analyses of Next Generation UAV/UCAV Systems
PA&E–23	Cost Analysis of Next Generation C^4I Systems
PA&E–24	Avionics and Mission Systems Cost Estimation
PA&E–25	Training Course for PA&E/Other Analysts
PA&E–26	CAIG Project Planning
PA&E–27	Costing Research and Student Theses at AFIT and NPS
PA&E–28	Initiation of Cost Estimating Institute
PA&E–29	Economics Research Symposium
PA&E–30	IDA Cost Research Symposium

Missile Defense Agency

MDA–1	Missile Cost Model
MDA–2	Estimating Cost of Programs with Initial Capabilities (Spiral Development)
MDA–3	Radar Cost Model Update

MDA–4	MDA Cost Risk Methodology Update (Revision 5)
MDA–5	Estimating Costs of BMC3
MDA–6	Software Database
MDA–7	Schedule Analysis for MDA Programs
MDA–8	Cost and Schedule Analysis for MDA Programs

Deputy Assistant Secretary of the Army for Cost and Economic Analysis Center

DASA-CE–1	Operating and Support Management Information System (OSMIS) Database Management
DASA-CE–2	ACEIT Help-Desk/Training
DASA-CE–3	ACEIT Enhancements
DASA-CE–4	Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C^4ISR) Systems
DASA-CE–5	Sensor Cost Estimating Relationship (CER) Development
DASA-CE–6	Tri-Service Missile and Smart Munitions Database
DASA-CE–7	Wheel and Tracked Vehicle Database and Methodology Development
DASA-CE–8	Aircraft Module Database Development
DASA-CE–9	Standard Variable IDs for use in ACEIT
DASA-CE–10	System Development & Demonstration Phase Development Engineering Cost Methodology Development
DASA-CE–11	Standard Service Cost (SSC)
DASA-CE–12	Personnel Costing System
DASA-CE–13	Force and Contingency Cost Models Update
DASA-CE–14	Unmanned Aerial Vehicle Data Collection and CER
DASA-CE–15	C^4ISR Cost-Performance Estimating Relationships
DASA-CE–16	Test & Evaluation Costing Methodology Development
DASA-CE–17	Test & Evaluation Costing Methodology Development
DASA-CE–18	Turbo-jet and Turbo-fan Propulsion Unit Cost Performance Estimating Relationships
DASA-CE–19	Integrated Performance Cost Model (IPCM)

Army Materiel Command

No input submitted.

Army Tank-automotive and Armaments Command

TACOM–1	Price Model Calibration—Combat Vehicles

Army Aviation and Missile Command

No summaries submitted.

Army Space and Strategic Defense Command

SMDC–1	THAAD Radar Environmental Quality Life Cycle Cost Estimate (EQLCCE)
SMDC–2	PAC-3 Environmental Quality Life Cycle Cost Estimate (EQLCCE)
SMDC–3	Environmental Cost Estimating Handbook for Missile Defense

Naval Cost Analysis Division

NCAD–1	Operating and Support Cost Analysis Model (OSCAM-Ship, OSCAM-Ship Systems)
NCAD–2	Aircraft Operating and Support Cost Analysis Model (OSCAM-Air)
NCAD–3	Naval VAMOSC Management Information System
NCAD–4	NCAD Online Document Library
NCAD–5	Weapon System Software Development Cost/Technical Database
NCAD–6	AIS Life Cycle Cost and Technical Database
NCAD–7	Hardware Deflator Methodology
NCAD–8	COTS Procurement Cost Estimating Methodology
NCAD–9	Platform Integration Cost Database/Methodology for Shipboard Electronics

Office of Naval Research

ONR–1	Marine Composites Affordability—A Knowledgebased Approach
ONR–2	The Effect of New Technologies on Ship Systems: A System Dynamics Cost Modeling Approach

Naval Air Systems Command

NAVAIR–1	SLAP/SLEP Full Scale Testing Model
NAVAIR–2	Demilitarization/Disposal Model
NAVAIR–3	Cost Growth Analysis
NAVAIR–4	Naval Aircraft Modification Model (NAMM) Update
NAVAIR–5	Force Level Economic Effectiveness Trade (FLEET) Model
NAVAIR–6	Engineering Investigations Cost Model (EICM)
NAVAIR–7	Avionics Database
NAVAIR–8	Rotary Wing Database
NAVAIR–9	Propulsion Database
NAVAIR–10	Environmental Costs of Hazardous Operations (ECHO) Model
NAVAIR–11	Analysis of Alternatives (AOA) Evaluation Tool
NAVAIR–12	Missile Database
NAVAIR–13	Cost Risk Methodology/Model
NAVAIR–14	Software Cost and Schedule Estimating - SBIR (Small Business Innovative Research) N01-020 Phase II
NAVAIR–15	Installation Optimization and ECP/Modification Cost Trade-off Model
NAVAIR–16	Aircraft Integration & Certification Cost Model

Naval Sea Systems Command

NAVSEA–1	Material Vendor Survey
NAVSEA–2	PEO-SHIPS Technology Refresh Cost Model
NAVSEA–3	NAVSEA Cost Estimating Handbook

Naval Surface Warfare Center, Dahlgren Division

No summaries submitted.

Naval Surface Warfare Center, Carderock Division

NSWCCD–1	Flexible Tool for Assessing Ship Cost (Flex-TASC)

Air Force Cost Analysis Agency

AFCAA–1	ACE-IT Enhancements
AFCAA–2	Military Aircraft Data and Retrieval (MACDAR) System Update
AFCAA–3	Air Force Total Ownership Cost (AFTOC) Management Information System
AFCAA–4	Air Force Inflation Model and Tutorial
AFCAA–5	Aircraft Avionics Systems Database and Study
AFCAA–6	Performance Activated COTS Electronics Relationships (PACER) (Formerly COTS Electronics Database/Modeling)
AFCAA–7	Cost Factor Model Support
AFCAA–8	Aircraft and Aircraft Modification Sufficiency Review Handbook
AFCAA–9	Long-Range Planning Cost Analytical Support
AFCAA–10	USCM/PSCM Unmanned Space Cost Model and Passive Sensor Cost Models
AFCAA–11	Develop CPFH Contingency Calibration Factors
AFCAA–12	Enhanced Methods Based on Contract Price Data (Formerly Firm Fixed Price Contract Study)
AFCAA–13	Space Systems Software Database (S3DB)
AFCAA–14	Post Production Spares Prices Study
AFCAA–15	Update CORE. SABLE/Contingency/LSC Models
AFCAA–16	Initial Support Cost CERs
AFCAA–17	Cost per Flying Hour Program Risk Model

Aeronautical Systems Center, Air Force Material Command

No input submitted.

Air Force Space and Missile Systems Center

No input submitted.

Electronics Systems Center, Air Force Material Command

No input submitted.

Department of Veterans Affairs

No input submitted.

Ministry of Defence, Special Procurement Services

PFG–1	Software Support Cost Model Project (SSCMP)
PFG–2	Cost Engineering Capability Improvement Model to ISO 15 504 (CECIM+)
PFG–3	Family of Advanced Cost Estimating Tools (FACET)
PFG–4	Ship Platform Risk based Unit production Costing Estimates Model (SPRUCE)
PFG–5	Automatic Cost Resource and Data Integration Tool (A-CREDIT)
PFG–6	Operation and Support Cost Analysis Model (OSCAM) Land and Sea

Air Force Institute of Technology, School of Engineering and Management

No input submitted.

Defense Acquisition University

DAU–1	Acquisition Strategy and Risk Management Methodologies for Aggregated Software-Intensive Systems

Aerospace Corporation

AEROSPACE–1	Cost of Technology IRAD
AEROSPACE–2	Small Satellite Cost Model (SSCM)

MITRE Corporation

MITRE–1	Determining Information Management (IM) Return-on-Investment (ROI) – Innovation Grant (IG)
MITRE–2	Software Engineering Economics and Best Practices of Internet based Software Developments
MITRE–3	Enterprise Life Cycle Investment Management

RAND Corporation

RAND–1	Software Cost Estimation and Sizing Methods, Issues, and Guidelines
RAND–2	The Impact of Price Based Acquisition on DoD Programs
RAND–3	F/A-22 and F/A-18 E/F Engineering/Manufacturing Development Case Studies: Lessons Learned
RAND–4	Aircraft Support Cost and Budget Estimating Relationships
RAND–5	Analysis of Cost Growth using Selected Acquisition Reports
RAND–6	Analysis of Systems Engineering and Program Management Costs
RAND–7	Developing a Space Systems Sufficiency Review Handbook
RAND–8	Implications and Implementation of OSD's Evolutionary Acquisition Strategy Relying on Spiral Development
RAND–9	An Assessment of Cost Risk Methodologies and Policies
RAND–10	Avionics and Mission Systems Cost Estimation Study
RAND–11	Test and Evaluation Trends and Costs for Aircraft and Guided Missiles
RAND–12	Aircraft and Missile Sufficiency Review Handbook

CNA Corporation

CNAC–1	Long-Term Projections of Operations and Support Costs
CNAC–2	Cost Tradeoffs for Major Acquisition Programs
CNAC–3	Improving Efficiency of Warfare Support and Manpower
CNAC–4	Implementing Acquisition Metrics
CNAC–5	Business Case Analysis of Performance Based Logistics

Institute for Defense Analyses

IDA–1	Assessment of Contractor Cost Data Reporting (CCDR) and Software Resource Data Report (SRDR) Systems
IDA–2	FYDP Analysis Support
IDA–3	FYDP Viewers Upgrade
IDA–4	Force and Infrastructure Studies
IDA–5	FYDP Improvement, Phase II
IDA–6	Program and Budget Detail Analysis
IDA–7	Contingency Operations Support Tool (COST)

IDA–8	DoD Enlistment Early Warning System
IDA–9	Methods to Assess Schedules for the Strategic Defense System
IDA–10	Costs of Developing and Producing Next Generation Tactical Aircraft
IDA–11	Support Labor Cost for Military Aircraft
IDA–12	Developing a Life Cycle Cost Model and Conducting a Cost Analysis of the Advanced Multifunction RF-Concept (AMRF-C)
IDA–13	Reducing Defense Infrastructure Costs
IDA–14	Training Transformation Funding and Requirements Validation Study
IDA–15	Consolidation of Defense Agency Overhead Functions
IDA–16	Total Manpower Cost of Military Personnel
IDA–17	Workload Forecasting for the Veterans Benefits Administration
IDA–18	Future Low Acquisition Cost Tactical Missiles
IDA–19	Evaluation of TRICARE Program Costs
IDA–20	Resource Analysis for Operational Test and Evaluation (OT&E)
IDA–21	Resource Analysis for Test and Evaluation (T&E)
IDA–22	Support to Space Systems Independent Cost Assessments
IDA–23	Assistance to OSD(PA&E) Independent Cost Estimate of the Pentagon Renovation
IDA–24	Portfolio Optimization Feasibility Study
IDA–25	Cost-Effectiveness Analysis of Training
IDA–26	Analytical Support for the Test and Evaluation Science and Technology (TEST) Program
IDA–27	Resource Analysis for T&E - CTEIP
IDA–28	Industrial Sector Capability Analysis
IDA–29	Cooperation with KIDA
IDA–30	Cost Analysis Education
IDA–31	Cooperation with MinDef, Singapore
IDA–32	Rational Limits on the Standardization of Federal Processes Across Agencies
IDA–33	Incentivizing Jointness in Department of Defense (DoD) Acquisition Programs
IDA–34	Rolling Capture of Acquisition Lessons Learned
IDA–35	Effects of Deployment and PCS on Retention and Readiness
IDA–36	Evaluating, Managing and Forecasting Army Equipment Readiness
IDA–37	Modernizing the USAF Air Refueling Tanker Fleet
IDA–38	Advanced SEAL Delivery System

Table A-1. Keyword Assignments

	PA&E	MDA	DASA-CE	AMCRM	TACOM	AMCOM	SMDC	NCAD	ONR	NAVAIR	NAVSEA	NSWCDD	NSWCCD	AFCAA	ASC/FMC	SMC	ESC/FMC	VA	PFG	AFIT/ENV	DAU	AEROSPACE	MITRE	RAND	CNAC	IDA	Total
PERSPECTIVE																											
Industry	5	—	5	—	—	—	3	1	2	—	1	—	—	2	—	—	—	—	—	—	—	—	—	1	—	2	22
Government	30	5	15	—	1	—	3	9	2	15	2	—	1	16	—	—	—	—	6	—	1	1	3	12	5	34	161
CONTEXT																											
Estimating	19	2	15	—	1	—	3	6	2	6	3	—	1	8	—	—	—	—	5	—	—	2	—	3	—	13	89
Analysis	2	8	9	—	—	—	—	5	—	9	1	—	—	10	—	—	—	—	2	—	1	—	3	6	—	22	78
Reviewing/Monitoring	3	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	6	1	7	18
Policy	1	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	2	1	10	15
Programming	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	8	13
Budgeting	1	—	1	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	1	—	—	—	—	—	—	6	11
OBJECT																											
Forces	3	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	8
Weapon Systems	6	1	4	—	—	—	—	1	—	1	2	—	—	—	—	—	—	—	3	—	1	—	—	3	4	2	28
Aircraft	1	—	1	—	—	—	—	2	—	8	—	—	—	9	—	—	—	—	—	—	—	—	—	5	—	4	30
Helicopters	—	—	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
Missiles	—	5	2	—	—	—	3	1	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	3	—	3	19
Ships	—	—	—	—	—	—	—	4	2	—	3	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	11
Land Vehicles	—	—	1	—	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
Space Systems	1	—	—	—	—	—	—	1	—	—	—	—	—	3	—	—	—	—	—	—	—	2	—	1	—	2	10
Airframe	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	2
Propulsion	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2
Electronics/Avionics	2	1	5	—	—	—	—	4	—	2	2	—	—	3	—	—	—	—	—	—	—	—	—	1	—	1	21
Spares/Logistics	—	—	1	—	—	—	—	—	—	—	—	—	—	6	—	—	—	—	—	—	—	—	—	—	—	1	8
Facilities	2	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	5	9
Infrastructure	2	—	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1	—	1	9	15
Manpower/Personnel	3	—	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1	7	13
STAGE																											
C&TD	—	—	7	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	2	—	1	—	—	11
SD&D	2	2	8	—	—	—	—	—	—	1	2	—	—	1	—	—	—	—	—	—	—	1	—	4	1	6	28
Production	—	2	9	—	—	—	—	2	1	1	2	—	—	5	—	—	—	—	—	—	—	1	—	2	1	7	33
Test and Evaluation	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	5	8
Operations and Support	2	1	3	—	—	—	—	3	1	—	2	—	—	3	—	—	—	—	1	—	—	—	—	1	3	3	23
Retirement and Demilitarization	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Life Cycle	2	4	4	—	1	—	3	3	1	3	1	—	—	8	—	—	—	—	—	—	—	—	2	—	1	5	38

(Continued on the next page.)

Table A-1—*Continued*

	PA&E	MDA	DASA-CE	AMCRM	TACOM	AMCOM	SMDC	NCAD	ONR	NAVAIR	NAVSEA	NSWCDD	NSWCCD	AFCAA	ASC/FMC	SMC	ESC/FMC	VA	PEG	AFIT/ENV	DAU	AEROSPACE	MITRE	RAND	CNAC	IDA	To
FOCUS																											
Labor	—	—	5	—	—	—	—	—	—	—	2	—	—	2	—	—	—	—	—	—	—	—	—	—	—	3	12
Material	1	—	3	—	—	—	—	—	—	—	3	—	—	2	—	—	—	—	—	—	—	—	—	—	—	2	11
Overhead/Indirect	3	—	4	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	13
Engineering	1	—	3	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6
Manufacturing	1	—	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	9
CPR/CCDR	—	—	4	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5
WBS	—	—	6	—	—	—	—	1	—	—	2	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	11
Fixed Costs	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	3
Variable Costs	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	4
Production Rate	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
Acquisition Strategy	1	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	1	2	—	5	11
Automation	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
Advanced Technology	—	—	2	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	4
Risk/Uncertainty	—	1	—	—	—	—	—	2	1	1	2	—	—	2	—	—	—	—	1	—	1	—	1	1	—	—	13
Training	7	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	10
Readiness	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2
Reliability	—	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	3
Sustainability	—	—	1	—	—	—	—	2	—	—	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1	6
Integration	—	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
Modification	—	—	—	—	—	—	—	2	—	1	2	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	6
Security	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Environment	—	—	—	—	—	—	3	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4
Schedule	1	2	—	—	—	—	—	2	—	—	1	—	—	1	—	—	—	—	—	—	—	—	1	1	—	3	12
Size	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1
Software	2	1	—	—	—	—	—	2	—	1	1	—	—	1	—	—	—	—	1	—	—	—	1	1	—	1	12
APPROACH																											
Data Collection	10	—	13	—	—	—	3	6	1	8	2	—	—	10	—	—	—	—	—	—	—	2	—	3	1	9	68
Survey	—	—	1	—	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—	—	1	—	1	—	2	8
Case Study	—	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	4	8
Mathematical Modeling	5	2	8	—	—	—	—	2	1	—	1	—	—	4	—	—	—	—	—	—	—	1	—	—	—	7	31
Economic Analysis	5	—	—	—	1	—	—	1	—	1	2	—	—	—	—	—	—	—	—	—	—	—	1	—	2	4	17
Cost/Production Function	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	3
Time Series	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1
Statistics/Regression	—	—	3	—	—	—	—	3	—	—	1	—	—	5	—	—	—	—	—	—	—	—	—	—	—	5	17

(Continued on the next page.)

Table A-1—*Continued*

	PA&E	MDA	DASA-CE	AMCRM	TACOM	AMCOM	SMDC	NCAD	ONR	NAVAIR	NAVSEA	NSWCDD	NSWCCD	AFCAA	ASC/FMC	SMC	ESC/FMC	VA	PFG	AFIT/ENV	DAU	AEROSPACE	MITRE	RAND	CNAC	IDA	Total
PRODUCT																											
Database	1	—	10	—	—	—	—	9	—	6	2	—	—	12	—	—	—	—	—	—	—	—	—	2	2	4	48
Review	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	4
Method	4	2	—	—	—	—	—	2	—	3	—	—	—	5	—	—	—	—	1	—	—	—	1	4	1	4	27
Mathematical Model	1	4	—	—	—	—	—	—	—	6	1	—	1	1	—	—	—	—	3	—	—	—	—	—	—	1	18
Computer Model	—	1	7	—	—	—	—	—	—	—	2	—	—	5	—	—	—	—	2	—	—	2	—	—	—	5	24
Expert System	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Cost Progress Curve	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
CER	—	4	4	—	—	—	—	4	—	2	1	—	—	6	—	—	—	—	—	—	—	2	—	4	—	—	27
Study	14	—	2	—	1	—	3	2	—	2	—	—	—	1	—	—	—	—	—	—	1	—	2	5	5	20	58

Program Analysis and Evaluation (PA&E)

Name:	Office of the Deputy Director (Resource Analysis), Program Analysis and Evaluation
Address:	OSD(PA&E), 1800 Defense Pentagon, Washington, DC 20301-1800
Director:	Dr. Richard P. Burke, (703) 695-0721
Size:	Professional: 50 Support: 4 Consultants: 0 Subcontractors: 5
Focus:	Cost Analysis Improvement Group (CAIG); Life-Cycle Costs of Major Defense Acquisition Programs; Force Structure; Operating and Support Costs; Economic Analysis
Activity:	CAIG reviews and studies per year: 45–50 POM, budget, FYDP reviews: As required

PA&E–1

Title: Major Defense Acquisition Program (MDAP), Cost Growth (CG) Study Support

Summary: This effort supports development of a comprehensive, global assessment of programmed operations and maintenance (O&M) funding. PA&E has a major initiative to collect O&M data that links program and budget, and provides visibility into major categories of O&M, including costs driven by equipment OPTEMPO, depot maintenance, and installation support. However, PA&E needs to develop a series of relationships that can be used to analyze this new O&M data in support of the overarching objective. In addition, PA&E wants to increase the scope of the FYDP normalization effort for historical data to include the expanded O&M data as now received in the FYDP submission. Tools and techniques will be developed for analysis of budgeted and programmed O&M resources in all major categories of O&M funding, with emphasis on the largest three categories: Operating Tempo, Installation Support and Depot Maintenance. Initial work developed single metrics as independent variables for each of these three broad categories. In this follow-on research, the study team will identify other factors likely to influence O&M resources. The study team will identify these candidate factors through on-site visits with cognizant commands and headquarters staff elements. Once candidate factors have been identified, the team will conduct necessary statistical analyses to quantify the contributions of these factors to O&M resource allocations.

Classification: Unclassified

Sponsor: OSD(PA&E)
EMAD
The Pentagon, Room BE-798
Washington, DC 20301

John McCrillis, (703) 697-2982

Performer: NAVSHIPSO

Resources:	*FY*	*Dollars*	*Staff-years*
	2000	$215,000	
	2001	$215,000	
	2002	$211,000	
	2003	$230,000	
	2004	$250,000	
Schedule:	*Start*	*End*	
	Ongoing		
Database:	*Title:*	SAR Cost Growth Database	
	Description:	Updated MS Access database with FY03 SAR data. Additionally, NAVSHIPSO will provide schedule quantity data for all programs.	
Publications:	TBD		
Keywords:	Government, Reviewing/Monitoring, Operations and Support, Data Collection, Mathematical Modeling		

PA&E–2

Title: Special Studies to Support CAIG ICE

Summary: The goal of this task is to enhance the productivity and efficiency of CAIG analysts by collecting and performing analysis of related historical program data 6 to 12 months prior to initiation of planned CAIG ICE activities. On a ICE-by-ICE basis the designated lead CAIG analyst will identify specific program data, information, and analysis needed to support his or her review. The current CAIG analyst typically performs and/or supports two to four independent cost estimates and/or assessments per year. However, a significant amount of the analyst's time is spent collecting and analyzing data from historical programs. This data collection and analysis could be done prior to the initiation of the CAIG's review improving the productivity of the analyst to help support the overall increase in CAIG workload. A task would be generated to the contractor for this specific support ahead of the initiation of the CAIG review. This information will not directly be used to develop the ICE, but rather support the development of the ICE and identification of potential risk areas for further study. Currently identified CAIG activities include helicopter plant specific overhead and industrial utilization and GPS III and MILSATCOM space programs.

Classification: Unclassified

Sponsors: OSD(PA&E)

OAPPD
The Pentagon, Room BE829
Washington, DC 20301

Steve Miller (703) 697-5056

Performer: FFRDC - TBD

Resources:	*FY*	*Dollars*	*Staff-years*
	2004	$250,000	
Schedule:	*Start*	*End*	
	May 2004	May 2005	

Title: Special Studies to Support CAIG ICE

Database: None

Publications: None

Keywords: Government, Estimating, Weapon Systems, Acquisition Strategy, Data Collection, Method

PA&E–3

Title: Space Systems Cost Research

Summary: This effort will improve cost and schedule estimates for DoD and NFIP space programs, and develop new tools, databases, and approaches to support the growing CAIG requirements to support the acquisition of space systems. The goal is to increase efficiency and productivity of CAIG space system cost estimates, improve the Department's credibility on projecting space system resource and schedule requirements, and ensure the latest and more comprehensive data is available to analysts reviewing space programs to support the compressed timeline required by the new National Security Space Acquisition process.

Classification: Unclassified

Sponsor: OSD(PA&E)

OAPPD
The Pentagon, Room BE829
Washington, DC 20301

Mr. Steve Miller (703) 697-5056

Performer: USAF MIPR

Resources:

FY	*Dollars*	*Staff-years*
2004	$150,000	

Schedule:

Start	*End*
Mar 04	
Ongoing	

Database: None

Publications: None

Keywords: Government, Space Systems, Schedule, Mathematical Modeling

PA&E–4

Title: Improved Methodologies for Estimating Development Costs

Summary: The state of the art in the estimation of the costs of the RDT&E phase of major defense acquisition programs is significantly less precise than other phases of major acquisition programs. Current models rely heavily on factors applied to recurring hardware costs to develop cost estimates for development efforts. Few attempts have been made to directly estimate the costs of development efforts. The goal of this task is to explore the possibility of using simulation techniques to directly estimate development costs by modeling the sequence of events that must occur during system development. A new tool, Generalized Activity Network System (GANS) was developed and used on a missile defense program development phase. Research will continue in software development activities.

Classification: Unclassified

Sponsors: OSD(PA&E)

OAPPD

The Pentagon, Room BE829
Washington, DC 20301

Brian Gladstone (703) 697-0319

Performer: LMI

Resources:

FY	*Dollars*	*Staff-years*
2001	$100,000	
2002	$200,000	
2003	$200,000	
2004	$200,000	

Schedule:

Start	*End*
Mar 2001	Sep 2004

Database: None

Publications: None

Keywords: Government, Estimating, Weapon Systems, SD&D, Study

PA&E–5

Title: Cost Drivers for Transformation Forces

Summary: This work program aims at providing more informed analyses for senior Department decision makers through advanced analyses of the Department's force and infrastructure activities. It focuses on two broad areas; improved taxonomies for analyses of forces and missions, and improved methods for estimating resource requirements for transformed military forces. The effort will focus on periodic updating of the Force and Infrastructure Categories (F&ICs) used as taxonomy for analysis of the defense program. It will also identify the factors most likely to affect the costs of transformed military forces, such as the Army's Future Combat Systems (FCS). The results of this research will be incorporated into cost models used by the Resource Analysis Directorate and the Cost Analysis Improvement Group.

Classification: Unclassified

Sponsor: OD(PA&E), FICAD
The Pentagon, Rm. BE779
Washington, DC 20301

Walt Cooper, (703) 697-4312

Performer: IDA

Resources:

FY	*Dollars*	*Staff-years*
2004	$150,000	

Schedule:

Start	*End*
Ongoing	

Database: None

Publications: None

Keywords: Government, Forces, Infrastructure, Study

PA&E–6

Title: Software Resource Metrics, Databases, and Analysis

Summary: The goal of this study is to help improve the Department's ability to better estimate the size, effort and schedule of software components within DoD projects and programs. Particular emphasis will be placed on "system of systems" or the degree of application "nesting". Over the last several years, defense systems have become increasingly dependent on software. All too frequently, the cost and schedule performance of these systems has suffered because of problems associated with critical software components. Defense analysts continue to attempt to project the cost and schedule of such projects with little or no historical experience. Actual cost- driver metrics of similar completed software efforts for both embedded weapon systems and Major Automated Information Systems (MAIS) programs are needed to properly estimate future program costs. To address this issue, the CAIG launched an effort during FY2000 to develop a proposal to collect software data within ACAT I programs. A small set of core data were identified, a data collection process was proposed, and pilot projects were initiated. The proposed metrics resulted in a change in the DoD regulations. All ACAT I programs must submit size, effort, and schedule information before the project begins and when the project is completed. All ACAT I materiel developers who have contracts that have an expected software effort in excess of $25 million are now required to provide these data. The purpose of the current effort is to collect these data on completed and on-going programs, with particular emphasis on those systems that have nested systems within them where integration issues are more complex. The objective of this effort is to "jump-start" the database by collecting and analyzing the Software Resource Data on existing and present programs so that cost analyst can apply size and schedule growth actuals, integration actuals and productivity factors to programs that must be estimated. This study will collect the proposed software metrics data associated with defense programs. The systems to be collected will be mutually agreed between the Project Action Officer and the research organization. The researcher will collect software metrics data, as defined in the recently approved Software Resource Data Report, and begin analyzing the data to assess a) size and schedule growth by application type and function (e.g., flight control, radar, real time communications, inventory) b) difference in growth metrics for various levels of re-use/COTS/GOTS, amount of integration effort by degree of "system nesting" and c) software productivity by application type, language, and overall size.

Classification: Unclassified

Sponsor: OD(PA&E), WSCAD
The Pentagon, Rm. BE779
Washington, DC 20301

Rob Flowe, (703) 692-8052

Performer: SEI

Resources:

FY	*Dollars*	*Staff-years*
2004	$650,000	

Schedule:

Start	*End*
Oct 2003	Sep 2004

Database: None

Publications: None

Keywords: Government, Industry, Estimating, Weapon Systems, Software, Data Collection, Study

PA&E–7

Title: Defense Cost and Resource Center (DCARC)

Summary: The OSD Cost Analysis Improvement Group (CAIG) maintains an integrated cost research program to improve the technical capabilities of the DoD to estimate the costs of major equipment. The CAIG works with DoD components to determine relevant costs, collect and make available related actual costs, and develop techniques for projecting them. An important part of the CAIG charter is to develop and implement policy to provide for the appropriate collection, storage, and exchange of information concerning improved cost estimating procedures, methodology, and data necessary for cost estimating.

This project will develop and maintain an Internet-based, secure document and data retrieval system that incorporates Cost and Software Data Reporting (CSDR), cost research libraries, system performance data, as well as interfaces with other cost-related data systems. Access to the system will be available to authorized users through the World Wide Web. The project will maintain and update software, provide a user-friendly, common search functionality for both electronic data and electronically stored documents, provide help desk support, scan documents into the system, develop both classroom and computer-based training programs for use of and access to the data, and continue its ongoing assessment of user needs and system streamlining requirements. The DCARC will also assist acquisition program offices in developing data collection plans and make assessments and change recommendations on DoD policy affecting cost data collection and develop a data availability assessment tool to assist cost estimators in using cost data for estimating purposes.

Classification: Unclassified

Sponsor: OSD(PA&E)
WSCAD/DCARC
Suite 500, CGN
Arlington, VA

Mr. Ron Lile (703) 602-3169

Performer: IDA, Technomics, SAIC
Jack Cloos (IDA), (703) 845-2506

Resources:

FY	*Dollars*	*Staff-years*
2002	$1,800,000	
2003	$2,385,000	
2004	$2,000,000	

Schedule:

Start	*End*
Oct 1996	Sep 2004

Database: Not applicable

Publications: None

Keywords: Government, Estimating, Training, Data Collection, Study

PA&E–8

Title: Databases and Methods for Estimating the Costs of the Defense Systems Remanufacture, Upgrades, Modifications, and SLEPs

Summary: In the last five years there have been more aircraft remanufacture, upgrades, modifications or service life extension programs than new aircraft starts. A recent macro-level study of remanufacture program costs concluded that cost growth in

remanufacture programs is nearly as high as new start programs. The goal of this project is to improve databases and methods for estimating the costs to conduct defense systems remanufacture, upgrades, modifications, service life extension programs and depot repair activities. Programs will be identified and a data collection effort will commence. Data collected will include pertinent technical, programmatic and cost information. Of important interest is classification of cost growth. The database will include raw and normalized data that will provide the basis for cost method development. The second phase of this effort is to develop cost estimating methods to be used for future independent cost estimates developed by the CAIG.

Classification: Unclassified

Sponsor: OSD(PA&E)

WSCAD
The Pentagon, Rm. BE779
Washington, DC 20301

Ed Kelly, (703) 697-6712

Performer: IDA

Resources:

FY	*Dollars*	*Staff-years*
2003	$250,000	
2004	$150,000	

Schedule:

Start	*End*
Jun 2003	Apr 2004

Database: None

Publications: None

Keywords: Government, Industry, Estimating, Weapon Systems, Manufacturing, Data Collection, Mathematical Modeling

PA&E–9

Title: Economic Drivers of Defense Overhead Costs

Summary: The objective of this task is to collect defense contractor cost data and to develop an automated database on defense contractor overhead and indirect cost pools. In addition, as resources permit, statistical models will be developed for individual companies that provide data to estimate future overhead costs including their fixed and variable components.

Classification: Unclassified/Company Proprietary

Sponsor: OSD (PA&E)
The Pentagon, Rm. BE779
Washington, DC 20301

Mr. Ed Kelly, (703) 697-6712

Performer: IDA, Dr. Thomas Frazier, (703) 845-2132

Resources:

FY	*Dollars*	*Staff-years*
1995	$250,000	
1996	$250,000	
2000	$175,000	
2002	$100,000	
2003	$100,000	

Schedule:	*Start*	*End*
	Apr 95	Sep 2004
Database:	*Title:*	IDA's Defense Contractor Overhead Database, Contractor Cost Data Reports
	Description:	
	Automation:	Incorporating data into an automated database.

Publications: "Renegotiation of Fixed Price Contracts on the F-16 Program," IDA Paper P-3286, December 1996.

Keywords: Industry, Government, Estimating, Overhead/Indirect, Economic Analysis, Study

PA&E–10

Title: Helicopter Plant Specific Overhead and Industrial Utilization Model

Summary: The effects of production rate on direct and indirect costs are important considerations when estimating the costs of future acquisition programs. This task will provide a model of these effects that will be useful when considering alternative helicopter acquisition programs. The objectives of this task are to provide the sponsor with a tool for estimating the cost effects of changes in production rates at selected defense helicopter manufacturing plants and with data and analyses that portray the relationship between direct and indirect costs at each of the selected plants. The effort will update and expand the IDA Airlift Affordability Model to provide OSD with a comprehensive and coherent approach to assessing acquisition strategies in terms of scheduling production of systems produced at the same plant to meet defense requirements in an affordable manner.

Classification: Unclassified

Sponsor: OSD(PA&E)

WSCAD
The Pentagon, Rm. BE779
Washington, DC 20301
Will Jarvis, (703) 695-7282

Performer: IDA

Resources:	*FY*	*Dollars*	*Staff-years*
	2004	$100,000	

Schedule:	*Start*	*End*
	Ongoing	

Database: None

Publications: None

Keywords: Government, Estimating, Overhead/Indirect, Study

PA&E–11

Title: USMA Special Studies to Support EMAD Analysis

Summary: The goal of this task is to enhance the productivity and efficiency of EMAD analysts by performing analysis that feeds into ongoing EMAD projects. EMAD will establish a relation with the United States Military Academy and potentially the other service academies to tap their pool of economic and manpower experts. On a project-by-project basis the designated lead EMAD analyst will identify specific program data, information,

and analysis needed to support his or her review. When appropriate, a task will be generated for necessary support.

***Classification*:** Unclassified

Sponsor: OSD(PA&E)
EMAD
The Pentagon, Room BE798
Washington, DC 20301

Dave Trybula, (703) 614-3840

Performer: USMA

Resources:

FY	*Dollars*	*Staff-years*
2003	$20,000	
2004	$25,000	

Schedule:	*Start*	*End*
Ongoing		

Database: None

Publications: None

Keywords: Government, Manpower/Personnel, Study

PA&E–12

Title: Spectrum Auction Market Analysis

Summary: Determine market value for spectrum scheduled to be auctioned in October 2004. Through an FFRDC obtain commercial and academic expertise to assess the value of the specified spectrum.

***Classification*:** Unclassified

Sponsor: OSD(PA&E)

EMAD
The Pentagon, Room BE798
Washington, DC 20301

Dave Trybula, (703) 614-3840

Performer: IDA

Resources:

FY	*Dollars*	*Staff-years*
2004	$50,000	

Schedule:	*Start*	*End*
Ongoing		

Database: None

Publications: None

Keywords: Industry, Government, Estimating, Electronics/Avionics, Economic Analysis

PA&E–13

Title: Integrated Global Footprint Costing Analysis

Summary: Establish the capability to support the Secretary of Defense's Integrated Global Presence and Basing Strategy initiative by providing rough order of magnitude facilities cost estimates for Forward Operating Bases (FOBs) and Forward Operating Locations

(FOLs). Contractor will research with the military services what constitutes a FOB or FOL and establish a limited number of templates that define the type and quantify of facilities for the most likely FOB/FOL variants. For each facility type it will develop a list of physical components and their corresponding construction and sustainment costs. The contractor will coordinate the component and cost factor lists with the military services. It will then create a model that estimates the total construction cost and the annual sustainment cost for each facility type. The model will be modular and designed for ease in making regular updates.

***Classification*:** Unclassified

Sponsor: OSD(PA&E)

FICAD
The Pentagon, Room BE798
Washington, DC 20301

Keith Kaspersen, (703) 695-7710

Performer:

Resources:

FY	*Dollars*	*Staff-years*
2004	$50,000	

Schedule:

Start	*End*
Ongoing	

Database: None

Publications: None

Keywords: Government, Estimating, Facilities, Data Collection, Mathematical Modeling

PA&E–14

Title: Analyzing O&M Execution Data in Support of the Planning, Programming, Budgeting, Execution System (PPBES)

Summary: The purpose of this project is to expand our understanding of the relationship between budgeted and executed O&M funds. Collect available data from DFAS, Defense Manpower Data Center (DMDC) and other sources of execution data. We will develop an understanding of the execution data structures, prepare a crosswalk between the programming/budgeting systems currently in use and the execution data, and create a model to show the flow of funds through the PPBES cycle. This effort will also provide executive views and analysis tools for use with the O&S data center. These should be developed in an environment consistent and compatible with the Defense Programming Database.

***Classification*:** Unclassified

Sponsor: OSD(PA&E)

FICAD
The Pentagon, Room BE798
Washington, DC 20301

Keith Kaspersen, (703) 695-7710

Performer: BAH

Resources:

FY	*Dollars*	*Staff-years*
2003	$161,000	
2004	$130,000	

Schedule: *Start* *End*

Ongoing

Database: None

Publications: None

Keywords: Government, Analysis, Budgeting, Operations and Support, Data Collection, Method

PA&E–15

Title: O&M Program Balance and Related Cost Drivers

Summary: The objective of this effort is to support a comprehensive, global assessment of programmed operations and maintenance (O&M) funding. PA&E has a major initiative to collect O&M data that links program and budget, and provides visibility into major categories of O&M, including costs driven by equipment OPTEMPO, depot maintenance, and Base Operation Support (BOS)/Real Property Maintenance (RPM).

Classification: Unclassified

Sponsor: OSD(PA&E)
FICAD
The Pentagon, Room BE798
Washington, DC 20301

Keith Kaspersen, (703) 695-7710

Performer: IDA
Mr. Dan Cuda, (703) 578-2770

Resources:

FY	*Dollars*	*Staff-years*
2000	$230,000	
2001	$200,000	
2002	$350,000	
2003	$150,000	
2004	$100,000	

Schedule: *Start* *End*

Ongoing

Database: None

Publications: None

Keywords: Government, Estimating, Reviewing/Monitoring, Programming, Forces, Facilities, Overhead/Indirect, Training, Study

PA&E–16

Title: Sizing the Medical Readiness Capability and Managing Beneficiary Demand

Summary: Part A of this study will provide an independent assessment of the necessary size of the medical readiness capability (physicians, medical support personnel, beds, and medical equipment), including assessment by medical specialty. Identify and contrast from a readiness and cost perspective alternative methods for delivering this capability, including critical assessment of utilizing capability for peacetime, in-house production of beneficiary care. Part B will quantify the options available to decision makers for dealing with rising health benefit costs.

Classification: Unclassified

Sponsors: OSD(PA&E)

EMAD
The Pentagon, Room BE829
Washington, DC 20301

John Whitley, (703)692-8045

Performer: Various (cross-cutting)

Resources:

FY	*Dollars*	*Staff-years*
2004	$500,000	

Schedule:

Start	*End*
Nov 2003	Dec2004

Database: None

Publications: None

Keywords: Government, Estimating, Infrastructure, Mathematical Model

PA&E–17

Title: Personnel Inventory Cost and Compensation Model (PICCM) Update

Summary: This project provides funding for Personnel Inventory Cost and Compensation Model (PICCM). PICCM funding enhances the ability to assess programming decisions concerning manpower gains, losses, demographics, and costs by having a more accurate predictive manpower model. The model provides insights into the effect of compensation alternatives on both cost and retention of military manpower. The existing model will be updated with current data. This provides the default settings as the most recent personnel status and updates the elasticities with estimates from the most current available data. This model allows the analyst to adjust pay rates, for all forms of monetary compensation and adjust some assumptions in personnel policies. Analyst entered economic assumptions are used to project losses, while promotions and longevity adjustments are made by the model. The model output is an annual inventory of military personnel and a detailed cost estimate of compensation related expenditures.

Classification: Unclassified

Sponsor: OSD(PA&E)

EMAD
The Pentagon, Room BE798
Washington, DC 20301

Bob Daigle, (703) 695-5941

Performer: SRA

Resources:

FY	*Dollars*	*Staff-years*
2003	$30,000	
2004	$100,000	

Schedule:

Start	*End*
Ongoing	

Database: None

Publications: None

Keywords: Government, Estimating, Manpower/Personnel, Mathematical Modeling

PA&E–18

Title: Comprehensive Manpower Research and Analysis Database

Summary: This study will produce a ready database for use by EMAD in analyzing effects of policy options and providing data for a myriad of waiting research projects. The database will be created from service and agency databases that incorporate personnel actions, pay, training, recruitment, retention, retirement, and health care data that tracks individuals over their careers and spans at least 25 years. Data will be validated and verified.

Classification: Unclassified

Sponsor: OSD(PA&E)

EMAD
The Pentagon, Room BE798
Washington, DC 20301

Dave Trybula, (703) 614-3840

Performer:

Resources:

FY	*Dollars*	*Staff-years*
2004	$200,000	

Schedule:

Start	*End*
Ongoing	

Database: None

Publications: None

Keywords: Government, Manpower/Personnel, Training, Data Collection

PA&E–19

Title: Resource Analysis of DoD Central Training

Summary: The aim of this study program is to improve the Department's understanding of the complex relationship among resources allocated to Central Training, major characteristics of force structure, and the Department's investments in training and learning technologies. The Department allocates more than $30 billion annually to Central Training. At any given time, roughly 7% of the Department's manpower is assigned to a training activity, either as instructors or as students. Little is understood, however, about the ways in which Central Training changes as elements of the force change. Past research has focused on regression analyses of various FYDP data, but the results have been disappointing from a statistical point of view. More important, that research has not shed light on the causal links between force structure changes, adoption of new training technologies, and Central Training resource requirements. The project will develop a set of analytical tools to characterize the relationship between Central Training resources and force structure. More specifically, the tools will use information from the FYDP, the annual Military Manpower Training Report and other data to forecast future Central Training resource requirements and workloads as a function of selected characteristics of force structure and training technologies. Current research is developing hypotheses that characterize the relationships. These hypotheses will serve as the bases for subsequent model development.

Classification: Unclassified

Sponsor: OSD(PA&E)

FICAD
The Pentagon, Rm. BE798
Washington, DC 20301

Dan Brintzinghoffer, (703) 697-0222

Performer: Tecolote

Resources:

FY	*Dollars*	*Staff-years*
2003	$200,000	
2004	$150,000	

Schedule:

Start	*End*
Ongoing	

Database: None

Publications: None

Keywords: Government, Estimating, Training, Study

PA&E–20

Title: Macroeconomic and Cost Data

Summary: Macroeconomic and Cost Data funding pays for subscriptions and gains access to macroeconomic forecasts and full cost information service to support various defense studies and cost analyses for the CAIG. Macroeconomic and Cost Data forecasts economic and cost growth and inflation by industry. These forecasts will provide better insights into anticipated effects on major weapon system acquisitions and are valuable to the CAIG and support PA&E's charter to advise the Secretary on impacts of the economy on defense.

Classification: Unclassified

Sponsor: OSD(PA&E)
EMAD
The Pentagon, Room BE798
Washington, DC 20301
Dave Trybula, (703) 614-3840

Performer: IDA

Resources:

FY	*Dollars*	*Staff-years*
2003	$42,000	
2004	$50,000	

Schedule:

Start	*End*
Sep 04	
Ongoing	

Database: None

Publications: None

Keywords: Government, Data Collection, Economic Analysis

PA&E–21

Title: Defense Employment and Purchases Projection System (DEPPS)

Summary: This effort provides funding for the Defense Employment and Purchases Projection System (DEPPS). DEPPS funding provides access to DEPPS model, data maintenance, and model documentation, pays for subscriptions, and gains access to macroeconomic models necessary to support DEPPS and various defense studies. DEPPS saves an enormous amount of PA&E time answering questions by providing an employment and purchasing projection of the FYDP in an unclassified cleared for public release format that is divisible by state and industry. The annual report is furnished to each member of the Senate and to each member of the House Armed Services Committee. The report is also posted to a publicly accessible website and is used by academics, state governments, and industry associations. In addition, the effort includes the cost of essential data to support DEPPS.

Classification: Unclassified

Sponsor: OSD(PA&E)

EMAD
The Pentagon, Room BE829
Washington, DC 20301

Dave Trybula, (703) 614-3840

Performer: INFORUM

Resources:

FY	*Dollars*	*Staff-years*
2003	$170,000	
2004	$130,000	

Schedule:

Start	*End*
Sep 04	
Ongoing	

Database: None

Publications: None

Keywords: Government, Analysis, Economic Analysis

PA&E–22

Title: Cost Analyses of Next Generation UAV/UCAV Systems

Summary: Unmanned Air Vehicles (UAVs) and Uninhabited Combat Air Vehicles (UCAVs) are being used and considered to fulfill a growing number of military missions. As these systems are proposed the costs are a factor in the decision process. Unfortunately very little data and tools are available to deal with the modern versions of these systems. The Next Generation UAV/UCAV study will provide the tools necessary to determine the life-cycle cost of these systems.

The objective of this task is to develop an approach and comprehensive process to estimate the life cycle cost of the next generation UAV and UCAV systems.

Classification: Unclassified

Sponsor: OSD(PA&E)
WSCAD
The Pentagon, Room BE779
Washington, DC 20301

Mr. Fred Janicki, (703) 697-8228

Performer: IDA
Mr. J. R. Nelson , (703) 845-2571

Resources:

FY	*Dollars*	*Staff-years*
2002	100,000	
2003	250,000	

Schedule:

Start	*End*
May 2002	Sep 2004

Database: TBD

Publications: None

Keywords: Government, Estimating, Analysis, Aircraft, Life Cycle, SD&D, Material, Engineering, Method

PA&E–23

Title: Cost Analysis of Next Generation C^4I Systems

Summary: The DoD is currently unable to accurately estimate the cost of highly-aggregated, software-intensive C^4I systems. These systems comprise a significant and rapidly-growing share of DoD investment and support resources. This research will obtain data from completed and ongoing C^4I development/integration programs to develop cost estimation databases and methodologies to enable analysts to more accurately estimate costs for this commodity class.

A recent multi-service/agency C^4I cost analysis working group identified the lack of adequate data and cost estimating methodologies as key deficiencies in the services'/agencies' ability to adequately estimate the cost of software-intensive C^4I systems. The working group requested OSD to take a leadership role in addressing these deficiencies. Current software cost estimating techniques are inadequate to estimate the cost of highly integrated C^4I systems, where a majority of cost and risk occur in the integration of functional software modules. Ongoing programs routinely incur dramatic cost growth, which results in impaired program execution, delayed delivery of capability to the warfighter, and chronic resource allocation issues. The ability to more accurately predict the cost of these vital systems would provide greater program stability, and would enable resource managers to make informed resource allocation decisions. Accurate cost estimates would enable programs to execute more efficiently with appropriate resources allocated at the outset.

Classification: Unclassified/Company Proprietary

Sponsor: OSD(PA&E)
The Pentagon, Rm. BE779
Washington, DC 20301

Mr. Rob Flowe, (703) 692-8052

Performer: IDA
Mr. J. R. Nelson , (703) 845-2571

Resources:	*FY*	*Dollars*	*Staff-years*
	2002	$150,000	
	2003	$250,000	
Schedule:	*Start*	*End*	
	Jun 2002	Sep 2003	

Database: None

Publications: None

Keywords: Industry, Government, Estimating, Electronics/Avionics, Software, Study

PA&E–24

Title: Avionics and Mission Systems Cost Estimation

Summary: The objective of this task is to develop a set of approaches and comprehensive processes to estimate the life cycle cost of next generation mission systems and avionics. Over the last two decades, defense systems have become increasingly dependent on avionics, mission systems and on board electronic sensors. Larger and larger portions of the defense budget are being spent to design, manufacture, upgrade and maintain these systems. It has become increasingly more difficult to estimate the cost and schedule of these systems as they have grown in complexity. Very limited cost estimating databases and tools are available and those in existence are for systems several generations prior to current technology. Defense analysts continue to attempt to project the cost and schedule of such projects with data sets that do not reflect the latest advances in digital technology as well as the inclusion of the latest industrial processes and parts. This study will collect actual costs, technical and programmatic data from the latest historical defense programs. Examples of potential programs/systems are: electronic warfare suites, fire control radars, flight control, signal processing, communications, navigation, receivers, displays, data fusion. This data set will be used to identify potential cost estimating relationships and trends for future avionics and mission systems.

Classification: Unclassified

Sponsor: OSD(PA&E)

WSCAD
The Pentagon, Room BE779
Washington, DC 20301

Fred Janicki (703) 697-8228

Performer: RAND

Resources:	*FY*	*Dollars*	*Staff-years*
	2004	$450,000	
Schedule:	*Start*	*End*	
	Ongoing		

Database: None

Publications: None

Keywords: Government, Estimating, Electronics/Avionics, Method

PA&E–25

Title: Training Course for PA&E/Other Analysts

Summary: Analysts assigned to the Office of the Secretary of Defense (OSD) Program Analysis and Evaluation and Cost Analysis Improvement Group (CAIG) often have only a limited background in the business practices of the Secretariat. Some newly assigned analysts come from technical and operational backgrounds with only minimal cost and resource analysis experience. Providing new analysts with a practical overview of the role of the OSD and the CAIG in resource management processes such as the Planning Programming and Budgeting (PPBS) and acquisition process would significantly reduce the time it takes them to become productive members of the staff. Few analysts newly assigned to PA&E and the CAIG have performed cost and resource analyses using the cost analysis and systems analysis practices that have been adopted by PA&E and the CAIG. A focused and tailored training program is needed to introduce new analysts to the resource management and cost analysis practices of the Secretariat, in general, and PA&E and the CAIG staff, in particular.

Classification: Unclassified

Sponsor: OSD(PA&E)
The Pentagon, Rm. BE779
Washington, DC 20301

Russ Vogel, (703) 695-2612

Performer: IDA

Jim Wilson, (703) 845-2469

Resources:

FY	*Dollars*	*Staff-years*
2002	$100,000	
2003	$100,000	
2004	$100,000	

Schedule:

Start	*End*
Jun 2002	Jan 2004

Database: None

Publications: Classroom material/CDs

Keywords: Government, Estimating, Training, Study

PA&E–26

Title: CAIG Project Planning

Summary: The CAIG's activities on MDAPs and other high value/interest programs is the critical path for DAB/DSAB/Deployment and other milestone review decision meetings. Coordination with the CAIG's numerous customers on planning and scheduling activities is inefficient and not integrated with the plethora of different systems being used. A coordinated scheduling activity with multiple organizations is critical to establishing successful timelines for major program reviews and will ensure adequate resources are available, timelines are acceptable and critical issues are addressed with each review. Additionally, access to a controlled site containing CAIG historical documentation and a public site containing reference/guidance material is essential for analysts to complete their analysis. This project will provide CAIG analysts and senior leaders IT support for web-based scheduling activities and CAIG on-line documentation.

Classification: Unclassified

Sponsor: OSD(PA&E)
The Pentagon, Room BE779
Washington, DC 20301

Russ Vogel (703) 695-2612

Performer: TBD

Resources:

FY	*Dollars*	*Staff-years*
2004	$130,000	

Schedule:

Start	*End*
May 2004	May 2005

Database: None

Publications: None

Keywords: Government, Estimating, Weapon Systems, Study

PA&E–27

Title: Costing Research and Student Theses at AFIT and NPS

Summary: Graduate students at AFIT and NPS are required to prepare research theses for graduation. Students in the Operations Research, Operations Analysis, Financial Management, Cost Analysis, and Information Systems programs provide valuable analysis/research and gain direct experience when performing studies that are of interest to the CAIG. These study funds support graduate students and AFIT/NPS professional staff in satisfying prescribed study topics provided by the CAIG.

Classification: Unclassified

Sponsor: OSD(PA&E)
The Pentagon, Rm. BE779
Washington, DC 20301

Rob Flowe, (703) 692-8052

John Thurman, (703) 692-8040

Performer: AFIT & NPS

Resources:

FY	*Dollars*	*Staff-years*
2002	$20,000	
2003	$50,000	
2004	$50,000	

Schedule:

Start	*End*
Oct 2001	Jun 2004

Database: None

Publications: Classroom material/CDs/Theses

Keywords: Government, Training, Study

PA&E–28

Title: Initiation of Cost Estimating Institute

Summary: Due to manpower reductions, conversion of military billets, and outsourcing, the Department of Defense has had a significant reduction in the number of cost analysts. This is occurring at a time when senior leadership is requiring more decision-making analyses from the cost estimating community to support programs regardless of the

event--DAB, POM, Budget Submission, or ad hoc cost analyses/estimating exercises. Senior acquisition officials in USD/AT&L, USD/I, and OSD/PA&E support an initiative to enhance the entire cost estimating community by establishing a Cost Estimating Institute that will facilitate cooperative activities with industry and academia. Work under this contract will consist of research into the statutory and regulatory policies governing the establishment of institutes, defining the mission of the Cost Estimating Institute, developing a plan of action to establish the Institute, defining activities to begin initiation and preparing a report and/or briefing detailing the results of this work.

Classification: Unclassified

Sponsor: OSD(PA&E)
The Pentagon, Rm. BE779
Washington, DC 20301

Russ Vogel, (703) 695-2612

Performer: TBD

Resources:

FY	*Dollars*	*Staff-years*
2003	$30,000	

Schedule:

Start	*End*
Jun 2003	Sep 2004

Database: None

Publications: None

Keywords: Government, Estimating, Training, Study

PA&E–29

Title: Economics Research Symposium

Summary: The economics research symposium is planned as a two-day symposium to promote sound integration and planning of DoD Economic and cost activities among OSD, the military services, and defense agencies sponsoring the efforts. IDA will provide the expertise to support it, the neutral location it requires, the assurance that government-sensitive information will be safeguarded, and the necessary continuity of effort.

Classification: Unclassified

Sponsor: OSD(PA&E) EMAD
The Pentagon, Room BE798
Washington, DC 20301

Dave Trybula, (703) 614-3840

Performer: IDA

Resources:

FY	*Dollars*	*Staff-years*
2004	$50,000	

Schedule:

Start	*End*
Jan 2004	
Ongoing	

Database: None

Publications: None

Keywords: Government, Policy, Economic Analysis

PA&E–30

Title: IDA Cost Research Symposium

Summary: IDA conducts a cost research symposium to facilitate the exchange of information on cost research that is in progress and planned, thereby avoiding wasteful duplication of effort and providing for more informed research planning decisions by participating offices. The Chairman, OSD CAIG, cosponsors this symposium. The 2004 Symposium will feature a panel consisting of all four CAIG Chairs on the subject of investments in and use of cost research. A second panel will discuss the histories of cost analysis and cost research within each Department/Agency. Documentation of the symposium includes a catalog of cost research projects recently completed or still in progress at participating offices.

Classification: Unclassified

Sponsor: IDA Central Research Program

OSD(PA&E)
The Pentagon, Room BE779
Washington, DC 20301

Russ Vogel (703) 695-2612

Performer: IDA

Dr. Stephen J. Balut, (703) 845-2527

Resources:

FY	*Dollars*	*Staff-years*
2000	$30,000 (PA&E share)	
2001	$30,000 (PA&E share)	
2002	$30,000 (PA&E share)	
2003	$30,000 (PA&E share)	
2004	$30,000 (PA&E share)	

Schedule:

Start	*End*
Oct 2003	Sep 2004

Database:

Title:	DoD Cost Research Projects
Description:	Summary descriptions of cost research projects (an example is this description)
Automation:	On the Web in Acrobat Reader.

Publications: "2003 IDA Cost Research Symposium: Cost of Evolutionary Acquisition/Spiral Development," Stephen J. Balut, Lynn C. Davis, David W. Henningsen, Robert Hirama, Terry Proffit, Russell A. Vogel, and Jan Young, Document D-2872, Unclassified, August 2003.

Keywords: Government, Reviewing/Monitoring, Forces, Weapon Systems, Life Cycle, Data Collection, Database

Missile Defense Agency (MDA)

Name:	Missile Defense Agency MDA/PIE and Elements
Address:	7100 Defense Pentagon, Washington, DC 20301-7100
Director:	Jan Young, (703) 693-1827 E-mail: jan.young@mda.osd.mil
Size:	Professional: 28 Support (w/Subs): 1+ Consultants: 0 Subcontractors: 7
Focus:	MDA Cost Policy/Processes, Cost Estimating, Cost Analysis, Cost Research/Methodology Improvement, POM and Budget Support
Activity:	Number of projects in process: 7 Average duration of a project: 12+ months Average number of staff members assigned to a project: < 1 Average number of staff-years expended per project: 1.5 Percentage of effort conducted by consultants: Percentage of effort conducted by subcontractors:

MDA–1

Title: Missile Cost Model

Summary: MDA/PIE and NSWC, Dahlgren have initiated development of a missile cost model that will facilitate short notice cost estimates for missile systems early in the development cycle. The model uses independent technical and performance data that are likely to be known prior completing a Critical Design Review. The model produces recurring and nonrecurring development and procurement costs for broad WBS categories (e.g., booster, seeker, DACs). The analysis is specifically tailored for missile defense but may be applicable for some other mission areas as well. Follow-on improvements will include adding a time phasing module and cost risk module.

Classification: Unclassified model, Secret database

Sponsor: MDA/PIE
Scott Vickers (703) 553-5697

Performer: MDA/PIE and NSWC, Dahlgren
Scott Vickers, Rob Grillo, Jason Stewart, Shelly Carney

Resources:

FY	*Dollars*	*Staff-years*

Schedule:

Start	*End*
Jan 2004	May 2004

Database: Various references from the MDA Cost Research Library and CCDR data for MDA and similar weapons system programs.

Publications: TBD

Keywords: Government, Analysis, Missiles, SD&D, Production, Mathematical Model, CER

MDA–2

Title: Estimating Cost of Programs with Initial Capabilities (Spiral Development)

Summary: The project is focused on understanding the cost analysis impact of fielding portions of programs as they become mature (spiral development) vice the traditional single-step acquisition approach. The challenge is to estimate the costs associated with inserting technology into existing capabilities or staggering the development and test process to allow for early release of program segments that have reached a higher level of maturity. This study is assessing several options for estimating development of initial capability, followed by a series of capability improvements. Specifically, this effort will assess the costs of a spiral from three perspectives: development durations (e.g., shorter durations with less capability), performance deltas, and technology insertion (e.g., ATP/ATDP) and result in proof of concept / prototype.

Classification: Unclassified

Sponsor: MDA/PIE
Jan Young (703) 693-1827

Performer: MCR Federal, Inc. and Galorath
Jason Dechoretz, Newlin Warden

Resources:

FY	*Dollars*	*Staff-years*

Schedule:

Start	*End*
Apr 2004	TBD

Database: TBD

Publications: TBD

Keywords: Government, Analysis, Life Cycle, Mathematical Model, CER

MDA–3

Title: Radar Cost Model Update

Summary: MDA/PIE currently uses the Radar Cost Model for supporting MDA business case analyses of radar alternatives. The model provides a capability to estimate missile defense radar costs early on, before the specifics of the radar design are known. The initial model consists of an Excel-based module driven by selected CERs and analogies to legacy MDA programs. The model accepts detailed design input, but can be run using only a few parameters that are typically known early in a program's concept development. Planned enhancements include updating CERs, enhancing the graphical user interface, and adding a capability to estimate radar Operations and Support costs.

Classification: Unclassified

Sponsor: MDA/PIE
Cheri Cummings (703) 553-5700

Performer: MDA/PIE and MCR Federal, Inc.

Pat Gilcest, William Covert, James Sullivan, Kyle Ratliff

Resources:

FY	*Dollars*	*Staff-years*

Schedule:

Start	*End*
Jan 2004	Sep 2004

Database: Various references from the MDA Cost Research Library and CCDR data for MDA programs.

Publications: TBD

Keywords: Government, Analysis, Electronics/Avionics, Radar, SD&D, Production, Operations and Support, Life Cycle, Mathematical Model, CER

MDA–4

Title: MDA Cost Risk Methodology Update (Revision 5)

Summary: MDA will update the current MDA Cost Risk Methodology to keep it current. This effort incorporates new SAR and CCDR data, develops new cost growth equations, makes the risk model easier to use, and rewrites the User's Manual. MDA will provide the updated methodology to all MDA program elements for use as a cost risk methodology alternative.

Classification: Unclassified

Sponsor: MDA/PIE
Jan Young (703) 693-1827

Performer: MCR Federal, Inc.
Kyle Ratliff

Resources:

FY	*Dollars*	*Staff-years*

Schedule:

Start	*End*
2003	TBD

Database: SAR Database

Publications: MDA Cost Risk Methodology User's Handbook

Keywords: Government, Analysis, Estimating, Weapon Systems, Life Cycle, Risk/Uncertainty, Mathematical Modeling, Computer Model

MDA–5

Title: Estimating Costs of BMC3

Summary: Focus of effort is to develop methods and model for estimating the costs associated with System of systems level interoperability (i.e., Battle Management Command, Control, and Communications) for the Ballistic Missile Defense System (BMDS).

Classification: Unclassified

Sponsor: MDA/PIE
John Maurer (703) 414-6514

Performer: CSCI
Dr Conrad Strack

Resources:

FY	*Dollars*	*Staff-years*

Schedule:

Start	*End*
April 2004	Mar 2005

Database: Numerous MDA Technical and Cost Studies on TMD Interoperability

Publications: Technical Report, CERs, Model, Database

Keywords: Analysis, Missiles, Life Cycle, Mathematical Model, CER

MDA–6

Title: Software Database

Summary: The purpose of this effort is to develop a database containing historical software data (e.g., lines of code, productivity factors, language) specifically for ballistic missile defense weapon systems.

Classification: Unclassified

Sponsor: MDA/PIE
Bill Seeman (703) 553-5702

Performer: MCR
Emett DeGuzman (703) 553-5711

Resources:

FY	*Dollars*	*Staff-years*

Schedule:

Start	*End*
Dec 2003	TBD

Database: Numerous MDA Technical and Cost Studies on TMD Interoperability, CCDRs for all BMDS Elements, CARDs, Specific Contractor Data

Publications: Technical Report, Database

Keywords: Government, Analysis, Estimating, Missiles, Software, Mathematical Modeling

MDA–7

Title: Schedule Analysis for MDA Programs

Summary: This research project examines new ways for MDA to assess the adequacy of planned schedules to complete development activities. The analysis includes a review of program milestones and the time required to progress between them at varying levels of effort. It will identify schedule drivers and use the drivers to develop equations that predict development time. The analysis will also develop a methodology for generating probability distributions for MDA schedules. MDA analysts will use the results of this analysis to determine a probability of overrun for MDA schedules. Each major MDA commodity area will be addressed in the study.

Classification: Unclassified

Sponsor: MDA/PIE
Bill Seeman (703) 553-5702

Performer: IDA
Bruce Harmon (703) 845-2501

Resources:

FY	*Dollars*	*Staff-years*
03-05	$425,000	2.5

Schedule:

Start	*End*
May 2003	Sep 2005

Database: TBD

Publications: Technical Report

Keywords: Analysis, Missiles, Schedule, Method

MDA–8

Title: Cost and Schedule Analysis for MDA Programs

Summary: This research project examines new ways for MDA to assess the adequacy of planned costs and schedules to complete development activities. The analysis includes a review of program milestones and the time required to progress between them at varying levels of effort. It will identify schedule drivers and use the drivers to develop equations that predict development time and cost. The analysis will also develop a methodology for generating probability distributions for MDA schedules. MDA analysts will use the results of this analysis to determine a probability of overrun for MDA schedules and costs. For 2004, we will address one of MDA's commodity areas. We plan to expand the analysis to include other commodities in future years.

Classification: Unclassified

Sponsor: MDA/PIE
Jan Young, (703) 693-1827
Bill Seeman, (703) 553-5702

Performer: IDA
Dick Nelson (703) 845-2571

Resources:

FY	*Dollars*	*Staff-years*
2003-04	$225,000	1.0

Schedule:

Start	*End*
Oct 2003	Continuing

Database:

Title:	TBD
Description:	TBD
Automation:	TBD

Publications: Technical Report TBD

Keywords: Analysis, Missiles, Schedule, Method

Deputy Assistant Secretary of the Army for Cost and Economics (DASA-CE)

Name:	Deputy Assistant Secretary of the Army for Cost and Economics (DASA-CE)
Address:	109 Army Pentagon, Rm. 3E352, Washington, DC 20310-0109
Director:	Mr. Stephen T. Bagby (703) 692-1722 DSN: 222-1722 FAX: (703) 614-2473
Size:	Professional: 52 Support: 5
Focus:	The focus of the Army's centrally funded Cost Research Program is to improve the capability of the Army to develop cost estimates and economic analyses. The main categories of concentration are: Database Development Methodology Development Costing the Effects of New Technology Software Support Systems PPBES Linkages The areas we cover are: Aircraft Systems Missiles and Space Systems Wheel and Tracked Vehicle Systems Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C^4ISR) Systems General Systems/Future Technology/Tools and Models Force Unit Costing Operating and Support Costing Financial Management and Operations
Activity:	Number of projects in progress: 19 Average duration of project: 1 year Number of Government personnel assigned to project: .25

DASA-CE–1

Title: Operating and Support Management Information System (OSMIS) Database Management

Summary: OSMIS is a Management Information System designed to assist the Army in determining the historical operating and support costs of selected major fielded weapons systems through the production of cost data and cost factors based on actual usage data. The cost data generated from OSMIS is derived from existing Army Logistics Support Management Information Systems. Includes the development of the annual data collection process, collection of data from LIF, PMR, ULLS and other sources, construction of the annual Materiel Systems Definition by system/Line Item Number, generation and validation of Weapon system to ammunition crosswalk tables, Unit tables and system asset tables, Cost Tables and OSMIS Cost Tables. This contract also

develops O&S Cost Factors for the POM, BES and President's Budget, Aircraft reimbursement rates, Class II & IV Cost Factors and management reports on data collected. The OSMIS processed data is used in other systems and models such as FORCES, REVOLVER, and the OSD VAMOSC System Interface Model. OSMIS also contains information on consumables, depot level reparables (DLRs), training ammunition, OPTEMPO, densities, depot maintenance, and petroleum, oil and lubricants (POL). Other special studies include; Increase OSMIS database coverage for Contractor Logistics Support, Integrated Sustainment Maintenance, IMPAC purchases and warranty demands. Develop procedure for tracking Training Resource Model projections with historical OSMIS data. Investigate LIF/CDBB as sources of data and recommend necessary fixes/changes to improve database.

Classification: Unclassified

Sponsor: DASA-CE
Kathleen O'Brien, (703) 692-5371, DSN222-5371

Performer: CALIBRE Systems, Inc.

Resources:

FY	*Dollars*
2004	$3,000,000
2004	$3,300,000

Schedule:

Start	*End*
Ongoing	

Database: OSMIS

Publications: U.S Army Operating and Support Management Information System (OSMIS) online interactive relational database

Keywords: Government, Spares/Logistics, Operations and Support, Training, Readiness, Reliability, Sustainability, Data Collection, Statistics/Regression, Database, Computer Model

DASA-CE–2

Title: ACEIT Help-Desk/Training

Summary: This project funds the Army dial up support for technical assistance when required for Army Cost Analysts and Army support contractors. It includes the update of annual Inflation Indices, problem resolution, bug fixes and configuration control. This project also provides training for Army analysts and Army Support Contractors.

Classification: Unclassified

Sponsor: DASA-CE
David Henningsen, (703) 601-4163/DSN 329-4163

Performer: Tecolote Research, Inc.

Resources:

FY	*Dollars*
2002	$150,000
2003	$300,000
2004	$350,000

Schedule:

Start	*End*
Apr 2004	Mar 2005

Database: IBM PC Compatible

Publications: ACE-IT Training Manuals

Keywords: Government, Estimating, Analysis, Life Cycle, Computer Model

DASA-CE–3

Title: ACEIT Enhancements

Summary: This project funds the enhancement and maintenance of the Automated Cost Estimating Integrated Tool (ACEIT) suite of tools. This effort funds a prioritized list of ACEIT enhancements requested Army cost analysts. In addition, this project funds the web enabling of the Automated Cost Database (ACDB). Major enhancements for this fiscal year include the update of the COTS spreadsheet control embedded in the software.

Classification: Unclassified

Sponsor: DASA-CE
David Henningsen, (703) 601-4163/DSN 329-4163

Performer: Tecolote Research, Inc.

Resources:

FY	*Dollars*
2004	$1,000,000

Schedule:

Start	*End*
Apr 2004	Sep 2005

Database: None

Publications: ACE-IT Version 6.1, ACEIT Version 7.0, ACEIT Application Programming Interface (API) Document

Keywords: Industry, Government, Estimating, Analysis, Life Cycle, Mathematical Modeling, Computer Model

DASA-CE–4

Title: Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C^4ISR) Systems

Summary: Continue to develop a comprehensive C^4ISR Module for the Automated Cost Database (ACDB) by collecting additional cost, technical and program data, mapping it to the common WBS and entering it into the C/E database structure.

Classification: Unclassified

Sponsor: DASA-CE
Sher Dhaliwal, (703) 601-4179/DSN 329-4179

Performer: Technomics, Inc.

Resources:

FY	*Dollars*
2003	$177,000 [shared with DASA-CE–5]
2004	TBD

Schedule:

Start	*End*
Ongoing	May 2004 Updated ACDB CD May 2005 Updated ACDB CD

Database: ACDB database

Publications: Updated database on CD

Keywords: Industry, Analysis, Electronics/Avionics, C&TD, SD&D, Production, CPR/CCDR, WBS, Data Collection, Database

DASA-CE–5

Title: Sensor Cost Estimating Relationship (CER) Development

Summary: This project will continue the FY2003 effort to develop and update CER that estimate the prototype manufacturing and procurement manufacturing costs of sensors. The initial focus is on infrared (IR) sensors and will include missile, airborne, and ground systems sensors used for guidance, surveillance and targeting. The CER should include both cooled and uncooled focal plane array technologies. Other sensor technologies of interest include millimeter wave (MMW), radio frequency (RF), and laser. The CER will allow the calculation of the cost of a full up sensor and not the costs involved in integrating the sensor into the missile, helicopter or ground system. In addition this effort will collect the sensor data required as inputs in commercial parametric estimating models. FY2003 deliverables included development on IR ground sensor CER, laser designators/ rangefinders/camera CER and nonrecurring/development CER.

Classification: Unclassified

Sponsor: DASA-CE
David Henningsen, (703) 601-4163/DSN 329-4163

Performer: Technomics, Inc.

Resources:

FY	*Dollars*
2003	$177,000 [shared with DASA-CE-4]
2004	TBD

Schedule:

Start	*End (Represents CER deliverables)*
Ongoing	May 2004
	May 2005

Database: None

Publications: CD containing CER results, raw data and parametric model input parameters

Keywords: Government, Estimating, Analysis, Electronics/Avionics, SD&D, Production, Manufacturing, Advanced Technology, Data Collection, Mathematical Modeling, Statistics/Regression

DASA-CE–6

Title: Tri-Service Missile and Smart Munitions Database

Summary: DASA-CE in conjunction with the Air Force and Navy Cost Communities has participated in the joint development and maturation of this Tri-Service database. The primary objective of this project is to collect missile cost data from CCDRs, CPRs, contracts or other sources that can be mapped and normalized to populate the Missile database. The database currently contains over 1,000 raw missile cost records. The database contains technical and programmatic data and can be used to develop learning curves and cost factors. In addition this effort will collect the sensor data required as inputs in commercial parametric estimating models.

Classification: Unclassified

Sponsor: DASA-CE
David Henningsen, (703) 601-4163/DSN 329-4163

Performer: MCR, Inc.

Resources:

FY	*Dollars*
2003	$250,000
2004	$242,000

Schedule:	*Start*	*End*
	Feb 2004	Jan 2005

Database: ACDB FoxPro database

Publications: Updated database on CD

Keywords: Government, Estimating, Analysis, Missiles, C&TD, SD&D, Production, Labor, Material, Overhead/Indirect, Engineering, Manufacturing, CPR/CCDR, WBS, Data Collection, Database

DASA-CE–7

Title: Wheel and Tracked Vehicle Database and Methodology Development

Summary: This project will provide USACEAC continued support in the development of a Wheeled and Tracked Vehicle Module (WTVM) for the Automated Cost Database (ACDB). Support will consist of data collection and analysis, database evaluation and management. In addition this effort will collect the data required as inputs in commercial parametric estimating models. This effort will also develop methodologies to cost a family of vehicles, factors for non-manufacturing costs and methodologies to cost composite materials.

Classification: Unclassified

Sponsor: DASA-CE
David Henningsen, (703) 601-4163/DSN 329-4163

Performer: Science Applications International Corporation (SAIC)

Resources:	*FY*	*Dollars*
	2002	$240,000
	2003	$460,000
	2004	TBD
Schedule:	*Start*	*End*
	Ongoing	Aug 2003 (updated ACDB CD) Aug 2004 (updated ACDB CD and methodologies)

Database: ACDB FoxPro database

Publications: Updated database on CD, electronic documents

Keywords: Government, Estimating, Analysis, Land Vehicles, C&TD, SD&D, Production, Labor, Material, Overhead/Indirect, Engineering, Manufacturing, CPR/CCDR, WBS, Data Collection, Database

DASA-CE–8

Title: Aircraft Module Database Development

Summary: This project provides continued development and improvement of the Aircraft Rotary Wing Cost database. This project includes the transition of the Aircraft Module Database in Automated Cost Database (ACDB) to a new contractor to perform the Army Aircraft DBA tasks. This project is expected to add additional cost, programmatic, and technical data for programs such as the Comanche, Longbow Apache Airframe Modifications, Longbow Apache Fire Control Radar, ATIRCM/CMWS, Blackhawk, and the Improved Cargo Helicopter.

Classification: Unclassified

Sponsor: DASA-CE
David Henningsen, (703) 601-4163/DSN 329-4163

Performer: Ketron

Resources:

FY	*Dollars*
2003	$105,000
2004	$140,000

Schedule:

Start	*End*
Ongoing	Dec 2003 (updated ACDB CD) Dec 2004 (updated ACDB CD)

Database: ACDB FoxPro database

Publications: Updated database on CD

Keywords: Government, Estimating, Analysis, Helicopters, C&TD, SD&D, Production, Labor, Material, Overhead/Indirect, Engineering, Manufacturing, CPR/CCDR, WBS, Data Collection, Database

DASA-CE–9

Title: Standard Variable IDs for use in ACEIT

Summary: This project will determine standard variable IDs and ACE Exec codes for use in developing missile, vehicle, aircraft and communication systems cost estimates. This is a required first step in linking cost models to other cost, performance or engineering models. A standard ID is proposed down to level three of the work breakdown structure (WBS). The standard IDs will be incorporated into the Army WBS built into ACEIT by Tecolote.

Classification: Unclassified

Sponsor: DASA-CE
David Henningsen, (703) 601-4163/DSN 329-4163

Performer: DASA-CE/Tecolote Research, Inc.

Resources:

FY	*Dollars*
2003	TBD (Tecolote effort funded as part of DASA-CE–3)

Schedule:

Start	*End*
May 2002	Jul 2004

Database: None

Publications: Updated Army WBS incorporated into ACEIT

Keywords: Government, Estimating, Weapon Systems, Life Cycle, Survey, Computer Model

DASA-CE–10

Title: System Development & Demonstration Phase Development Engineering Cost Methodology Development

Summary: The objective of this task is to develop cost estimating methodologies for Cost Element 1.01 Development Engineering under the new spiral and incremental development processes. The research includes a review and summary of the single step acquisition approach and the incremental and spiral approaches and a comparison of the approaches.

Classification: Unclassified

Sponsor: DASA-CE
David Henningsen, (703) 601-4163/DSN 329-4163

Performer: Tecolote Research, Inc.

Resources:	*FY*	*Dollars*
	2003	$125,000
Schedule:	*Start*	*End*
	August 2003	Jul 2004
Database:	None	
Publications:	Report, CPER and data on CD	
Keywords:	Industry, Estimating, Missiles, C&TD, SD&D, Production, WBS, Mathematical Modeling, Statistics/Regression, Database	

DASA-CE–11

Title: Standard Service Cost (SSC)

Summary: This project will develop cost factors/cost relationships for Installation services to support the Army BASOPS requirements generation model (AIM-HI) at the MACOM and Department of Army levels. Cost Factors will be based on historical cost, quantitative and qualitative data collected through ISR Part III and SBC Data collection efforts.

Classification: Unclassified

Sponsor: DASA-CE
Steve Barth, (703) 692-7399

Performer: Calibre Systems Inc.

Resources:	*FY*	*Dollars*
	2004	$650,000
Schedule:	*Start*	*End*
	Ongoing	
Database:	IBM PC Compatible	
Publications:	None	
Keywords:	Government, Programming, Budgeting, Facilities, Infrastructure, Operations and Support, Labor, Overhead/Indirect, Data Collection, Mathematical Modeling, CER	

DASA-CE–12

Title: Personnel Costing System

Summary: The Personnel Costing System consists of two modules, (1) the Civilian Costing System (CCS) and (2) Army Military-Civilian Cost System (AMCOS). The CCS is a model used to develop civilian personnel costs in support of PPBES. AMCOS is a model used to estimate military and civilian personnel costs in support of weapon systems acquisition and various analytical studies. This project funds the update of the models with the latest rate data.

Classification: Unclassified

Sponsor: DASA-CE
Steve Barth, (703) 692-7399

Performer: Calibre Systems Inc.

Resources:	*FY*	*Dollars*
	2004	$827,000

Schedule: *Start* *End*

Ongoing

Database: IBM PC Compatible

Publications: None

Keywords: Government, Estimating, Manpower/Personnel, Life Cycle, Labor, Data Collection, Mathematical Modeling, Computer Model

DASA-CE–13

Title: Force and Contingency Cost Models Update

Summary: This project will update FORCES and include the Contingency Operations Cost Model (ACM) and develop a WEB based interactive capability for the FORCES and the Cost Factor handbook. The FORCES Cost Model will be available for download from the FORCES website with frequent updates for O&S and equipment cost factors.

Classification: Unclassified

Sponsor: DASA-CE
Joe Gordon, (703) 692-7388

Performer: Management Analysis Inc.

Resources:

FY	*Dollars*
2004	$575,000

Schedule: *Start* *End*

Ongoing

Database: IBM PC Compatible

Publications: None

Keywords: Government, Estimating, Forces, Operations and Support, Data Collection, Mathematical Modeling, Computer Model

DASA-CE–14

Title: Unmanned Aerial Vehicle Data Collection and CER

Summary: This project will develop CPER/CER that calculates the procurement cost for unmanned aerial vehicles and their payloads. The CPER/CER will incorporate both physical and performance characteristics. In addition this effort will collect the data required as input in commercial parametric estimating models. The FY2004 effort builds on the prior research. The focus is on updating and developing CPER/CER for payloads.

Classification: Unclassified

Sponsor: DASA-CE
David Henningsen, (703) 601-4163/DSN 329-4163

Performer: TBD

Resources:

FY	*Dollars*
2002	$225,000
2004	$150,000

Schedule:

Start	*End*
May 2002	Sep 2003
Apr 2004	Apr 2005

Database: None

Publications: CER and report on CD

Keywords: Government, Estimating, Aircraft, Production, Manufacturing, Data Collection, Mathematical Modeling, Cost/Production Function, CER

DASA-CE–15

Title: C^4ISR Cost-Performance Estimating Relationships

Summary: The objective of this project is to collect data and develop cost-performance estimating relationships (CPER) for C^4ISR hardware and software systems. A key area of interest is software required for the integration of various C^4ISR systems. The goal is to develop a cost estimating capability that relates incremental performance improvements with incremental increases in cost. In addition to the data collected to support CER development, sufficient data will be collected to allow the use of commercial hardware and software parametric cost estimating models. This effort is performed under a NAVAIR contract.

Classification: Unclassified

Sponsor: DASA-CE
David Henningsen, (703) 601-4163/DSN 329-4163

Performer: Technomics, Inc.

Resources:

FY	*Dollars*
2002	$317,000

Schedule:

Start	*End*
Sep 2002	Sep 2004

Database: None

Publications: Database, model and CER on CD

Keywords: Government, Estimating, Analysis, Electronics/Avionics, Advanced Technology, C&TD, SD&D, Production, Manufacturing, Data Collection, Database

DASA-CE–16

Title: Test and Evaluation Costing Methodology Development

Summary: The objective of this project is to develop a methodology for the cost analyst that provides a detailed, structured approach to estimate the cost of system test and evaluation. A bottoms-up versus top down methodology is desired. The methodology will not rely on factors off of recurring costs. Methodologies will be developed to cover the following areas: Aircraft, missiles, vehicle and C4ISR system's testing.

Classification: Unclassified

Sponsor: DASA-CE
David Henningsen, (703) 601-4163/DSN 329-4163

Performer: ACT I

Resources:

FY	*Dollars*
2003	$200,000

Schedule:

Start	*End*
Sep 2003	Sep 2004

Database: None

Publications: Handbook, data and CER on CD

Keywords: Government, Estimating, Weapon Systems, Electronics/Avionics, Test and Evaluation, Fixed Costs, Variable Costs, Data Collection, Study, Database, CER

DASA-CE–17

Title: Test and Evaluation Costing Methodology Development

Summary: The objective of this project is to develop a methodology for the cost analyst that provides a detailed, structured approach to estimate the cost of system test and evaluation. The methodology is based on the use of a generalized activity network (GAN).

Classification: Unclassified

Sponsor: DASA-CE
David Henningsen, (703) 601-4163/DSN 329-4163

Performer: LMI

Resources:

FY	*Dollars*
2003	

Resources:

FY	*Dollars*
2003	$126,000

Schedule:

Start	*End*
Sep 2003	Sep 2004

Database: None

Publications: Handbook, data and CER on CD

Keywords: Government, Estimating, Weapon Systems, Electronics/Avionics, Test and Evaluation, Fixed Costs, Variable Costs, Data Collection, Study, Database, CER

DASA-CE–18

Title: Turbo-jet and Turbo-fan Propulsion Unit Cost Performance Estimating Relationships

Summary: The objective of this project is to expand on the Loitering Missile Propulsion Unit effort completed in March 2003 by collecting additional data on turbo-jet propulsion units, updating the CPER and developing CPER for turbofan propulsion units. In addition to the data collected to support CPER development, sufficient data will be collected to allow the use of commercial parametric cost estimating models. The effort will develop CPER that will estimate prototype manufacturing and manufacturing costs for current and future missile systems and unmanned aerial vehicles.

Classification: Unclassified

Sponsor: DASA-CE
David Henningsen, (703) 601-4163/DSN 329-4163

Performer: Tecolote Research, Inc.

Resources:

FY	*Dollars*
2003	$90,000

Schedule:

Start	*End*
May 2003	Jun 2004

Database: None

Publications: Report, Data and CPER on CD

Keywords: Industry, Estimating, C&TD, SD&D, Production, WBS, Mathematical Modeling, Database

DASA-CE–19

Title: Integrated Performance Cost Model (IPCM)

Summary: This is the second phase of a project to develop and integrate a cost model with engineering and requirements tools. This phase expands on the overall architecture and roadmap developed previously. In addition a prototype model will be developed to demonstrate the architecture and concept. The model is expected to be scalable and estimate both system level costs as well as component level costs. In the second half of FY2004 we propose to issue a competively awarded contract(s) to begin work on the final model.

Classification: Unclassified

Sponsor: DASA-CE
Ruth Johnson, (703) 601-4183/DSN 329-4183

Performer: LMI

Resources:

FY	*Dollars*
2003	$800,000
2004	TBD

Schedule:

Start	*End*
May 2003	Jun 2004

Database: None

Publications: Architecture document, Prototype model

Keywords: Industry, Analysis, Weapon Systems, Computer Model

Army Materiel Command (AMCRM)

No input submitted.

Tank-automotive and Armaments Command (TACOM)

Name:	U.S. Army Tank-automotive and Armaments Command, Cost & Systems Analysis
Address:	6501 E. 11 Mile Road, Warren, MI 49397-5000
Director:	Richard S. Bazzy
Size:	Professional: 47 Support: 3 Consultants: 0 Subcontractors: 0
Focus:	Responsible for preparation of program office estimates, life cycle cost estimates, economic analyses, and combat effectiveness modeling. Supports the development of combat and tactical vehicles.
Activity:	Number of projects in process: 25 Average duration of a project: 3–20 weeks Average number of staff members assigned to a project: 1–3 Average number of staff-years expended per project: .5 Percentage of effort conducted by consultants: 0% Percentage of effort conducted by subcontractors: 0%

TACOM–1

Title: Price Model Calibration—Combat Vehicles

Summary: The objective of this project is to calibrate the PRICE model to allow for Combat Vehicle Estimates to be developed using the PRICE model. The model is being calibrated using Stryker data for potential use to estimate Future Combat Systems platforms along with other similar weight class combat vehicles.

Classification: Unclassified

Sponsor: TACOM Cost & Systems Analysis

Performer: TACOM Cost & Systems Analysis
Ron DiCesare, Christopher Cristante

Resources:

FY	*Dollars*	*Staff-years*
2003	$25,000	.25
2004	$50,000	.50

Schedule:

Start	*End*
FY03	FY04

Database: None

Publications: None

Keywords: Government, Estimating, Land Vehicles, Life Cycle, Study

Army Aviation and Missile Command (AMCOM)

Name:	Cost Analysis Division, Command Analysis Directorate U.S. Army Aviation & Missile Command (AMCOM)
Address:	AMSAM-CA-CA, Redstone Arsenal, Alabama 35898-5000
Director:	Frank T. Lawrence, Director, Command Analysis (256) 842-2817, DSN 788-2817, Fax (256) 876-6351 Frank.Lawrence@redstone.army.mil Claudia L. Rhen, Chief, Cost Analysis Division (256) 842-7843, DSN 788-7843, Fax (256) 876-9809 Claudia.Rhen@redstone.army.mil
Size:	Professional: 33 Support: 1 Consultants: N/A Subcontractors: N/A
Focus:	Provide cost estimation and analysis support to Aviation, Tactical Missiles, and Air Missiles Program Executive Offices (PEOs), Program/Project Offices (PMOs), and AMCOM organizational elements. Manage the PEO, PMO, and AMCOM Cost Analysis Programs. Develop, update or obtain Cost Estimating Relationships (CERs), cost factors, and mathematical/computerized cost models for estimating purposes. Develop cost estimates to support Analyses of Alternatives (AoA), tradeoff studies, and force structure estimates. Develop and prepare life cycle cost estimates, and conduct other related studies in support of weapon systems cost analysis. Perform cost risk analyses and cost risk assessments to support weapon systems program decisions. Provide certification/validation for cost estimates and economic analyses.
Activity:	Number of projects in process: 48 Average duration of a project: 3–26 weeks Average number of staff members assigned to project: 1–3 Average number of staff-years expended per project: 1 Percentage of effort conducted by consultants: 0% Percentage of effort conducted by subcontractors: 0%

No active cost research projects at this time.

Major focuses are supporting PMOs for upcoming Milestone Reviews for Apache Block III, Fixed Wing, UH60, and Block II HIMARS. CAD also has lead of an IPT that is defining metrics of success for the CH47 Cargo Soldier Focused Logistics (SFL) concept/process.

Army Space and Missile Defense Command (SMDC)

Name:	U.S. Army Space and Missile Defense Command (SMDC)
Address:	SMDC–SP-C, 106 Wynn Drive, P.O. Box 1500, Huntsville, AL 35807
Director:	Kay R. Ward, Director, Research, Development and Acquisition Dr. William Hughes, Team Leader, Cost Analysis Division, (256) 955-5913
Size:	Professional: 10 Support: 0 Consultants: N/A Subcontractors: N/A
Focus:	Systems Costs, Component Cost Analyses, Economic Analyses
Activity:	Number of projects in process: 1 Average duration of a project: 1 year Average number of staff members assigned to a project: 3 Average number of staff-years expended per project: 0.5 Percentage of effort conducted by consultants: 0% Percentage of effort conducted by subcontractors: 0%

SMDC–1

Title:	THAAD Radar Environmental Quality Life Cycle Cost Estimate (EQLCCE)
Summary:	This estimate conformed to the guidelines set forth in the Environmental Quality Life Cycle Cost Estimating Handbook for Material Acquisition, draft dated June 2001. This is the first EQLCCE done for the THAAD system. Activities included collection of data and constructing an ACEIT model. Elements of cost addressed are Overhead, Tradeoff Analysis, NEPA, Pollution Prevention, Conservation, Remediation and Restoration, and Demilitarization and Disposal.
Classification:	Unclassified
Sponsor:	Dr. William Hughes, (256) 955-5913, bill.hughes@smdc.army.mil
Performer:	SMDC Command Analysis Division/Army Environmental Center
Resources:	*FY* — *Dollars* — *Staff-years* 2001 — $30,700 — 0.05
Schedule:	*Start* — *End* Jul 2001 — May 2003
Database:	*Title:* None *Description:* DoD systems *Automation:* MS Word and PDF format
Publications:	THAAD Radar Environmental Quality Life Cycle Cost Estimate (EQLCCE), CR-1121, November 2001
Keywords:	Government, Industry, Estimating, Missiles, Life Cycle, Environment, Data Collection, Study

SMDC–2

Title: PAC-3 Environmental Quality Life Cycle Cost Estimate (EQLCCE)

Summary: This estimate conformed to the guidelines set forth in the Environmental Quality Life Cycle Cost Estimating Handbook for Material Acquisition, draft dated June 2001. Elements of cost addressed are Overhead, Tradeoff Analysis, NEPA, Pollution Prevention, Conservation, Remediation and Restoration, and Demilitarization and Disposal.

Classification: Unclassified

Sponsor: Dr. William Hughes, (256) 955-5913, bill.hughes@smdc.army.mil

Performer: SMDC Command Analysis Division/Army Environmental Center

Resources:

FY	*Dollars*	*Staff-years*
2002	$47,829	0.05

Schedule:

Start	*End*
Jan 2002	Jun 2003

Database:

Title:	None
Description:	DoD systems
Automation:	MS Word and PDF format

Publications: TBD

Keywords: Government, Industry, Estimating, Missiles, Life Cycle, Environment, Data Collection, Study

SMDC–3

Title: Environmental Cost Estimating Handbook for Missile Defense

Summary: This effort is being performed to develop a quick reference guide and handbook which may be used by cost estimators, when developing environmental costs for missile defense systems.

Classification: Unclassified

Sponsor: Dr. William Hughes, (256) 955-5913, bill.hughes@smdc.army.mil

Performer: SMDC Command Analysis Division/Army Environmental Center

Resources:

FY	*Dollars*	*Staff-years*
2004	$143,000	1.33

Schedule:

Start	*End*
Sep 2003	Nov 2005

Database:

Title:	None
Description:	DoD systems
Automation:	MS Word and PDF format

Publications: TBD

Keywords: Government, Industry, Estimating, Missiles, Life Cycle, Environment, Data Collection, Study

Naval Cost Analysis Division (NCAD)

Name:	Naval Cost Analysis Division (NCAD)
Address:	1000 Navy Pentagon 4C449, FMB-6 Washington, DC 20350-1000
Director:	Mr. Christopher Deegan (703) 692-4882
Size:	Professional: 14 civilian, 1 military Support: Consultants: Subcontractors:
Focus:	The Naval Cost Analysis Division (NCAD) prepares independent cost estimates for DON ACAT 1C programs and for major automated information systems. NCAD also manages the DON VAMOSC Program and coordinates DON cost research. The focus of the NCAD cost research program is as follows: improved acquisition and operating and support (O&S) cost/technical databases (e.g., VAMOSC, ACDB, etc.); improved methods for estimating direct and indirect O&S costs; improved methods for estimating software development/maintenance costs; improved methods for estimating specific SDD/E&MD cost elements, e.g., non-recurring engineering, system integration, government in-house support, etc.; methods for estimating the cost impact of acquisition reform initiatives.
Activity:	Number of projects in process: Average duration of a project: Average number of staff members assigned to a project: Average number of staff-years expended per project: Percentage of effort conducted by consultants: Percentage of effort conducted by subcontractors:

NCAD–1

Title:	Operating and Support Cost Analysis Model (OSCAM-Ship, OSCAM-Ship Systems)
Summary:	These models were developed using a “system dynamics” approach. This approach provides a structured methodology for dealing with complex systems having many interacting components. A system dynamics approach enables us to capture the dynamic behavior of a system while allowing for a flexible design, which can be easily enhanced and expanded. The model suite provides the flexibility for fast, top-level cost estimating, as well as the framework for analyzing possible policy decisions and their impact on cost and availability. Model outputs include both cost and availability. The inclusion of availability data within the model is crucial because cost reduction policies need to be analyzed in conjunction with their impact on availability, and vice versa.
Classification:	Unclassified

Sponsor: Naval Cost Analysis Division (NCAD)
ASN (FM&C) FMB-63
1000 Navy Pentagon, Room 4C449
Washington, DC 20350-1000
Ms. Wendy Kunc, (703) 692-4889

Specialist Procurement Services/Cost Forecasting (SPS/CF)
MoD Abbey Wood
P.O. Box 702
Bristol BS12 7DU
UK
Mr. Nick Hartigan, UK, 011 44 117 91 32686

Performer: NCAD in-house, UK MoD in-house and HVR Consulting Services, Ltd
Ms. Wendy Kunc, NCAD, (703) 692-4889
Mr. Paul Wood, MoD, UK, 011 44 117 91 32686
Mr. Dave Exelby, HVR CSL, 011 44 1420 87977

Resources:

FY	*Dollars*	*Staff-years*
96	UK$ only	1.0
97	UK$ only	1.5
98	$123,000 + UK$	0.75
99	$125,000 + UK$	0.5
00	$ 96,203 + UK$	0.5
01	$100,000 + UK$	0.5
02	$125,000 + UK$	0.5
03	$135,000	0.1
04	$125,000	0.1

Schedule:

Start	*End*	
Jan 97	Nov 97	Version 1 development
Dec 97	Feb 98	Version 2 development
Aug 98	Apr 99	Version 3 development
May 99	Apr 00	Version 4 development
Jun 00	Sep 01	Version 5 development
Dec 01	July 02	Version 6 development

Database: VAMOSC/other cost data and technical data

Publications: Training information, model software, and supporting documentation available on website, www.oscamtools.com.

Keywords: Government, Estimating, Analysis, Operations and Support, Sustainability, Ships, Mathematical Modeling, Statistics/Regression, Database, Method, CER, Study

NCAD–2

Title: Aircraft Operating and Support Cost Analysis Model (OSCAM-Air)

Summary: This model was developed using a “system dynamics” approach. This approach provides a structured methodology for dealing with complex systems having many interacting components. A system dynamics approach enables us to capture the dynamic behavior of a system while allowing for a flexible design that can be easily enhanced and expanded. Many questions posed today (e.g., How can the Navy reduce operating and support costs while maintaining readiness?) cannot be addressed with existing tools. The model will provide the flexibility for fast, top-level cost estimating, as well as the framework for analyzing possible policy decisions and their impact on cost and availability. Model outputs will include both cost and availability. The inclusion of availability within the model is crucial because cost reduction policies need to be analyzed in conjunction with their impact on availability, and vice versa.

Classification: Unclassified

Sponsor: Naval Cost Analysis Division (NCAD)
ASN (FM&C) FMB-63
1000 Navy Pentagon, Room 4C449
Washington, DC 20350-1000
Ms. Wendy Kunc, (703) 692-4889

Specialist Procurement Services/Cost Forecasting (SPS/CF)
MoD Abbey Wood
P.O. Box 702
Bristol BS12 7DU
UK
Mr. Nick Hartigan, UK, 011 44 117 91 32686

Performer: NCAD in-house, UK MoD in-house and HVR Consulting Services, Ltd
Ms. Wendy Kunc, NCAD, (703) 692-4889
Mr. Paul Wood, MoD, UK, 011 44 117 91 32686
Mr. Dave Exelby, HVR CSL, 011 44 1420 87977

Resources:

FY	*Dollars*	*Staff-years*
99	$100,000 + UK$	0.75
00	$105,000	0.75
01	$106,000	0.5
02	$227,000	0.1
03	$185,000	0.1
04	$125,000	0.1

Schedule:

Start	*End*	
Apr 99	Sep 99	(Prototype development)
Oct 99	Apr 00	(Version 1 development)
Jun 00	Sep 01	(Continuing development)
Dec 01	Nov 02	(Version 2 development)
Mar 03	Mar 03	(Verification and Validation)
Sep 03		(Released)

Database: VAMOSC/other cost data and technical data

Publications: Training information and supporting documentation available on website, www.oscamtools.com.

Keywords: Government, Estimating, Analysis, Operations and Support, Sustainability, Aircraft, Mathematical Modeling, Statistics/Regression, Database, Method, CER, Study

NCAD–3

Title: Naval VAMOSC Management Information System

Summary: The Visibility and Management of Operating and Support Costs (VAMOSC) management information system displays Naval operating and support (O&S) costs and related information (e.g., operating hours or manning levels) for ships, shipboard systems, aircraft, weapons, and USMC ground systems. Depending on the specific commodity type and system, the VAMOSC Oracle relational databases contain up to 18 years of data presented by fiscal year by alternative hierarchical cost element structures. Depending on the cost element, data for a particular commodity are available not only at the system level, but also at the subsystem and component levels. Detailed ship and aviation maintenance data provide additional insight into Organizational, Intermediate, and Depot level maintenance man-hours and parts costs. Ship O&I level maintenance data are reported by ship and Equipment Identification Code, and ship public depot maintenance data are reported by ship and Expanded Ship Work Breakdown Structure. Aviation O&I maintenance data are reported by Type/Model/Series and Work Unit Code. A five-year (FY99-03) improvement effort was completed that increased the

breadth (i.e., weapon system and cost element coverage), depth (i.e., cost element visibility), timeliness, and accessibility of the VAMOSC database. A detailed manpower database containing military pay and attribute data was released during FY03.

Classification: Unclassified

Sponsor: Naval Cost Analysis Division (NCAD)
ASN (FM&C) FMB-63
1000 Navy Pentagon, Room 4C449
Washington, DC 20350-1000
Ms. Wendy Kunc, (703) 692-4889

Performer: IBM Business Consulting
Ms. Wendy Kunc, Program Manager, 703-692-4889
Mr. Michael Carey, Deputy Program Manager, 703-692-4901
Mr. Don Clarke, IT Integration, 703-692-4893
Mr. Peter Bowman, IBM Business Consulting, 703-653-7195

Resources:

FY	*Dollars*	*Staff-years*
00	$2,800,000	5.0
01	$2,035,000	5.0
02	$2,615,000	5.0
03	$2,700,000	2.5
04	$2,4000,000	2.5

Schedule:

Start	*End*
FY 99	Continuing

Database: VAMOSC Ships, Shipboard Systems, Aviation, Weapons, USMC Ground Systems, Personnel

Publications: Data and supporting documentation accessible via www.navyvamosc.com and www.usmcvamosc.com

Keywords: Government, Operations and Support, Data Collection, Database

NCAD–4

Title: NCAD Online Document Library

Summary: The NCAD Online Document Library is currently comprised of over 4000 cost estimating related documents. These documents are currently being scanned into PDF format by a contractor to be placed on the NCAD website. This will allow the cost community to search for and find documents quickly from any location. The documents will be available for download to Government employees and FFRDCs directly from the website, while contractors can get the documents from their government sponsors. An additional 4000 documents have been identified to add to the library in the near future.

Classification: Unclassified

Sponsor: Naval Cost Analysis Division (NCAD)
4C449, FMB-6
Washington, DC 20350-1000
Mr. Don Clarke (703) 692-4893
Mr. Tom Burton (703) 692-4887

Performer: NCCA in-house
Perot Systems
Unisys Corporation

Resources:

FY	*Dollars*	*Staff-years*
03	$294K	3
04	$125K	2

Schedule:

Start	*End*
Oct 1, 2003	Sep 30, 2005

Database: Currently there is a Microsoft Access database that contains information on 4000 documents in the NCAD library. In addition, a Microsoft Excel spreadsheet contains 4000 documents that will be added to the Access database for a total of over 8000 documents.

Publications: Information available online at http://www.ncca.navy.mil/resources/library.cfm

Keywords: Government, Analysis, Life Cycle, Software, Data Collection, Database, Schedule, Risk/Uncertainty, CER, Aircraft, Ships, Missiles, Space Systems, Land Vehicles, Electronics/Avionics

NCAD–5

Title: Weapon System Software Development Cost/Technical Database

Summary: This effort expands the NCAD (formerly NCCA) software effort, schedule, labor rate, and SLOC growth databases developed for the NCCA *Software Development Estimating Handbook – Phase One* analysis. Data from various commodities was collected from DoD defense contractors. Upper Mohawk, Inc. delivered the original database in Oct 02. An update is pending in raw/normalized and sanitized forms.

Classification: Unclassified

Sponsor: Naval Cost Analysis Division (NCAD)
1000 Navy Pentagon
4C449, FMB-6
Washington, DC 20350-1000
Ms. Susan Wileman, (703) 692-4892

Performer: NCCA in-house and Upper Mohawk, Inc.
Ms. Pamela L. Johnson, Upper Mohawk

Resources:

FY	*Dollars*	*Staff-years*
00	$274,226	

Schedule:

Start	*End*
Oct 00	TBD

Database: Separate NCAD software databases covering effort, schedule, labor rate and SLOC growth

Publications: TBD

Keywords: Government, Analysis, Electronics/Avionics, Life Cycle, Software, Data Collection, Database, Schedule, Risk/Uncertainty

NCAD–6

Title: AIS Life Cycle Cost and Technical Database

Summary: This effort entails developing a database of historical and estimated AIS program costs and cost drivers, program descriptions, cost methodology, programmatic/technical description. Technomics delivered the original database in April 2002. The current efforts will incorporate more data and expand the capabilities of the database.

Classification: Unclassified

Sponsor: Naval Cost Analysis Division (NCAD)
1000 Navy Pentagon
4C449, FMB-6
Washington, DC 20350-1000
Ms. Susan Wileman, (703) 692-4892

Performer: NCAD in-house
Ms. Susan Wileman, NCAD
Mr. David Cashin, NCAD
Mr. John Moskowitz, NCAD
Mr. Todd Andrews, NCAD

Schedule:

Start	*End*
Oct 00	TBD

Database: AIS historical program information and costs by Cost Element Structure

Publications: TBD

Keywords: Government, Estimating, Data Collection, Statistics/Regression, Database, CER, Life Cycle

NCAD–7

Title: Hardware Deflator Methodology

Summary: This effort entailed collecting Navy AIS hardware cost and technical data to determine a methodology for estimating hardware over time. In addition, Navy and commercial data was collected to determine the life of various types of technology and its applicability to the Navy hardware procurement process. Results delivered in Feb 03.

Classification: Unclassified

Sponsor: Naval Center for Cost Analysis
Nebraska Avenue Complex
4290 Mount Vernon Drive NW, Suite 18200
Washington, DC 20393-5444
Ms. Cheri Cummings, (202-764-2662 / Robert Hirama (202) 764-2615

Performer: NCCA in-house and Technomics, Inc.
Ms. Pamela L. Johnson, NCCA
Ms. Jennifer Echard, NCCA
Mr. Jeff Cherwonik, Technomics, (703) 415-1006
Mr. Jason Lee, Technomics (703) 415-1007

Resources:

FY	*Dollars*	*Staff-years*
00	$63,668	0.4

Schedule:

Start	*End*
Oct 00	Feb 03

Database: Data within report.

Publications: TBD

Keywords: Government, Estimating, Data Collection, Database, Economic Analysis

NCAD–8

Title: COTS Procurement Cost Estimating Methodology

Summary: Developed factors for estimating commercial off-the-shelf (COTS) electronics hardware costs (specifically for data/signal processing & display equipment) as a function of military specification (MILSPEC) costs. These factors are appropriate for application in Milestone A and B cost estimating. Effort completed in FY-02.

Classification: Unclassified

Sponsor: Naval Center for Cost Analysis (NCCA)
Nebraska Avenue Complex
4290 Mount Vernon Drive NW, Suite 18200
Washington, DC 20393-5444
Mr. Tom Burton, (202) 764-2612

Performer: Technomics, Inc. and Naval Surface Warfare Center (NSWC)/Crane Division

Resources:

FY	*Dollars*
00	$165K

Schedule:

Start	*End*
Sep 00	Sep 02

Database: Cost, technical and programmatic data for COTS and MILSPEC Navy data/signal processing and display equipment

Publications: Report entitled "COTS Procurement Cost Estimating Methodology" dtd September 2002

Keywords: Government, Estimating, Electronics/Avionics, Ships, Production, Modification, Case Study, Database

NCAD–9

Title: Platform Integration Cost Database/Methodology for Shipboard Electronics

Summary: Develop a database and top-level cost estimating methodology for projecting hardware/software integration costs for shipboard electronics and weapon systems. The database should include cost data, technical characteristics, and other relevant information (e.g., software size). This is a two phase effort. Phase I concentrated on developing an integration work breakdown structure, identifying integration cost drivers, hypothesizing estimating relationships and collecting cost data for one shipboard combat system program. Phase I is complete. Phase II, which is ongoing, involves collecting cost data for a shipboard combat system program and developing top-level cost estimating methodology.

Classification: Cost Data: Business Sensitive
Technical Characteristics: Business Sensitive

Sponsor: Naval Center for Cost Analysis (NCCA)
Nebraska Avenue Complex
4290 Mount Vernon Drive NW, Suite 18200
Washington, DC 20393-5444
Mr. Tom Burton, (202) 764-2612

Performer: Gibbs & Cox, Inc., Lockheed Martin Corporation, and Technomics, Inc. - Phase I
Technomics, Inc. - Phase II

Resources:

FY	*Dollars*	
00	325K	Phase I
01	75K	Phase I
02	147K	Phase II

Schedule:

	Start	*End*
Phase I	Sep 00	Dec 02
Phase II	Jan 03	Sep 04

Database: Integration costs, technical and programmatic data for at least two shipboard combat system programs

Publications: Report, including database, that presents top-level integration cost estimating methodology

Keywords: Industry, Government, Estimating, Ships, Weapon Systems, Electronics/Avionics, Production, Integration, Modification, WBS, Data Collection, Database

Office of Naval Research (ONR)

Name:	Office of Naval Research (ONR)
Address:	800 N. Quincy St Arlington, VA 22217
Director:	Dr. Stephen C. Lubard
Size:	Professional: Support: Consultants: Subcontractors:
Focus:	Research in Cost Analysis Methods
Activity:	Number of projects in process: 2 Average duration of a project: 4 years Research conducted by a mix of academia, industry, and Navy System Commands

ONR–1

Title: Marine Composites Affordability—A Knowledgebased Approach

Summary: With shrinking budgets, total ownership costs for ships must be reduced. Low cost methods are required for the design, manufacture, and maintenance of Naval ship components. One such application is the manufacturing of composite deckhouses. This project, focused on composite deckhouses, offers a means to rapidly assess the affordability of a ship's structure when it is designed using marine composites. This project uses a knowledgebase and an inference engine to query CAD files and provide Total Ownership Cost (TOC) on a component by component basis. Although this project represents an application to marine composites, use of this knowledgebased methodology can then be applied to other ship components in an analogous manner. This project includes participation by Louisiana Tech University, Northrup Grumman Ship Systems Avondale Operations, the University of New Orleans, NSWC Carderock, and Louisiana State University.

Classification: Reports are Unclassified, Capability to Manage Data to SECRET Level

Sponsor: Office of Naval Research
800 North Quincy Street
Arlington, VA 22217-5600
Ms. Katherine Drew
(703) 696-5992

Performer:

Louisiana State University
CEBA 2508
Baton Rouge, LA 70803
Dr. H. Dwayne Jerro
(225) 578-5808

NSWC Carderock
9500 MacArthur Blvd.
West Bethesda, MD 20817
Dr. Milton Critchfield
(301) 227-1769

Northrop Grumman Corp.
Ship Systems Avondale
Operations

Univ. of New Orleans
913 Engineering Building
New Orleans, LA 70148

PO Box 50280
New Orleans, LA 70150
Mr. John White
(504) 437-3328

Dr. Alley C. Butler, PE
504-458-6339

Louisiana Tech University
PO Box 10348
Ruston, LA 71272-0046
Dr. Dileep Sule
(318) 257-3394

Resources:

FY	*Dollars*
2000	$130K*
2001	$84K*
2002	$184K*
2001	$ 68K
2002	$ 84K

* in-kind contribution from Louisiana Tech University total $15K, and an in-kind contribution from Avondale Industries of $56K, Carderock $147.5K, assigned $95K for Carderock.

Schedule:

Start	*End*
Aug 17, 2000	Sep 30, 2004

Database: *Model Formulation:* Knowledgebased System using Categorical and Probabilistic Methods

Publications: Public Domain as appropriate

Keywords: Industry, Government, Estimating, Ships, C&TD, Production, Life Cycle, Operations and Support, Risk/Uncertainty, Reliability, Data Collection, Expert System

ONR–2

Title: The Effect of New Technologies on Ship Systems: A System Dynamics Cost Modeling Approach

Summary: The introduction of new technologies often causes a temporary loss of productivity and leads to additional unforeseen costs over a system's life cycle. One of the reasons for this productivity degradation is that traditional systems engineering management fails to plan for the effects of technology procurement, implementation, and maintenance. The success of introducing new technologies for ship systems requires a high level of initial planning and cooperation among the customers (in this case the fleet), the suppliers (in this case the shipbuilder), and the government procurement organization. The capability of the technology, the skills of the users of the technology, and the ship system structure and performance must be collectively evaluated and reconfigured to determine the best operational environment for the new technology. Establishing this operational environment will determine the affordability of future ship systems. This research defines the problem of introducing new technologies for ship systems and outlines how ship system performance can be predicted, evaluated, and controlled using a system dynamics (SD) modeling approach with an embedded optimization routine called Data Envelopment Analysis (DEA).

Classification: Reports are Unclassified, Capability to Manage Data to SECRET Level

Sponsor:
Office of Naval Research
800 North Quincy Street
Arlington, VA 22217-5600
Ms. Katherine Drew
(703) 696-5992

Performer: Virginia Tech
Grado Department of Industrial and Systems Engineering
System Performance Laboratory
Dr. Kostas Triantis, Principal Investigator
(703) 538-8446

Newport News Shipbuilding
4101 Washington Avenue
Newport News, VA 23607
Mr. Robert Schatzel
(757) 688-2124

Naval Sea Systems Command (SEA 0176)
1333 Isaac Hull Avenue SE
Washington Navy Yard, DC 20376-5060
Mr. Irwin Chewning
202-781-2697

Resources:

FY	*Dollars*
2000	$103K*
2001	$250K*
2002	$146K*
2003	$30K

* assigned $88K for NAVSEA 017.

Schedule:

Start	*End*
May 2000	Jun 30, 2004

Database: VAMOSC and other cost and technical data.

Publications: Technical reports, scholarly refereed publications, model documentation.

Vaneman, W. and K. Triantis, "The Dynamic Production Axioms and System Dynamics Behaviors: The Foundation for Future Integration," Journal of Productivity Analysis, 19 (1), 93-113, 2003.

Monga, P. "A System Dynamics Model of the Development of New Technologies for Ship Systems Pavinder Monga, MS Thesis, Virginia Tech, September 2001.

Vaneman, W., "Evaluating Performance in a Complex and Dynamic Environment" Ph.D. Dissertation, Virginia Tech, December 2002

Scott, J., "A System Dynamics Model of the Operations, Maintenance and Disposal Costs of New Technologies for Ship Systems," M.S. thesis, Virginia Tech, October 2002.

Damle, P., "System Dynamics Modeling Approach for the Technology Integration of New Technologies in Ship Systems," M.S. Thesis, Virginia Tech, September 2003.

Monga, P. and Triantis, K., "The Behavior of New Technology Development: A System Dynamics Approach," Twentieth International Conference of System Dynamics Society, Palermo, Italy, August 2002.

Vaneman, W.K. and Triantis, K., "Planning for Technology Implementation: An SD(DEA) Approach," Technology Management in the Knowledge Era, D.F. Kocaoglu, et al. eds., PICMET: Portland, OR, 375-383, 2001

Vaneman, W., Triantis, K., and Carayannis, E., "Embedding Data Envelopment Analysis into a System Dynamics Framework," 2000 Proceedings of the American Society for Engineering Management, George Washington University, October 2000, 112-121.

Model Documentation:
- DSS software
- VENSIM Models
- User's Guide

Feedback from Users
Business Plan
Memorandum of Understanding
Research Papers

Keywords: Industry, Government, Estimating, Ships, Advanced Technology, Mathematical Modeling

Naval Air Systems Command (NAVAIR)

Name: Naval Air Systems Command Headquarters

Address: Cost Department (AIR-4.2), 21491 Great Mills Rd.,
Lexington Park, MD 20653

Director: Dave Burgess (301) 757-7810
Web site: http://www.navair.navy.mil/air40/air42/

Size: Professional:

NAVAIR HQ	39
NAWC-AD-LAKE	21
NAWC-AD-PAX	187
NAWC-WD-CL	13

Focus: The Cost Department provides a wide variety of cost analysis products and services. The department's primary focus is to provide a clear and comprehensive understanding of life cycle cost and attendant uncertainties to be used in developing, acquiring, and supporting affordable Naval Aviation Systems. Besides life cycle cost estimates, the Cost Department provides source selection cost evaluation support, earned value management analysis, cost research, databases and various cost/benefit studies.

The focus of NAVAIR cost research is: Total Ownership Cost initiatives; cost growth; modifications; cost/benefits; engineering investigations, and building comprehensive databases.

Activity:

Number of projects in process:	4
Average duration of a project:	1-2 years
Average number of staff members assigned to a project:	1-2
Average number of staff-years expended per project:	1-2
Percentage of effort conducted by consultants:	50%
Percentage of effort conducted by subcontractors:	0%

NAVAIR–1

Title: SLAP/SLEP Full Scale Testing Model

Summary: Use the results of existing technical information and inputs from class desk personnel supporting programs currently evaluating SLAP/SLEP efforts to build an estimating model approach to estimating SLAP/SLEP and associated testing efforts. Research cost history for past SLAP/SLEP programs to identify key costs and cost drivers and use existing AV-3M/VAMOSC data to assess airframe maintenance and service bulletin cost trends. Using results of technical inputs and cost data, develop a simple model to aid in quick turn around assessments of the costs and potential O&S benefits of these types of programs. Model delivered on schedule.

Classification: Unclassified

Sponsor: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Performer: Tecolote, Inc.

Resources:	*FY*	*Dollars*	*Staff-years*
	1999	$50,000	
Schedule:	*Start*	*End*	
	May 1999	Jan 2000	

Database: None

Publication: Technical Report

Keywords: Government, Estimating, Analysis, Method, Data Collection, Mathematical Model

NAVAIR–2

Title: Demilitarization/Disposal Model

Summary: A report was prepared on the costs associated with removing Naval Aviation aircraft and related equipment from active service and the production of a model based on historical data to estimate future demilitarization/demobilization costs for a given Type/Model Aircraft. Since in many cases aircraft are removed from inventory and placed in long-term storage at AMARC, associated data and estimating relationships will also be incorporated into this model. Current model for the ongoing Environmental Consequences of Hazardous Operations (ECHO) project may be used in the development of this model.

Classification: Unclassified

Sponsor: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Performer: Naval Air Warfare Center—Aircraft Division
Lakehurst, New Jersey

Resources:	*FY*	*Dollars*	*Staff-years*
	1999	$35,000	
	2000	$7,000	
Schedule:	*Start*	*End*	
	May 1999	Mar 2000	

Database: None

Publication: Technical Report

Keywords: Government, Estimating, Analysis, Aircraft, Method, Data Collection, Mathematical Model

NAVAIR–3

Title: Cost Growth Analysis

Summary: This task investigates the cost, technical, and programmatic growth experienced on historical Navy aircraft, weapons, and avionics programs. Data are being analyzed for specific NAVAIR programs for NAVAIR commodity groups, and collectively for all NAVAIR programs including ACAT I programs reported in the SAR. These data are being organized in a cost growth database. Technical and programmatic characteristics are also being recorded for various points within a program's lifecycle to analyze changes over time. These data are captured in an excel spreadsheet. The analysis will result in a conceptual approach for NAVAIR cost risk estimation.

Classification Unclassified

Sponsor: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Performer: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Resources:

FY	*Dollars*	*Staff-years*
2000	$69,000	.5
2001	$30,000	.2
2002	$225,000	1.5
2003	$255,000	1.7
2004	$39,000	.25

Schedule:

Start	*End*
Mar 2000	Sept 2004

Database: *Title:* NAVAIR Cost Growth Database

Description: NAVAIR aircraft, weapons, and avionics programs cost growth in Excel spreadsheets

Automation: Microsoft EXCEL

Publication: Technical Report

Keywords: Government, Analysis, Aircraft, Electronics/Avionics, Case Study, Study

NAVAIR–4

Title: Naval Aircraft Modification Model (NAMM) Update

Summary: This task includes updating OSIP cost information currently contained in NAMM and expanding the coverage, functionality, and usefulness of the existing NAMM database. Additional OSIP and modifications program data will be collected, normalized, and incorporated into the existing database of technical characteristics and program descriptions.

Classification: Unclassified

Sponsor: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Performer: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Resources:

FY	*Dollars*	*Staff-years*
2002	$35,000	.25
2003	$37,000	.25

Schedule:

Start	*End*
June 2002	Sept 2003

Database: *Title:* Naval Aircraft Modifications Model (NAMM)

Description: Technical, programmatic and cost data for modifications programs.

Automation: Microsoft ACCESS

Publication: Technical Report

Keywords: Government, Analysis, Aircraft, Data Collection, Database

NAVAIR–5

Title: Force Level Economic Effectiveness Trade (FLEET) Model

Summary: A model is being developed to provide quick and reasonably accurate life cycle cost estimates for all active Navy aircraft programs. A prototype model is being developed. The FLEET model will provide cost insights on deferring development of follow-on aircraft, evaluating aircraft production rate alternatives, and identifying future operation and maintenance costs.

Classification: Unclassified

Sponsor: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Performer: Tecolote, Inc.

Resources:

FY	*Dollars*	*Staff-years*
2000	$70,000	.5
2001	$50,000	.5
2002	$80,000	.8
2003	$50,000	.5
2004	$0	.0
2005	$78,000	.5

Schedule:

Start	End
Apr 2000	Sept 2005

Database: None

Publication: Technical Report, Model

Keywords: Estimating, Analysis, Aircraft, Life Cycle, Mathematical Model

NAVAIR–6

Title: Engineering Investigations Cost Model (EICM)

Summary: The Engineering Investigation Cost Model (EICM) provides Fleet Support Teams (FST) with a tool to evaluate the cost and potential cost avoidance of performing a routine engineering investigation. The EICM allows users to assess the economic merits of conducting an EI on an aircraft subsystem, support equipment item, or weapon. Based on a minimum number of required data inputs, the model allows FST members to estimate the initial cost of conducting the EI, to determine the potential cost avoidance associated with fixing the problem item, and to calculate the maximum remedial action investment available while still generating a return on investment (ROI) of 5 to 1.

Classification: Unclassified

Sponsor: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Performer: Ketron

Resources:

FY	*Dollars*	*Staff-years*
1999	$75,000	
2000	$50,000	

Schedule:

Start	*End*
Apr 1999	Jul 2000

Database: None

Publication: Technical Report, Model

Keywords: Government, Estimating, Analysis, Aircraft, Economic Analysis

NAVAIR–7

Title: Avionics Database

Summary: Development continues on this database of historical avionics cost, technical, and programmatic information. The database aims to provide complete avionics system data in a user-friendly format. Standard but flexible WBS based templates allow users to view data in varying levels of detail.

Classification Unclassified

Sponsor: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Performer: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Resources:

FY	*Dollars*	*Staff-years*
2000	$100,000	.75
2001	$100,000	.75
2002	$100,000	.75
2003	$100,000	.75
2004	$100,000	.75
2005	$100,000	.75

Schedule:

Start	*End*
Dec 1999	Sept 2004

Database: *Title:* Avionics Database

Description: Cost, technical, and programmatic data for historical avionics programs including IR, EO-IR, Communication/Navigation, Radar, Inst/Proc

Automation: TBD

Publication: Technical Report—Database Documentation

Keywords: Government, Electronics/Avionics, Data Collection, Database

NAVAIR–8

Title: Rotary Wing Database

Summary: A database of historical helicopter cost, technical, and programmatic data is being developed. The database is being constructed to respond to ad hoc queries and to provide standard format reports.

Classification Unclassified

Sponsor: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Performer: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Resources:	*FY*	*Dollars*	*Staff-years*
	2000	$100,000	.75
	2001	$50,000	.3
	2002	$100,000	.75
	2003	$50,000	.5

Schedule: *Start* — *End*
Dec 1999 — Mar 2003

Database: *Title* — Rotary Wing Database

Description: Cost, technical, and programmatic data for historical Navy and Army helicopter programs.

Automation: Microsoft ACCESS

Publication: Technical Report—Database Documentation

Keywords: Government, Helicopters, Data Collection, Database

NAVAIR–9

Title: Propulsion Database

Summary: A database of historical propulsion cost, technical, and programmatic data was developed. The database responds to ad hoc queries and to provide standard format reports.

Classification Unclassified

Sponsor: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Performer: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Resources:	*FY*	*Dollars*	*Staff-years*
	2000	$100,000	.75
	2001	30,000	.2
	2002	50,000	.4

Schedule: *Start* — *End*
Dec 1999 — June 2002

Database: *Title:* Propulsion Database

Description: Cost, technical, and programmatic data for historical propulsion programs.

Automation: Microsoft ACCESS

Publication: Technical Report—Database Documentation

Keywords: Government, Aircraft, Propulsion, Data Collection, Database

NAVAIR–10

Title: Environmental Costs of Hazardous Operations (ECHO) Model

Summary: Perform a verification/validation of the ECHO model, which was developed by Tecolote. The model calculates the environmental costs incurred throughout the life cycle of a program. Costs include hazardous material purchase; hazardous material tracking, handling and storage; hazardous waste disposal; hazardous waste management; wastewater treatment; air emissions control; air emissions monitoring and reporting. The

model will be populated with data for various weapons systems. New CERs will be developed to relate the data streams to the environmental costs. Changes to the model will be made to make it more user friendly and to allow easy tracking of input data.

Classification: Unclassified

Sponsor: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Performer: Naval Air Warfare Center—Aircraft Division
Lakehurst, NJ 08733

Resources:

FY	*Dollars*	*Staff-years*
2000	$130,000	

Schedule:

Start	*End*
Dec 1999	Oct 2000

Database: None

Publication: Validation Report, Software User's Manual

Keywords: Government, Analysis, Life Cycle, Environment, Study

NAVAIR–11

Title: Analysis of Alternatives (AOA) Evaluation Tool

Summary: AIR 4.2.4 Weapons Division continues its involvement in the formal AoA process and other analysis evaluating alternatives for weapon systems. The number of alternatives in an analysis is not set by policy, but typically ranges from a few to many (5 to 20). The AoA Evaluation Tool is an Excel-based tool used to organize and standardize the process used in the evaluation of each alternative. The tool assists the analyst in normalizing data for inflation, quantity, and learning and rate improvement curves.

Classification: Unclassified

Sponsor: Various

Naval Air Warfare Center—Weapons Division
China Lake, CA 93556

Performer: Naval Air Warfare Center—Weapons Division
China Lake, CA 93556

Resources:

FY	*Dollars*	*Staff-years*
1999	$150,000	1.0 MMC
1999	$200,000	1.4 JDAM PIP

Schedule:

Start	*End*
Aug 1999	Sep 2000 MMC
Oct 1999	Aug 2000 JDAM PIP

Database: None

Publication: Cost Analysis section of technical report.

Keywords: Government, Analysis, Weapon Systems, Mathematical Model

NAVAIR–12

Title: Missile Database

Summary: This task is to develop a PC-based relational database to store unclassified missile data. Actual cost, programmatic, and technical data will be included. The ability to query the database will be built into the system. This effort involves the collection of data and

costs necessary to build more detailed cost estimating relationships (CERs) that can be used to provide both data and estimating support to NAVAIR 4.2 analysts.

Classification: Unclassified

Sponsor: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Performer: Naval Air Warfare Center—Weapons Division
Cost Analysis Department
China Lake, CA

Resources:

FY	*Dollars*	*Staff-years*
1999	$87,000	.8
2001	$75,000	.7
2002	$75,000	.7
2003	$75,000	.7
2004	$75,000	.5

Schedule:

Start	*End*
Nov 1999	Sept 2004

Database: *Title:* Missile Database

Description: Missile cost, technical, and programmatic data.

Automation: Microsoft ACCESS application

Publication: Functional Requirements, System Specifications

Keywords: Government, Missiles, Data Collection, Database, CER

NAVAIR–13

Title: Cost Risk Methodology/Model

Summary: A methodology for quantifying technical, schedule and cost estimating risk is being developed. The methodology will address the major risk drivers specific to a particular program. It will also consider the cost growth experienced on historical programs. The cost risk methodology will be integrated with the NAVAIR Risk Management process.

Classification: Unclassified

Sponsor: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Performer: NAVAIR and Northrop Grumman/TASC

Resources

FY	*Dollars*	*Staff-years*
2000	$70,000	.5
2002	$90,000	1.0
2003	$90,000	1.0

Schedule:

Start	*End*
Apr 2001	Sept 2003

Database: Cost Growth Database will support Cost Risk Model.

Publication: Technical Report

Keywords: Government, Analysis, Aircraft, Risk/Uncertainty, Method

NAVAIR–14

Title: Software Cost and Schedule Estimating - SBIR (Small Business Innovative Research) N01-020 Phase II

Summary: Effort to develop next generation of software cost and schedule estimating models and algorithm's for all phases of the life cycle. Emphasis is on methods that yield increased accuracy, easier use, and enhancements to the ability of the models to justify the results and thus increase the results believability to the decision maker. There are two independent developers working on separate implementations of this effort.

Classification: Contractor Sensitive, although the Government will have data rights to the product

Sponsor: NAVAIR
21491 Great Mills Rd.
Lexington Park, MD 20653

Performer: Galorath, Inc.
100 North Sepulveda Blvd Suite 1801
El Segundo, CA 90245

Technomics, Inc.
5290 Overpass Rd Suite 206
Santa Barbara, CA 93111-2051

Resources N68335-02-C-0385, $1,124,765.73—Galorath
N68335-02-C-0386, $1,120,137—Technomics

Schedule:

Start	*End*
May 2002	May 2004—Galorath
Feb 2002	Feb 2004—Technomics

Database: None

Publication: Technical Report

Keywords: Government, Estimating, Life Cycle, Software, Mathematical Model

NAVAIR–15

Title: Installation Optimization and ECP/Modification Cost Trade-off Model

Summary: The model was developed in response to requirements identified by the Installation/Modification and ECP Business Process Reengineering (BPR) Teams. Specifically, the model helps users to develop optimal kit acquisition and installation plans (Installation Optimization Module) or to evaluate the potential cost avoidance of a proposed ECP or modification (ECP/Modification Cost Trade-off Module). The model was created primarily because there was no standard method for estimating the life cycle costs of ECPs, modifications, or OSIPs. Potential users include APMLs, Configuration Managers, Fleet Support Team members, Budget Analysts, Supply Managers, and Cost Analysts. The final operational model will be completed by the end of FY03.

Classification: Unclassified

Sponsor: NAVAIR (AIR 1.0; 3.1.8; and 4.2)
21491 Great Mills Rd.
Lexington Park, MD 20653

Performer: Ketron

Resources

FY	*Dollars*
2001	$175,000
2003	$100,000

Schedule:

Start	*End*
Feb 2001	Jul 2001—Prototype
Sep 2001	Jul 2002—Draft Operational
Apr 2003	Sep 2003—Final Operational

Database: None

Publication: User Manual/Technical Report

Keywords: Government, Estimating, Modification, Mathematical Model

NAVAIR–16

Title: Aircraft Integration & Certification Cost Model

Summary: The work in the aircraft integration area consisted of developing a database and cost estimating relationships (CERs) to estimate the development and production costs of aircraft integration programs. The final product will be a PC-based software cost model containing all of the data and equations necessary for a cost analyst to estimate the costs of a Navy aircraft integration project. The software will contain five modules which address specific blocks of aircraft integration and certification considerations including: (1) Contractor Platform Integration; (2) Software Development; (3) Government Development Test and Support; (4) Government Airworthiness Test and Support; and (5) Weapon Integration. Cost analysts and program managers within Navy program offices will use this model to develop early estimates of aircraft integration projects and to help establish budgets for these projects. Commercial applications of this model include use by the prime contractors responsible for performing the aircraft integration work.

Classification: Unclassified

Sponsor: NAVAIR (AIR 4.2)
21491 Great Mills Rd.
Lexington Park, MD 20653

NAVAIR (AIR 4.5)
21960 Nickles Road, Hanger 201
Lexington Park, MD 20670

Performer: Technomics, Inc.

Resources:

FY	*Dollars*	*Staff-years*
2000	$40,000	0.3
2001	$223,000	1.7
2002	$240,000	1.8
2003	$240,000	1.8

Schedule:

Start	*End*
Jun 2000	Jun 2003

Database: None

Publication: Technical Report

Keywords: Government, Aircraft, SD&D, Production, Integration, Data Collection, Database, CER

Naval Sea Systems Command (NAVSEA)

Name:	Cost Engineering and Industrial Analysis Division, Comptroller Directorate Naval Sea Systems Command (SEA 017)
Address:	1333 Isaac Hull Ave., SE, Washington Navy Yard, DC 20376-1340
Director:	Barbara A. Young, (202) 781-0959
Size:	Professional: 51 Support: 1 Consultants: 0 Subcontractors: 4 collocated or 30 total
Focus:	O&S Cost Estimating; Total Ownership Cost Estimating; Commonality and Standardization of Ship Design and Construction Processes and of Ship Components or Sub-assemblies (impact on acquisition and O&S costs); Build Strategy Impact on Ship Costs; Ship Design Trade-Off Analysis Tools; Ship and Weapon System Cost Modeling
Activity:	Number of projects in process: 3 Average duration of a project: 2.2 years Average number of staff members assigned to a project: 1 Average number of staff-years expended per project: 1/2 Percentage of effort conducted by consultants: 0% Percentage of effort conducted by subcontractors: 90%

NAVSEA–1

Title: Material Vendor Survey

Summary: The objective of this annual survey is to capture future price trends and last year's actual price change for material used in Navy ship construction. The survey samples over 900 shipboard material and equipment suppliers, requesting their price changes for the current year and their projections of future price changes for the next five years. The results are grouped according to Ship Work Breakdown Structure (SWBS) Cost Groups 1-9, and indices are calculated.

Classification: Unclassified

Sponsor: NAVSEA (SEA 017C)
1333 Isaac Hull Ave., SE
Washington Navy Yard, DC 20376-1340

Morris Fields, (202) 781-2709; DSN: 326-2709

Performer: Naval Shipyard Norfolk Detachment
NAVSEA Shipbuilding Support Office
3751 Island Avenue, 3rd Floor
Philadelphia, PA 19153

Joe Neumann (215) 365-5767, ext 218

Resources:

FY	*Dollars*	*Staff-years*
Each year	$125,000	

Schedule:

Start	*End*
Oct each year	Sep each year

Database: End use is MATCER Data File update. Backup data is maintained at NAVSHIPSO.

Publications: None

Keywords: Industry, Estimating, Ships, Material, WBS, Economic Analysis, Survey

NAVSEA–2

Title: PEO-SHIPS Technology Refresh Cost Model

Summary: Under NAVSEA policy and guidance for commercial and non-developmental item selection, acquisition, integration, and life cycle support, modeling plays a critical part in planning and budgeting. The objective of this cost research initiative is to adapt existing processes employed by NAVSEA Crane in commercial technology management to determine when and how often to conduct technology refreshes to ship's systems. Those processes use models of engineering activity associated with a technology refresh change and the labor and material costs at various levels of detail. The model helps to predict when various commercial parts will change and calculates when to make bridge buys to support the items through planned technology refreshes. The cost model has been updated with additional sets of program process flows, additional charting and data output options. Currently the model is being revised to include assessment of non-commercial components as candidates for commercial technology insertion initiatives, and is currently being migrated to a web-based application. The program is also incorporating a process for development of FYDP estimates for technology improvements and refresh initiatives, addressing total ownership costs for trade-off analysis of each initiative.

Classification: Unclassified

Sponsor: Department of the Navy
Program Executive Office Ships
1333 Isaac Hull Ave., SE
Washington Navy Yard, DC 20376

Performer: Naval Sea System Command
Crane Division (Code 604)
300 Hwy 361
Crane, IN 47522-5060

Resources:

FY	*Dollars*
1999	$200,000
2000	$100,000
2001	$250,000
2002	$285,000
2003	$285,000
2004	$150,000

Schedule:

Start	*End*
Oct 1998	Oct 2005

Database: A database of commercial product supportability factors is used to provide key elements used by the cost model. The database is in Microsoft SQL Server format and accessed via a Visual Basic interface. It is available through a local area network at NAVSEA Crane.

Publications: None to date

Keywords: Government, Estimating, Budgeting, Ships, Weapon Systems, Electronics/Avionics, SD&D, Production, Operations and Support, Labor, Material, Engineering, Acquisition Strategy, Risk/Uncertainty, Sustainability, Modification, Data Collection, Survey, Database, Computer Model

NAVSEA–3

Title: NAVSEA Cost Estimating Handbook

Summary: The NAVSEA Cost Estimating Handbook was originally prepared in 1986 and updated in August 2002. The handbook has provided a ready reference to NAVSEA cost estimating personnel, particularly in new construction ship cost estimating practices. As an adjunct to other command and division efforts in defining cost engineering as an integral component of command technical authority policy the Cost Estimating Handbook is being updated. This update will include incorporating new or expanding subject areas such as weapons and combat system costing, software estimating, integration costs, and risk and reserve analysis. The revision will also include information on internal processes such as workload analysis, labor and overhead rates, inflation, and other economic analyses. The completed handbook will provide a user-friendly guide that is useful to both new users and experienced cost estimators.

Classification: Unclassified

Sponsor: Department of the Navy
Naval Sea Systems Command (SEA 017)
1333 Isaac Hull Ave., SE
Washington Navy Yard, DC 20376

Performer: Naval Sea System Command
Cost Engineering and Industrial Analysis Division (SEA 017)
1333 Isaac Hull Ave., SE
Washington Navy Yard, DC 20376

Booze Allen Hamilton, Inc.
1725 Jefferson Davis Highway
Arlington, VA 22202

Resources:

FY	*Dollars*	*Staff-years*
2004	$262,000	1 man-year

Schedule:

Start	*End*
Apr 2004	Oct 2004

Database: None

Publications: None to date

Keywords: Government, Estimating, Analysis, Policy, Budgeting, Ships, Weapon Systems, Electronics/Avionics, SD&D, Production, Operations and Support, Life Cycle, Labor, Material, Overhead/Indirect, Engineering, CPR/CCDR, WBS, Acquisition Strategy, Risk/Uncertainty, Schedule, Software, Modification, Data Collection, Survey, Mathematical Modeling, Economic Analysis, Statistics/Regression, Database, Mathematical Model, Computer Model, CER

Naval Surface Warfare Center, Dahlgren Division (NSWCDD)

Name:	Cost & Affordability Branch, Code T51 Warfare Analysis Division, Code T50 Naval Surface Warfare Center, Dahlgren Division (NSWCDD)	
Address:	17320 Dahlgren Road, Dahlgren, VA 22448-5100	
Director:	Amanda Cardiel	
Size:	Professional:	15
	Support:	1
	Consultants:	0
	Subcontractors:	0
Focus:	The Cost and Affordability Branch resides within the Integrated Warfare Systems Department at NSWCDD. The branch is responsible for providing cost estimation, budget and affordability analysis, and methodology development in support of system development programs, analyses of alternatives, and strategic planning. Particular areas of expertise and emphasis include developing and maintaining models, databases, and procedures for performing these functions, technology assessments, life cycle cost estimates, budget and force-level analyses, performance-based cost models, and product-oriented cost models. The current focus of the NSWCDD cost research program this year is working closely with MDA to developing top level models for complex surface navy radar and missile systems during the development and production phases of a program.	
Activity:	Number of projects in process:	2
	Average duration of a project:	2 years
	Average number of staff members assigned to a project:	2
	Average number of staff-years expended per project:	1
	Percentage of effort conducted by consultants:	
	Percentage of effort conducted by subcontractors:	100%

No summaries submitted.

Naval Surface Warfare Center, Carderock Division (NSWCCD)

Name:	Systems Engineering and Analysis Department, Code 21 Cost and Economic Analysis Office, Code 211 Naval Surface Warfare Center, Carderock Division
Address:	9500 MacArthur Boulevard, West Bethesda, MD 20817-5000
Director:	Scott "Gus" Gustavson, (301) 227-5479 E-mail:gustavsonse@nswccd.navy.mil
Size:	Professional: 16 Support: 1 Consultants: 0 Subcontractors: 4
Focus:	The Cost and Economic Analysis Office provides cost estimating support, performs budget and affordability analysis, provides support for analyses of alternatives, and performs cost model research and development. Particular areas of expertise and emphasis include developing and maintaining models, life cycle cost estimates, operating and support cost estimates, independent cost estimates, technology assessments, performance-based cost models, and product-oriented cost models. Recent projects are tending more toward support of major acquisition programs for NAVSEA, and Independent Cost Estimates for NCAD, rather than research oriented.
Activity:	Number of projects in process: 10 Average duration of a project: 2 Average number of staff members assigned to a project: 2 Average number of staff-years expended per project: 4 Percentage of effort conducted by consultants: 0% Percentage of effort conducted by subcontractors: 20%

NSWCCD–1

Title: Flexible Tool for Assessing Ship Cost (Flex-TASC)

Summary: A spreadsheet tool that combines two NSWC-CD developed models: Model for Assessing Cost of High Speed Ships (MACHSS) and Small Boat Performance Based Cost Model (Small Boat PBCM). For small high-speed ships, it: predicts unit production costs reasonably well for early-design tradeoffs, produces repeatable output, and provides costing method flexibility and promotes configuration control. It allows ship designers to receive real-time cost feedback for design trade-off decisions.

Classification: Unclassified

Sponsor: NSWC-CD Innovation Cell for High Speed Small Naval Combatants
West Bethesda, MD

Kelly Malkin (301) 227-0293

Performer: Kelly Malkin (301) 227-0293

Resources:

FY	*Dollars*	*Staff-year*
2003	$40,000	0.25
2004	TBD	TBD

Schedule:

Start	*End*
FY03	Ongoing

***Database**:* Resident within cost model

Publications: None

Keywords: Government, Estimating, Ships, Mathematical Model

Air Force Cost Analysis Agency (AFCAA)

Name:	Air Force Cost Analysis Agency
Address:	1111 Jefferson Davis Highway, Suite 403, Arlington, VA 22202-4306
Director:	Mr. Richard Hartley, (703) 697-5311 Mr. Jay Jordan, Technical Director, (703) 604-0400 Ms. Deborah Cann, Research Chief, (703) 604-0402
Size:	Professional: 51 (authorized); 46 (assigned) Support: 7
Focus:	The Air Force Cost Analysis Agency supports the Air Force by providing thorough, effective independent cost analyses and special studies in support of weapon system programs. We provide quality analyses through research to develop superior analytical tools, models and databases.
Activity:	Number of projects in process: 17 Average duration of a project: 1 year Average number of staff members assigned to a project: 1 Average number of staff-years expended per project: 0.37 Percentage of effort conducted by consultants: 100% Percentage of effort conducted by subcontractors: 0%

AFCAA–1

Title: ACE-IT Enhancements

Summary: ACE-IT
The purpose of this project is to continue to upgrade the capabilities of ACE-IT. Current enhancements will include narrative reporting improvements, a variable pick list and integration with Word providing a simplified method for creating custom user narrative templates along with an interface to easily interact with ACE for definition edits. FY04 efforts will continue to improve the narrative report creation process by automatically directing the narrative report session back into the ACE session.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Ms. Janice Hughes, (703) 602-8148; DSN 332-8148
E-mail: Janice.Hughes@pentagon.af.mil

Performer: Tecolote Research, Inc.

Resources:

	FY	Dollars
Enhancements	93-95	$646,000
Enhancements	96-98	$410,000
Enhancements	99-02	$$15,000
Enhancements	03	$125,000
Enhancements	04	TBD

Schedule:

	Start	End
Enhancements	Jan 93	Complete
Enhancements	Oct 98	Jan 05

Database: N/A

Publications: ACE-IT user manuals and supporting documentation

Keywords: Industry, Government, Analysis, Estimating, Aircraft, Airframe, EMD, Production, Life Cycle, Database, Method, Computer Model

AFCAA–2

Title: Military Aircraft Data and Retrieval (MACDAR) System Update

Summary: The objective of this project is to normalize and fully document Air Force and Navy cost and technical data. The database will be flexible enough to allow for either an analogy-based or CER-based approach for both recurring and non-recurring costs of aircraft systems. The database contains documented functional hourly and cost information as well as technical information for each hardware WBS element and purchased equipment. Throughout the effort, data is being added to repair holes in the material costs of various aircraft and ensure the material costs are accurate and complete. FY03 effort focused on collecting and normalizing F-22 and F/A-18E/F, providing learning curve analysis on F/A-18 and F-15, collecting Price Bill of Material cost data and providing verification and validation of old platforms. FY04 effort focuses on including production cost data on the F/A-18 E/F and the F/A-22 as it becomes available. Additionally research will be done on two new platforms, the C-17 and the V-22 to determine if there is sufficient and credible data to develop new MACDAR databases in FY04. Finally, effort will continue on updating the MACDAR Data Dictionary, initiated in FY03.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Ms. Janice Hughes, (703) 604-8148; DSN 664-8148
E-mail: Janice.Hughes@pentagon.af.mil

Performer:

Phase I	RAND
Phase II	Tecolote Research Inc.
Phase III-VIII	Naval Air Systems Command

Resources:

	FY	*Dollars*
Phase I	93	$100,000
Phase II	96	$225,000
Phase III	97	$25,000
Phase IV	99	$80,000
Phase V	00	$120,000
Phase VI	01	$119,000
Phase VII	02	$100,000
Phase VIII	03	$126,000
Phase IX	04	$120,000

Schedule:

Start	*End*
Phase I-VIII	Complete
Phase IX	Dec 04

Database: Excel (pivot tables)

Publications: Written report and data dictionary.

Keywords: Government, Analysis, Estimating, Aircraft, Airframe, EMD, Production, Labor, Material, Data Collection, Database

AFCAA–3

Title: Air Force Total Ownership Cost (AFTOC) Management Information System

Summary: AFTOC is an unclassified management information system that receives data from many Air Force legacy data systems and produces consistent and reliable information about Air Force weapon systems and infrastructure. Mission costs are reported by system (aircraft,

space systems, munitions, and some C3I) while infrastructure costs can be viewed by functional category (supply operations, mission operation, MILCON, etc.). Additionally, supply transaction detail (National Stock Number, MSD and GSD) is available for major aircraft and space systems as well as for many subsystems. Munition and small missile expenditure costs can also be found in AFTOC. Cost detail can be found by program element, appropriation, EEIC, and RC/CC to name a few. For registered users, standard data products are available on the AFTOC web site and a user accessible multidimensional database can be reached through CITIRX. The registration page can be found at https://aftoc.hill.af.mil. Current development activities include completion of the back-end reengineering and the fielding of a new front-end user interface called COGNOS.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Force Analysis Division
Mr. Scott Belford, (703) 604-0462; DSN: 664-0462
E-mail: scott.belford@pentagon.af.mil

Performer: Battelle Memorial Institute, Northrop Grumman--TASC, and OO-LC/MASMC

Resources:

	FY	*Dollars*
Phase I	98	$2.0M
Phase II	99	$3.9M
Phase III	00	$3.7M
Phase IV	01	$3.6M
Phase V	02	$3.3M
Phase VI	03	$3.0M
Phase VII	04	$2.9M

Schedule:

	Start	*End*
Initial Development	Dec 97	Complete
Validation	Oct 00	Complete
Expansion	Oct 01	Complete
Reengineering	Oct 02	Sep 03
Revalidation	Dec 03	Sep 04
Enhancements	Oct 04	Sep 05

Database: SQL Server 2000

Publications: Metadata files.

Keywords: Government, Reviewing/Monitoring, Aircraft, Space Systems, Missiles, Operations and Support, Data Collection, Database, Infrastructure, Logistics, Computer Model

AFCAA–4

Title: Air Force Inflation Model and Tutorial

Summary: This tool is used throughout the Air Force for making inflation conversion calculations and instructing personnel in the principles of inflation. It supports all cost analysis activities in AFCAA including aircraft weapon systems, computer, command and control, missile and munitions weapon systems, and space systems. A custom generator report feature and update to the tool for new inflation indices is contained in the model. The FY03 effort updated the annual inflation indices as well as supported upgrades in Microsoft Windows and Excel. In FY04 the requirement will update the inflation indices as well as revise programming as necessary for compatibility with current updates of Excel and Microsoft Office. Development will continue modifying the inflation tool to support custom report generating capabilities.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research & Resource Management Division
Mrs. Lynn Davis, (703) 604-0451; DSN 664-0451
E-mail: Lynn.Davis@pentagon.af.mil

Performer:

FY 97-98	TASC
99-03	Center for Systems Management, Inc.

Resources:

FY	*Dollars*
97	$41,000
98	$46,000
99	$20,000
00	$16,000
01	$16,000
02	$25,000
03	$16,000
04	$25,000

Schedule:

Start	*End*
Oct 96	On-going

Database: Excel

Publications: N/A

Keywords: Government, Estimating, Analysis, Database, Mathematical Modeling, Computer Model

AFCAA–5

Title: Aircraft Avionics Systems Database and Study

Summary: The objective of this effort is to develop an avionics database that will provide cost estimating relationships for both federated and next-generation integrated avionics systems and making a bridge between those systems. An extensive data collection effort was accomplished and data was updated. The contractor developed a supportable methodology to estimate integrated avionics systems through CERs supporting the development, production and integration phases of systems. FY03 validated and normalized data and attempt to provide CERs and technical consulting for estimating the rapidly changing acquisition costs of avionics programs. The contractor identified discrepancies between the WBS used to map the data to the database common work breakdown structure and the WBS of historical systems added to the database. The contractor provided hands-on training to government analysts on the use of the database.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research & Resource Management Division
Mrs. Lynn Davis, (703) 604-0451; DSN 664-0451
E-mail: Lynn.Davis@pentagon.af.mil

Performer: Tecolote Research, Inc.

Resources:

FY	*Dollars*
99	$212,000
00	$125,000
01	$100,000
02	$137,000
03	$89,600

Schedule:

Start	*End*
Mar 99	Complete
Mar 00	Complete
Mar 01	Complete
May 02	Complete
Jul 03	Jul 04

Database: Excel

Publications: Final Report

Keywords: Government, Analysis, Electronics/Avionics, EMD, Production, Labor, Material, Data Collection, Database

AFCAA–6

Title: Performance Activated COTS Electronics Relationships (PACER) (Formerly COTS Electronics Database/Modeling)

Summary: The Performance Activated COTS Electronics Relationships (PACER) Model is a series of cost estimating relationships that enable cost analysts to estimate commercial-off the-shelf (COTS) electronics prices using key performance characteristics. The model provides CERs for data/signal processor boards, memory boards, analog to digital and digital to analog converter boards, serial input/output boards, digital input/output boards, receiver boards, signal/waveform generator boards, 1553 data bus boards, backplanes, power supplies, enclosures, electronic storage devices, servers, workstations, routers, hubs, switches, inertial measurement units, and batteries. The performance characteristics used as independent variables vary depending on the CER but may include processor capability metrics, memory and type of memory, board size, sampling rates, year on market, number of channels, rate, revolutions per minute, watts, temperature range, radiation hardening, vibration, shock, and many other continuous and discrete variables. The data set underpinning the equations range in size depending on the CER, but can include over a thousand distinct boards, in the case of the data/signal processor CER. The CERs are incorporated into a graphic user interface (GUI) that uses Visual Basic programmed into an Excel spreadsheet. The GUI greatly simplifies the use of the CERs and assists the user in developing inputs for the model. The model also provides an Internet Explorer-based help file that explains each of the CER inputs in greater detail. Applications include virtually all electronics systems that use commercial-off-the-shelf electronic boards, including avionics, AIS/C3I systems, and space-based electronics. New types of equipment will be included in the database for CER development based on user demand and funding support by the user. In addition to the routine technical and management services necessary to support, maintain, and enhance the model, additional tasks to be accomplished during FY04 are course preparation and classroom training and dedicated technical assistance on CCAs.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Ms. Janice Hughes, (703) 602-8148; DSN 332-8148
E-mail: Janice.Hughes@pentagon.af.mil

Performer: Mission Research Corp. (MRC)

Resources:

FY	*Dollars*
99	$ 80,000
00	$ 17,000
01	$225,000
02	$344,000 (AF, Army & Navy)
03	$145,000 (AF)
04	TBD

Schedule:

Start	*End*
Sep 99	Complete
Mar 02	Complete
Sep 02	Sep 03
Sep 03	Sep 04

Database: Excel

Publications: Final Report

Keywords: Government, Estimating, Analysis, Life Cycle, Data Collection, Database, Mathematical Modeling, Statistics/Regression, CER, Computer Model

AFCAA–7

Title: Cost Factor Model Support

Summary: The purpose of this project is to support the development of the Air Force Planning Projection model outlining the future force structure using Total Ownership Cost models on 50+ weapon systems. The three primary objectives of this effort are creating a single electronic data repository for storing the annual cost information published in Air Force Instruction (AFI) 65-503 and the data used as inputs to AFCAA cost models; creating the capability for automatic generation of reimbursement rates and updates to AFCAA cost models using the data stored in the repository; and maintaining and updating the Cost Per Flying Hour application. FY03 tool development captured AFI 65-503 revisions. The FY04 effort will develop a methodology to adjust CPFH data for wartime/contingency effects. It updates and continues the physics-based model started in FY03 to add additional wartime data from the Iraq crisis and to refine the methodology.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Mr. John Wallace (703) 692-6002; DSN: 222-6002
E-mail: John.Wallace@pentagon.af.mil

Performer:

FY01	Center for Systems Management, Inc. (CSMI)
FY03	Battelle

Resources:

FY	*Dollars*
01	$150,900
02	$150,000

Schedule:

Start	*End*
Nov 00	Complete
Feb 02	Complete

Database: AFTOC, REMIS and PDS

Publications: Draft Study/Annotated Briefing/Reports

Keywords: Government, Aircraft, Life Cycle, Spares/Logistics, Method

AFCAA–8

Title: Aircraft and Aircraft Modification Sufficiency Review Handbook

Summary: The objective of this project is to update the Air Force Cost Analysis Agency (AFCAA) resources and guidelines for performing sufficiency reviews of Analyses of Alternatives (AoAs), Program Office Estimates (POEs), and any other items requiring a sufficiency review by creating a handbook and providing cost analysis assistance. The FY03 effort focused on data collection, documentation and metrics that could be used to crosscheck estimates for aircraft and aircraft modification programs. The FY04 effort focuses on suggesting estimating approaches, providing background information and programmatics on aircraft systems and sensitizing analysts to key estimating issues.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Mrs. Lynn C. Davis, (703) 604-0451; DSN 664-0451
E-mail: Lynn.Davis@pentagon.af.mil

Performer: RAND

Resources:

FY	*Dollars*
01	$175,000
02	$175,000

Schedule:

Start	*End*
Apr 01	Complete
Jun 02	May 04

Database: Access/Excel

Publications: User Handbook

Keywords: Government, Estimating, Analysis, Electronics/Avionics, Modification, Risk/Uncertainty, EMD, Aircraft, Production, WBS, CER, Cost Progress Curve, Methodology, Statistics/Regression, Data Collection

AFCAA–9

Title: Long-Range Planning Cost Analytical Support

Summary: The objective of this task is to provide skilled analytic support services to assist with projecting long term financial requirements including the assessment of acquisition, direct mission and indirect support costs. Iterations update and expand the long-range planning models for the Air Force Capability Investment Strategy (AFCIS). The FY03 effort included a C-17 Cost Benefit Analysis Sufficiency Review. The FY04 effort while supporting the Air Force Capabilities Investment Strategy (AFCIS), force structure roadmaps, weapon system recapitalization studies, sufficiency review of weapon system O&S estimates, building of models/databases and conducting "what-if" analysis also includes on-site support as required.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Mr. John Wallace, (703) 692-6002; DSN 222-6002
E-mail: John.Wallace@pentagon.af.mil

Performer: SAIC – FY02
LMI – FY03-FY04

Resources:

FY	*Dollars*
02	$150,000
03	$205,000
04	$213,000

Schedule:

Start	*End*
Mar 02	Complete
Jan 03	Jan 04
Jan 04	Jan 05

Database: AFTOC

Publications: Draft Study/Annotated Briefing/Reports

Keywords: Government, Analysis, Spares/Logistics, Life Cycle, Sustainability, Data Collection, Database

AFCAA–10

Title: USCM/PSCM Unmanned Space Cost Model and Passive Sensor Cost Models

Summary: The purpose of this project is to collect data for estimating space sensor payloads (passive sensors, e.g., infrared) and estimate the cost of a spacecraft and a communication payload at the subsystem and component level. Sensor data collection will be at the subsystem level. These two models will be integrated into one model. The model will retain the name of Unmanned Space Cost Model.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Ms. Janice Hughes, (703) 602-8148; DSN 332-8148
E-mail: Janice.Hughes@pentagon.af.mil

Performer: Tecolote Research Corporation

Resources:

FY	*Dollars*
02	$100,000
03	$62,000
04	$400,000

Schedule:

Start	*End*
Jun 02	Dec 02
Mar 04	Mar 05

Database: Access/Excel

Publications: Final Report

Keywords: Government, Estimating, SD&D, Space Systems, Electronics/Avionics, Production, WBS, CER, Statistics/Regression, Database, Data Collection, Mathematical Model

AFCAA–11

Title: Develop CPFH Contingency Calibration Factors

Summary: The FY02 objective of the project was to develop CPFH factors that represent Contingency operations; and develop the capability to normalize historical data that reflects contingency operations to a peacetime scenario. This study funds cost factors as well as the development of marginal cost factors that measure the incremental costs in weapon system changes. In FY03 analytical support developed contingency calibration factors models for all aircraft/command combinations that participated in contingencies since September 11, 2001. The calibration models addressed separately DLRs and GSD consumption. In FY04 this effort will add anticipated wartime data from the Iraq crisis and refine the methodology as well as develop a method to forecast spares CPFH in an anticipated contingency.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Mrs. Lynn Davis, (703) 604-0451; DSN 664-0451
E-mail: Lynn.Davis@pentagon.af.mil

Performer: LMI

Resources:

FY	*Dollars*
02	$80,000
03	TBD

Schedule:

Start	*End*
Mar 03	Mar 04

Database: Access/Excel

Publications: Final Report

Keywords: Government, Estimating, Analysis, Life Cycle, Statistics/Regression, Data Collection, Database, Mathematical Modeling, Method, CER, and Computer Model.

AFCAA–12

Title: Enhanced Methods Based on Contract Price Data (Formerly Firm Fixed Price Contract Study)

Summary: The objective of the project is to make recommendations on approaches to estimate costs and prices for follow-on Firm Fixed Price (FFP) production contracts (whether sole source or competitively awarded follow-on efforts) based on validated historical contractual information from Engineering Manufacturing Development (EMD) contracts and Production contracts with options. The FY04 effort will include an effort to estimate costs and prices on Engineering Change Orders on contracts.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Mrs. Lynn Davis, (703) 604-0451; DSN 664-0451
E-mail: Lynn.Davis@pentagon.af.mil

Performer: Technomics

Resources:

FY	*Dollars*
02	$99,000
04	TBD

Schedule:

Start	*End*
Sep 02	Sep 03

Database: Access/Excel

Publications: Final Report

Keywords: Industry, Estimating, Analysis, Life Cycle, Data Collection, Database, Mathematical Modeling, Statistics/Regression, Method, CER

AFCAA–13

Title: Space Systems Software Database (S3DB)

Summary: Space Systems Software Database (S3DB) is currently under development. The database will include the historical software data for space systems to include both ground and space segments. The database is designed to be independent of software estimating tools so that it will support a variety of tools. The database content will include a program description, labor rates, software size, development environment, development effort, and schedule. A vigorous attempt will be made to collect data to support the study of significant software development issues such as size growth and achievable productivity.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Space Systems Division
Lt Col Thomas Mick, (703) 604-0460; DSN: 664-0460
E-mail: tom.mick@pentagon.af.mil

Performer: Software Technology Support Center, Hill AFB UT

Resources:

FY	*Dollars*
03	$0.4M

Schedule:

Start	*End*
Jun 03	Jun 04

Database: MS ACCESS

Publications: None

Keywords: Government, Space Systems, Software, Data Collection, Database

AFCAA–14

Title: Post Production Spares Prices Study

Summary: The object of this project is estimating future unit acquisition cost for spare parts when aircraft programs end the production phase is a considerable challenge for the cost estimator. Historically, future unit acquisition costs for spare parts increases significantly once an aircraft program ends the production phase. This research effort will quantify any increase in spare parts unit acquisition cost in the postproduction phase compared to the production phase. It will identify the most likely causes and cost drivers; then develop robust cost estimating relationships/models to quantify and predict future costs.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Forces Division
Lt Col Tom Lies, (703) 692-6014; DSN: 222-6014
E-mail: Thomas.Lies@pentagon.af.mil

Performer: TBD

Resources:

FY	*Dollars*
04 (Phase I)	$.098M

Schedule:

Start	*End*
Feb 04	Jan 05

Database: AFTOC/Other

Publications: Draft Study/Annotated Briefing/Reports

Keywords: Government, Aircraft, Spares/Logistics, Study

AFCAA–15

Title: Update CORE. SABLE/Contingency/LSC Models

Summary: Due to many of the key tools used by the AF for quick reaction studies, force structure analysis and Life Cycle Cost analysis having become outdated, this research will survey users to determine which models are still relevant, identify other models being used, select the best models and ensure they are consistent with the new OSD CAIG cost element structure and too other policy changes (e.g., WCF pricing) deemed relevant, and to update the databases within these models to the most current data.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Forces Division
Mr. John Wallace, (703) 602-6002; DSN: 222-6002
E-mail: John.Wallace@pentagon.af.mil

Performer: TBD

Resources:

	FY	*Dollars*
Phase I	04	TBD

Schedule:

Start	*End*
Feb 04	Jan 05

Database: AFTOC, PDS, REMIS

Publications: Draft Study/Annotated Briefing/Reports

Keywords: Government, Analysis, Aircraft, Life Cycle, Spares/Logistics, Database

AFCAA–16

Title: Initial Support Cost CERs

Summary: Develop a series of cost estimating relationships to estimate those logistics support elements that are generally non-recurring startup costs associated with establishing support capability. These are elements of cost that are normally paid for with procurement/development funds. They include such things as initial spares, support equipment, MILCON, training, depot activation, etc. These CERs would be used to estimate these elements early in a program and as a secondary check later in a program's cycle.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Forces Division
Mr. John Wallace, (703) 602-6002; DSN: 222-6002
E-mail: John.Wallace@pentagon.af.mil

Performer: TBD

Resources:

FY	*Dollars*
04	TBD

Schedule:

Start	*End*
TBD	TBD

Database: AFTOC and others

Publications: Draft Study/Annotated Briefing

Keywords: Government, Aircraft, Spares/Logistics, Operations and Support, CER

AFCAA–17

Title: Cost per Flying Hour Program Risk Model

Summary: Develop a methodology to assess the risk associated with AF corporate funding decisions for flying hour spares requirements (depot-level reparables and AF managed consumables) supporting the direct Air Force Flying hour program. The *Crystal Ball* risk model addresses the variability and uncertainty in CPFH projections, programmed and actual flying hours, forecast and actual price increases, and Working capital fund rate increases V. approved OSD inflation rates.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Forces Division
Maj Michael Welborn, (703) 692-6001; DSN: 222-6001
E-mail: Michael.Welborn@pentagon.af.mil

Performer: In-house

Resources:

FY	*Dollars*
04	N/A

Schedule:

Start	*End*
Oct 03	Mar 04

Database: AFTOC, REMIS, ABIDES, and PDS

Publications: Draft Study/Annotated Briefing/Reports

Categories: Aircraft weapon systems, depot-level reparables

Keywords: Government, Aircraft, Life Cycle, Spares/Logistics, Operations and Support, Risk/Uncertainty, Method

Aeronautical Systems Center, Air Force Material Command (ASC/FMC)

No input submitted.

Air Force Space and Missile Systems Center (SMC)

No input submitted.

Electronics Systems Center, Air Force Material Command (ESC/FMC)

No input submitted.

Department of Veterans Affairs (VA)

No input submitted.

UK Ministry of Defence, Pricing & Forecasting Group (PFG)

Name:	Pricing & Forecasting Group (PFG), Defence Procurement Agency	
Address:	Larch 1b #2109 MoD Abbey Wood Bristol BS 34 8JH UK	
Director:	Head of PFG – Mr. A. N. Pearse	
Size:	Professional: 58 Support: 4 Consultants: 0 Subcontractors: 8 Companies (>200 staff)	
Focus:	Tools & Techniques, EVM, Risk, PPP/PFI, Contract Pricing,	
Activity:	Number of projects in process:	80
	Average duration of a project:	8 Months
	Average number of staff members assigned to a project:	3
	Average number of staff-years expended per project:	0.5
	Percentage of effort conducted by consultants:	0
	Percentage of effort conducted by subcontractors:	<15%

PFG–1

Title: Software Support Cost Model Project (SSCMP)

Summary: The overall aim of the SSCMP is to develop a software package to enable procurers, managers and designers to estimate the cost of software support over the in-service life. A second version of the algorithms has been developed and a new web based tool delivered to users, together with the associated training. An update contract has been placed to provide data collection and a user help desk.

Classification: Unclassified

Sponsor: PFG UK MoD
Mr. C. Whittaker, 44 (0)117 91 34055

Performer: PFG & BMT Reliability Consultants – Fareham, UK

Resources:

FY	*Dollars*	*Staff-years*
99/01	$250,000	1.0
01/02	$40,000	0.5
02/03	$40,000	0.5
03/04	$75,000	0.75
04/05	$40,000	0.25

Schedule:

Start	*End*
Dec 95	Nov 04

Database: MS Excel and Access for data storage, Minitab for Analysis. Tool implemented in Java.

Publications: Various reports, presentations, user guides

Keywords: Government, Estimating, Operations and Support, Software, Computer Model

PFG–2

Title: Cost Engineering Capability Improvement Model to ISO 15 504 (CECIM+)

Summary: To aid our knowledge of Contractors Costing capability and to inform the risk process PFG sponsored the development of the European Aerospace Cost Engineering working group (EACE) maturity model to comply with ISO 15 504. A training programmer has been commissioned for Vorticity LTD to deliver PFG Lead Assessors. The CECIM model is made up of 3 domains (Engineering, Project and Organization) within these domains there are 19 key process areas that require assessment against the reference model. The level and scope of the assessment is set by the sponsor (the IPT) and will be driven by the project, with cradle to grave projects requiring a full assessment where as a follow on manufacturing project may only look at 8 process areas.

Classification: Method unclassified. Results are Restricted Commercial.

Sponsor: PFG Business Development
Mr. Terry Johns, PFG EngSt-A, 44 (0)117 91 34063

Performer: MoD in-house effort and Vorticity LTD, Chalgrove, Oxford, UK

Resources:

FY	*Dollars*	*Staff-years*
03/04	$50k	0.3
04/05	$30k	0.2

Schedule:

Start	*End*
Jan 04	Oct 04

Database: N/A

Publications: EACE White paper

Keywords: Government, Analysis, Method

PFG–3

Title: Family of Advanced Cost Estimating Tools (FACET)

Summary: These are a set of Top Down models that use sizing rules and Bayesian techniques to produce quick cost estimates of military platforms & equipments, results are display in relationship to historical values for similar family products.

Classification: Unclassified

Sponsor: PFG Business Development
Terry Johns, PFG EngST-A 44 (0)117 91 34063

Performer: PFG and HVR LTD Alton UK

Resources:

FY	*Dollars*	*Staff-years*
2004/05	$10k	.05

Schedule:

Start	*End*
On going	

Database: N/A

Publications: User Guide

Keywords: Government, Estimating, Weapon Systems, Mathematical Model

PFG–4

Title: Ship Platform Risk based Unit production Costing Estimates Model (SPRUCE)

Summary: The model is driven by Weight and Geometry and incorporates the principles of block coefficients and packing density, to produce man-hour and material estimates of the UPC and FOC for Naval vessels. The model has economic and production inputs and the

ability to spread costs and hours by financial years. The historical data set that drives the model can be can be overwritten with by man hour and material estimates from other models. The user can utilize the spend curves, learner rates, economic and production estimates to produce outputs for individual ships and total programmers costs. The model runs in Excel with riskHive's Arrisca software providing the risk engine.

Classification: Restricted Commercial with data set, Unclassified without data.

Sponsor: PFG Business Development
Terry Johns, PFG EngST-A 44 (0)117 91 34063

Performer: PFG in house

Resources:

FY	*Dollars*	*Staff-years*
2003/04	$50k	0.9

Schedule:

Start	*End*
May 03	May 04

Database: Arrisca for Risk cases

Publications: PFG report, User Guide

Keywords: Government, Estimating, Ships, Risk/Uncertainty, Mathematical Model

PFG–5

Title: Automatic Cost Resource and Data Integration Tool (A-CREDIT)

Summary: The overall aim of A-CREDIT is to provide a repository of cost model outputs in a form that provides non-modeling specialists with the facility to carry out 'what if' calculations and feed UK MoD's budget scheme. It aligns with the UK MoD's move to resource accounting and budgeting. There is a facility to link outputs to budget holders and resource types. A mapping facility allows various commercial and bespoke cost models to be imported and set against a standard cost breakdown structure

Classification: Restricted Commercial with data set, Unclassified without data

Sponsor: PFG Business Development
Terry Johns, PFG EngST-A 44 (0)117 91 34063

Performer: PFG and HVR LTD Alton UK

Resources:

FY	*Dollars*	*Staff-years*
04/05	$25k	.25

Schedule:

Start	*End*
On going	

Database: Access and Excel

Publications: handbooks, user guide, course work

Keywords: Government, Estimating, Analysis, Budgeting, Weapon Systems, Computer Model

PFG–6

Title: Operation and Support Cost Analysis Model (OSCAM) Land and Sea

Summary: This model was developed using a "system dynamic" approach and provides a structured methodology for dealing complex systems having many interacting components. The model provides the flexibility for fast, top-level estimating as well as a framework for analyzing possible policy decisions and their impact on cost and availability. The inclusion of availability within the model is crucial as cost reduction polices need to be fully analyzed in conjunction with their impact on equipment availability, and vice versa.

Classification: Restricted Commercial with data set, Unclassified without data

Sponsor:	PFG Business Development Terry Johns, PFG EngST-A 44 (0) 117 91 34063
Performer:	PFG and HVR LTD Alton UK
Resources:	*FY* *Dollars* *Staff-years* 04/05 £25k 0.1
Schedule:	*Start* *End* Ongoing
Database:	N/A
Publications:	Handbooks, model, Web site
Keywords:	Government, Estimating, Weapon Systems, Mathematical Model

Air Force Institute of Technology
School of Engineering and Management (AFIT/ENV)

No input submitted.

Defense Acquisition University (DAU)

Name:	Program Analysis & Evaluation (PA&E) Defense Acquisition University (DAU)	
Address:	Pentagon/Fort Belvoir, Virginia	
Director:	Dr. Rick Burke/Mr. Frank Anderson	
Size:	Professional: 3 Support: Consultants: 3 Subcontractors: 1	
Focus:	Research	
Activity:	Number of projects in process:	1–3
	Average duration of a project:	multi-year
	Average number of staff members assigned to a project:	3
	Average number of staff-years expended per project:	1
	Percentage of effort conducted by consultants:	20%
	Percentage of effort conducted by subcontractors:	10%

DAU–1

Title: Acquisition Strategy and Risk Management Methodologies for Aggregated Software-Intensive Systems

Summary: *Background*: The DoD has, and will continue to leverage the rapid evolution of information technology to provide overmatching combat capability to the warfighter, and thus will continue to invest in large-scale initiatives such as Army Battlefield Digitization. The Army Digitization effort, like many service battle management command, control, communications, and intelligence (BMC3I) efforts, is a "system of systems". The emerging importance of these aggregated systems, both in terms of the investment resources allocated to them, and the operational value of the functionality they provide, has prompted changes in the DoD's approach to managing them. In December 1998, DUSD (A&TL) directed the Army and OASD (C3I) to implement system of system oversight of the Army's Tactical Command and Control System (ATCCS), and to realign its constituent programs to facilitate management at an aggregate level.

Research Question: Is it possible to discern, from artifacts developed as a natural consequence of the requirements development, the Joint Capabilities Analysis, the interoperability analysis and systems architecture processes, the key attributes of contemplated systems-of-systems (SoS) that drive SoS cost, schedule, and acquisition risk?

Classification: Unclassified

Sponsor: Cost Analysis Improvement Group (CAIG)
Pentagon
Washington, DC

Performer: CAIG
Rob Flowe, (703) 692-8052, Robert.Flowe@osd.mil
Defense Acquisition University (DAU)
Bob Skertic, (703) 805-5281, Bob.Skertic@dau.mil
Martha Ann Spurlock, (804) 765-4234, spurlocm@lee.army.mil

Resources:

FY	*Dollars*	*Staff-years*
2004	$25,000	

Schedule:

Start	*End*
Oct 2003	Sep 2004

Database: None

Publications: Articles, Course Materials

Keywords: Government, Analysis, Weapon Systems, Risk/Uncertainty, Study

The Aerospace Corporation

Name:	Cost and Requirements Department, The Aerospace Corporation
Address:	2350 E. El Segundo Blvd., El Segundo, CA 90245 Mail: M4-021, P.O. Box 92957, Los Angeles, CA 90009-2957
Director:	Mr. Carl Billingsley Email: carl.d.bilingsley@aero.org (310) 336-0156
Size:	Professional: 1.5 Support: 1 Consultants: 1,000 Aerospace Corporation Engineers Subcontractors: 0
Focus:	Space-system cost modeling and estimating, Relationship between requirements and cost, Cost-risk Analysis, Commercial practices, Statistical issues in cost analysis, Schedule analysis, cost/schedule/performance/design/ architecture trade studies.
Activity:	Number of projects in process: 4 Average duration of a project: 1 year Average number of staff members assigned to a project: 2 Average number of staff-years expended per project: 1.0 Percentage of effort conducted by consultants (Aerospace Corp. engineers) 20% Percentage of effort conducted by subcontractors: 0%

AEROSPACE–1

Title: Cost of Technology IRAD

Summary: Aerospace has received many requests from its customers to evaluate the cost impact of technology alternatives when comparing configurations within its Concept Design Center (CDC). This project will help to provide higher resolution and more accurate answers with respect to cost for our customers. Work to be done this year includes: 1. Define a process for upgrading the CDC cost models with cost of technologies. 2. Survey customers and collect historical information to determine the key areas of technology that would be required for cost trade-offs in the CDC. 3. Perform a Pareto analysis to determine the highest utility for the time and funding invested to select a pathfinder technology to demonstrate the process. 4. Evaluate methods for generating cost databases and/or algorithms in support of the process. 5. Create a cost database and/or algorithms for the pathfinder technology selected in step 3 using Cost Estimating Relationships (CERs) or added factors to existing CERs.

Classification: Unclassified

Sponsor: The Aerospace Corporation, Internal Research and Development (IRAD)

Performer: Business and Operations Analysis and Electrical and Electronic Systems

The Aerospace Corporation
P.O. Box 92957
Los Angeles, CA 90009-2957
Mr. Melvin Broder, (310) 336-2567, melvin.a.broder@aero.org

Resources:	*FY*	*Dollars*	*Staff-years*
	01		
	02		
	03		
	04	$100K	0.7 MTS-years

Schedule:	*Start*	*End*
	Oct 03	Sept 04

Database: None

Publications: TBD

Keywords: Government, Estimating, Space Systems, C&TD, SD&D, Production, Advanced Technology, Data Collection, Survey, Computer Model, CER

AEROSPACE–2

Title: Small Satellite Cost Model (SSCM)

Summary: Funding provides continued maintenance of the Small Satellite Database with current missions and development of the Small Satellite Cost Model. This includes CER development, research into new methodologies, and implementation of the CERs into the computer model.

Classification: Unclassified

Sponsor: The Aerospace Corporation
2350 E. El Segundo Blvd.
El Segundo, CA 90245
Mr. Greg Richardson, (310) 336-6791

Performer: The Aerospace Corporation, Space Architecture Department and Cost and Requirements Department

Resources:	*FY*	*Dollars*	*Staff-years*
	02	3.0 MTS-months	
	03	2.5 MTS-months	
	04	4.0 MTS-months	

Schedule:	*Start*	*End*
	Ongoing	

Database: None

Publications: E. M. Mahr and G. G. Richardson, "Development of the Small Satellite Cost Model (SSCM) Edition 2002, *2003 IEEE Aerospace Conference*, Big Sky, MT, March 8–15, 2003.

Keywords: Estimating, Space System, C&TD, Data Collection, Mathematical Modeling, Computer Model, CER

The MITRE Corporation

Name:	The MITRE Corporation The Center for Acquisition and Systems Analysis (CASA)		
Address:	7515 Colshire Drive, McLean, Virginia 22102		
Director:	Howard Carpenter		
Size:	Professional:	175	
	Support:	7	
	Consultants:	0	
	Subcontractors:	0	
Focus:			
Activity:	Number of projects in process:		150+
	Average duration of a project:		4–6 months
	Average number of staff members assigned to a project:		
	Average number of staff-years expended per project:		
	Percentage of effort conducted by consultants:		0%
	Percentage of effort conducted by subcontractors		0%

MITRE–1

Title: Determining Information Management (IM) Return-on-Investment (ROI) – Innovation Grant (IG)

Summary: Because it is difficult to assess the economic implications of IM enhancements, investment decisions are frequently based solely upon anticipated operational improvements. Regulations and industry best practices strongly suggest that ROI analysis support IM investment decisions. The primary objective of this IG is to consider whether an ROI analysis methodology can be developed to support investment decisions related to a specific type of IM investments (i.e., information retrieval) that can be realistically applied by MITRE sponsors across a finite spectrum of IM operating environments at different stages of the investment lifecycle.

If this investigation determines that development and wide-spread adoption of an ROI analysis methodology for information retrieval (IR) initiatives is feasible and would be significantly valuable for government agencies, then an extensive MITRE-sponsored research (MSR) investigation will be proposed to refine the ROI analysis methodology. Two case studies are being conducted as part of the IG, including one for MITRE's Knowledge Zone investment (a topic-based information search/retrieval capability) and one for the intelligence community.

Classification: Unclassified

Sponsor: MITRE R&D – Innovation Grant

Performer: Kevin S. Buck, CASA Lead Staff, (937) 859-1192, kbuck@mitre.org

Resources:

FY	*Dollars*	*Staff-years*
04	$25,000	1.75 staff months

Schedule:

Start	*End*
Jan 04	Jun 04

Database:

Publications: Final product will be a MITRE Technical Report

Keywords: Government, Analysis, Infrastructure, Life Cycle, Acquisition Strategy, Case Study, Economic Analysis, Method, Study

MITRE–2

Title: Software Engineering Economics and Best Practices of Internet based Software Developments

Summary: Acquisition reform has forced a paradigm shift from traditional, stand-alone applications to software development technologies such as Web-based, COTS-intensive and object-oriented design. Prior to this shift, cost analysts benefited from in-depth research into traditional developments. Similarly, rigorous research has not been conducted for component-based Web applications, resulting in an urgent need for methods to estimate effort and schedule for Web-centric projects.

The purpose of this research is to: (1) determine how new software development technologies impact the economics and risks of software development; (2) understand and characterize how the paradigm shift impacts or replaces our current methods of software cost, schedule, productivity, and risk estimation; (3) identify best practices and lessons learned with web-centric developments; and, (4) identify acquisition and lifecycle risks.

Classification: Unclassified

Sponsor: MITRE R&D

Performer: Audrey E. Taub, 781-271-8363

Resources:

FY	Dollars	Staff-years
04	$400,000	1.5

Schedule:

Start	*End*
Oct 04	Sep 04

Database:

Title: Software Engineering Economics and Best Practices of Internet based Software Developments

Description: Assessing the economic impact of emerging software development technologies

Automation: Word

Publications: MITRE Technical Report, MITRE Briefing

Keywords: Government, Analysis, Software, Size, Life Cycle, Schedule, Risk/Uncertainty, Study

MITRE–3

Title: Enterprise Life Cycle Investment Management

Summary: Government agencies must make sound, results-oriented resource allocation and investment decisions across the full investment life cycle. Thus, there is a strong need for an analytically-based decision-making process that is consistent with the organization's existing enterprise architecture framework and products.

The objective of heresiarch is Integrate and extend current investment analysis methods/tools and processes by encompassing the full investment management life cycle in order to (1) Ensure consistency and alignment with established enterprise architecture frameworks (e.g. TEAF, FEAF) and (2) Provide a robust capability to achieve repeatable, traceable, defensible investment decisions

Classification:	Unclassified		
Sponsor:	MITRE R&D		
Performer:	Bruce Lamar and Brian Schmidt		
Resources:	FY	Dollars	Staff-years
	04	$100,000	
Schedule:	*Start*	*End*	
	Oct 04	Sep 04	
Database:	Enterprise Life Cycle Investment Management		
	Description:		
	Automation:	Word	
Publications:	MITRE Technical Report,		
Keywords:	Government, Analysis		

RAND Corporation

Name:	RAND Corporation Note: RAND cost analysts are part of the research staff and also work on other, non-cost research projects within the various DoD-oriented divisions (Project Air Force, Arroyo Center, and National Defense Research Institute).
Address:	Main Office: 1700 Main Street, Santa Monica, CA 90407-2138 Washington Office: 1200 South Hayes Street, Arlington, VA 22202-5050
Director:	Obaid Younossi (703) 413-1100 Ext. 5235
Size:	Professional: 13 Support: 0 Consultants: 0 Subcontractors: 0
Focus:	The purpose of this multi-year project is to conduct a number of studies related to developing better cost estimating tools for use by the acquisition community, examine the effects of DoD policies as they impact weapon system costs, and establish a Center of Excellence for Cost Analysis at RAND. The initial direction was to concentrate on military aircraft costing, so the results could be used as part of the Joint Strike Fighter deliberations in 2001. Later, the focus was to shift to uninhabited air vehicles, space systems, and universal costs such as software, testing, and systems engineering/ program management costs.
Activity:	Number of projects in process: 10 Average duration of a project: 1–2 years Average number of staff members assigned to a project: 1–3 Average number of staff-years expended per project: 0.5 to 3 Percentage of effort conducted by consultants: 0% Percentage of effort conducted by subcontractors: 0%

RAND–1

Title:	Software Cost Estimation and Sizing Methods, Issues, and Guidelines
Summary:	This project has two objectives: to assess the current industry and government methods used to estimate software size as input to software cost estimates, and to provide a set of guidelines for using cost estimation methods. However, the overriding goal is to help AFCAA manage the risks inherent in providing software cost estimates early in a project's life. The result will be two reports. The first will contain three parts: a discussion of current sizing techniques, their pros and cons, and the issues that must be addressed if additional or improved sizing methods are to be adopted by the AFCAA. The second report will contain a checklist that can be applied to an existing or proposed cost estimation method to help assess its appropriateness or usefulness in a given situation.
Classification:	Unclassified
Sponsor:	SAF/AQ with Mr. Jay Jordan, (AFCAA/TD) as Technical Monitor Air Force Cost Analysis Agency, Research and Resource Management Division Mrs. Lynn Davis, (703) 604-0451; DSN 664-0451 E-mail: Lynn.Davis@pentagon.af.mil

Performer: Dr. Shari Lawrence Pfleeger

Resources: Approximately one staff year for FY 2003

Schedule:

Start	*End*
Oct 2002	Dec 2003 (draft report)

Database: None

Publications: DRR-3163-AF

Keywords: Industry, Government, Estimating, Reviewing/Monitoring, Software, Survey

RAND–2

Title: The Impact of Price Based Acquisition on DoD Programs

Summary: The purposes of this project are to:

1) Document savings/cost avoidance on government and contractor activities due to use of price-based acquisition strategies in a manner useful to the acquisition, planning, and cost estimating communities;

2) Generate recommendations for approaches to more accurately assessing the potential cost savings and cost avoidance that can be expected from the wider use of PBA. The focus will be on specific recommendations useful to the acquisition management, programming, and cost estimating communities;

3) Develop recommendations regarding the more effective implementation of PBA, as well as measures aimed at reducing any potential new risks that arise from the use of PBA.

Classification: Unclassified

Sponsor: SAF/AQ, with Jay Jordan, (AFCAA/TD) as Technical Monitor

Air Force Cost Analysis Agency, Research and Resource Management Division
Mrs. Lynn Davis, (703) 604-0451; DSN 664-0451
E-mail: Lynn.Davis@pentagon.af.mil

Performer: Dr. Mark Lorell

Resources: Approximately 1.2 staff years

Schedule:

Start	*End*
Oct 2002	Mar 2004 (Draft Report)

Database: None

Publications: DRR-3166-AF

Keywords: Government, Reviewing/Monitoring, Policy, Weapon Systems, Acquisition Strategy, Study

RAND–3

Title: F/A-22 and F/A-18 E/F Engineering/Manufacturing Development Case Studies: Lessons Learned

Summary: This project will involve an analysis of the approaches used by Boeing and Lockheed, the objectives and the priorities of the USN and USAF, compare data such as weight growth, cost growth, development strengths and difficulties, and other factors to provide lessons learned from each aircraft useful for future cost estimators, program managers, etc., who will be involved in the next generation of aircraft. An in-depth case study of each aircraft's development will be made using all available program, cost, schedule, and technical data, including interviews with government and contractor participants in both the F/A-18E/F and F/A-22 programs. From these data, a side-by-side comparison will be made on a variety of issues, including approaches and philosophies by the USAF and

USN in managing EMD; contractor differences in managing EMD activities; growth patterns for cost, schedule, and aircraft weight; performance trade-offs; and any other metrics which provide insight into similarities and differences between the aircraft. Although some classified material may be reviewed as part of the project, the final report will not be classified.

Classification: Unclassified

Sponsor: SAF/AQ, with Mr. Jay Jordan, (AFCAA/TD) as Technical Monitor

Air Force Cost Analysis Agency, Research and Resource Management Division
Mrs. Lynn Davis, (703) 604-0451; DSN 664-0451
E-mail: Lynn.Davis@pentagon.af.mil

Performer: Obaid Younossi

Resources: Approximately one staff year

Schedule:

Start	*End*
Oct 2002	Feb 2004 (Draft Report)

Database: None

Publications: DRR-3189-AF (Contractor Proprietary Information)

Keywords: Government, Analysis, Aircraft, C&TD, SD&D, Schedule, Case Study, Study

RAND–4

Title: Aircraft Support Cost and Budget Estimating Relationships

Summary: The objective of this study will be to develop Cost Estimating Relationships (CERs) for specific categories of Operating and Support costs. CERs will be developed for software maintenance, modification kit acquisition and installation, sustaining engineering, maintenance manpower, depot level reparables (DLRs), consumable supplies and depot overhauls. In the first phase, the effects of aircraft aging on aircraft depot level reparables and consumable supplies will be analyzed and their effect on flying hour (FH) cost factors will be developed. In the second phase, the cost of aircraft aging will be analyzed for its impact on funding for DLRs and consumable supplies across the FYDP. In Phase 3, aircraft overhaul, engine overhaul, and base maintenance CERs will be developed. In Phase 4, aircraft modification CERs will be developed using the Investment Budget Documentation System (IDOCS) database maintained by SAF/AQ and other sources. Finally, in a final phase, an O&S Handbook will be developed.

Classification: Unclassified

Sponsor: SAF/AQ, with Mr. Jay Jordan, (AFCAA/TD) as Technical Monitor

Air Force Cost Analysis Agency, Research and Resource Management Division
Mrs. Lynn Davis, (703) 604-0451; DSN 664-0451
E-mail: Lynn.Davis@pentagon.af.mil

Performer: Dr. Greg Hildebrandt

Resources: Approximately one staff year annually

Schedule:

Start	*End*
Nov 2000	Apr 2002—Phase 1
Apr 2002	Oct 2002—Phase 2
Nov 2002	May 2003—Phase 3
Nov 2002	Sep 2003—Phase 4
Nov 2003	Sep 2004 – Phase 5

Database: None

Publications: In work

Keywords: Government, Estimating, Aircraft, Operations and Support, CER

RAND–5

Title: Analysis of Cost Growth using Selected Acquisition Reports

Summary: The objective of this study is to analyze the contents of the DoD Selected Acquisition Reports (SARs) from their inception through the latest SARs submitted as part of the annual President's Budget. This analysis will categorize cost growth by Service, type of system, and growth from Milestones. The database contains a wide range of programmatic information for all MDAPs in a digital format. This analysis will improve understanding of cost growth in order to enable better-informed decisions regarding both specific weapon system acquisitions and future resource and acquisition policy decisions.

Classification: Unclassified

Sponsor: SAF/AQ, with Mr. Jay Jordan, (AFCAA/TD) as Technical Monitor

Air Force Cost Analysis Agency, Research and Resource Management Division
Mrs. Lynn Davis, (703) 604-0451; DSN 664-0451
E-mail: Lynn.Davis@pentagon.af.mil

Performer: Robert Leonard

Resources: Approximately one-half staff year

Schedule:

Start	*End*
Mar 2001	Continuing

Database: None

Publications: In work

Keywords: Government, Analysis, Weapon Systems, Data Collection, Database, Study

RAND–6

Title: Analysis of Systems Engineering and Program Management Costs

Summary: The objective of this study is to analyze the effects of new concepts and practices, such as manufacturing processes, out sourcing, integrated product teams, and acquisition reform principles, on systems engineering/program management (SE/PM) costs. Past cost methodologies often used factors of weapon system hardware or other costs to estimate SE/PM costs. In today's development and manufacturing environment, these methods may not produce accurate results. This analysis will attempt to look at other methodologies available to cost estimators for SE/PM costs.

Classification: Unclassified

Sponsor: SAF/AQ, with Mr. Jay Jordan, (AFCAA/TD) as Technical Monitor

Air Force Cost Analysis Agency, Research and Resource Management Division
Mrs. Lynn Davis, (703) 604-0451; DSN 664-0451
E-mail: Lynn.Davis@pentagon.af.mil

Performer: David Stem

Resources: Approximately one-half staff year

Schedule:

Start	*End*
May 2002	Feb 2004 (Draft Report)

Database: None

Publications: DRR-3284-AF

Keywords: Government, Analysis, Weapon Systems, Aircraft, Missiles, SD&D, Production, CER, Study

RAND–7

Title: Developing a Space Systems Sufficiency Review Handbook

Summary: The objective of this study is to expand and update the Air Force Cost Analysis Agency (AFCAA) resources and guidelines for performing sufficiency reviews of Analyses of Alternatives (AoAs), program office estimates (POEs), and any other items requiring a sufficiency review by creating a Space Systems Sufficiency Review Handbook. The Handbook will include sections for spacecraft buses, various types of payloads, ground segment, integration activities, systems engineering/program management, and launch costs. The project will not address space operating and support costs. RAND will initially collect and normalize cost, technical, programmatic data, and previous cost estimates for various space systems to produce crosschecks, "rules of thumb," and other metrics useful for evaluating cost estimates. Eventually, each Handbook section will include relevant past and current cost research studies (including past and current RAND research), methodologies, average factors and learning curves with ranges, "rules of thumb" (such as dollars per pound, dollars per drawing, hours per pound, hours per drawing, etc.), and recommended approaches to estimating each space WBS element. Some of these recommended methods may be the result of limited, original cost research by RAND using contractor and other sources of original data. The emphasis will be on helping analysts identify cost drivers and potential issues early, providing enough background to focus their analysis and data gathering in the areas most useful to their review.

Classification: Unclassified

Sponsor: SAF/AQ with Mr. Jay Jordan, (AFCAA/TD) as Technical Monitor

Air Force Cost Analysis Agency, Research and Resource Management Division
Mrs. Lynn Davis, (703) 604-0451; DSN 664-0451
E-mail: Lynn.Davis@pentagon.af.mil

Performer: Bernard Fox

Resources: Approximately one staff year

Schedule: *Start* *End*

Jan 2003 Sept 2004

Database: None

Publications: In work

Keywords: Government, Reviewing/Monitoring, Space Systems, Data Collection, Method

RAND–8

Title: Implications and Implementation of OSD's Evolutionary Acquisition Strategy Relying on Spiral Development

Summary: The objective of this research is to aid the Air Force Cost Analysis Agency (AFCAA) in formulating policies that anticipate and respond to the prospect of more widespread use of evolutionary acquisition strategies relying on a spiral development process, as recently mandated by OSD. This objective will be met through a threefold process. First, the project will survey, explicate, and clarify as much as possible the current and still evolving OSD acquisition policy of focusing on evolutionary acquisition strategies relying on spiral development. Second, it will review and assess case studies of weapon systems development programs that exhibit one or more critical characteristics similar to OSD's new policy of evolutionary acquisition through spiral development. Finally, RAND will develop a qualitative assessment of the implications of OSD's new policy for the AFCAA, and generate implementation recommendations. The research will be conducted through literature reviews, extensive interviews with OSD and service

acquisition policy makers and cost estimators, and assessment of historical case studies of programs with analogous attributes.

Classification: Unclassified

Sponsor: SAF/AQ, with Mr. Jay Jordan, (AFCAA/TD) as Technical Monitor

Air Force Cost Analysis Agency, Research and Resource Management Division
Mrs. Lynn Davis, (703) 604-0451; DSN 664-0451
E-mail: Lynn.Davis@pentagon.af.mil

Performer: Dr. Mark Lorell

Resources: Approximately two staff years

Schedule:

Start	*End*
Nov 2004	Nov 2005

Database: None

Publications: In work

Keywords: Government, Analysis, Reviewing/Monitoring, Acquisition Strategy, Study

RAND–9

Title: An Assessment of Cost Risk Methodologies and Policies

Summary: The objective of this research is to aid the Air Force Cost Analysis Agency (AFCAA) in formulating and implementing a cost risk policy. RAND will conduct research that will explore and review various risk methodologies that can be applied to cost estimating for major acquisition programs. Furthermore, RAND will explore how these risk methods and policies relate to a total portfolio of programs. The research will also explore how risk information can be communicated to senior decisionmakers in a clear and understandable way. This research will be done through literature reviews; discussions with policy makers, costs estimators, and other researchers; and original research on historical cost growth/risk. The results of this research will be documented in a report that will provide a series of recommendations for the AFCAA.

Classification: Unclassified

Sponsor: SAF/AQ, with Mr. Jay Jordan, (AFCAA/TD) as Technical Monitor

Air Force Cost Analysis Agency, Research and Resource Management Division
Mrs. Lynn Davis, (703) 604-0451; DSN 664-0451
E-mail: Lynn.Davis@pentagon.af.mil

Performer: Dr. Mark Arena

Resources: Approximately one staff year

Schedule:

Start	*End*
Nov 2004	Nov 2005

Database: None

Publications: In work

Keywords: Government, Estimating, Analysis, Policy, Risk/Uncertainty, Method

RAND–10

Title: Avionics and Mission Systems Cost Estimation Study

Summary: The objective of this research is to develop a set of approaches and comprehensive processes to estimate the life cycle cost of next generation mission systems and avionics. The initial focus of this study will be in the area of radar technology and the costs associated with the development and production phases of the life cycle.

Classification: Unclassified

Sponsor: OSD Cost Analysis Improvement Group (CAIG)

Mr. Fred Janicki, (703) 697-8228
E-mail: Frederick.Janicki@OSD.mil

Performer: David Stem

Resources: Approximately 1.5 staff years

Schedule:

Start	*End*
Feb 2004	May 2005

Database: Yes

Publications: In work

Keywords: Government, Reviewing/Monitoring, Electronics/Avionics, SD&D, Production, Database, Method

RAND–11

Title: Test and Evaluation Trends and Costs for Aircraft and Guided Missiles

Summary: This study examined the cost of system-level test and evaluation for recent Air Force and Navy fixed-wing aircraft and air launched guided weapons. Over the past 20 years, various approaches have been proposed to reduce the cost and duration of testing military systems. A number of efficiencies have been implemented, such as increasing the use of modeling and simulation and combining developmental and operational testing. At the same time, the systems being tested have become considerably more complex. This study found that the duration and costs appear to be largely in step with the increasing complexity of the systems and test programs. Although the available data is not sufficient to isolate the effects of discrete initiatives, some, such as modeling and simulation and combined testing, have empirically demonstrated their value on a variety of programs. The report provides cost estimating methodologies as well as technical and programmatic information on the test programs studied.

Classification: Unclassified

Sponsor: SAF/AQ, with Mr. Jay Jordan, (AFCAA/TD) as Technical Monitor

Air Force Cost Analysis Agency, Research and Resource Management Division
Mrs. Lynn Davis, (703) 604-0451; DSN 664-0451
E-mail: Lynn.Davis@pentagon.af.mil

Performer: Bernard Fox

Resources: Approximately one staff year

Schedule:

Start	*End*
Mar 2001	Oct 2003

Database: TR-114-AF (Contractor Proprietary Information)

Publications: MG-109-AF (Final report forthcoming)

Keywords: Government, Analysis, Aircraft, Missiles, Test and Evaluation, SD&D, CER

RAND–12

Title: Aircraft and Missile Sufficiency Review Handbook

Summary: The handbook is a reference for AFCAA analysts who are conducting sufficiency reviews of estimates of aircraft development, procurement, and O&S costs. The handbook contains cost and schedule metrics for many Air Force and Navy fixed wing aircraft programs and addresses issues that analysts should keep in mind when applying the metrics. The effort for FY04 is to add metrics for unit recurring flyaway costs,

	schedule estimating relationships for development programs, and a methodology for the time-phasing of funds for development programs.
Classification:	Unclassified
Sponsor:	SAF/FMC, with Mr. Jay Jordan, (AFCAA/TD) as Technical Monitor Air Force Cost Analysis Agency, Research and Resource Management Division Mrs. Lynn Davis, (703) 604-0451; DSN 664-0451 E-mail: Lynn.Davis@pentagon.af.mil
Performer:	Michael Boito
Resources:	Approximately one-half staff year
Schedule:	*Start* *End* 10/03 9/04
Database:	None
Publications:	In work (Proprietary Data)
Keywords:	Government, Reviewing/Monitoring, Aircraft, Missiles, CER, Data Collection, Method

CNA Corporation (CNAC)

Name:	CNA Corporation, Cost and Acquisition Team	
Address:	4825 Mark Center Drive	
	Alexandria, VA 22311-1850	
Director:	Dr. Matthew S. Goldberg, (703) 824-2455	
Size:	Professional:	6
	Support:	3
	Consultants:	6
	Subcontractors:	0
Focus:	Cost estimation for DoD programs; analysis of DoD acquisition policy; investigation of defense industrial base	
Activity:	Number of projects in process:	5
	Average duration of a project:	9 months
	Average number of staff members assigned to a project:	2
	Average number of staff-years expended per project:	1.25
	Percentage of effort conducted by consultants:	10%
	Percentage of effort conducted by subcontractors:	0%

CNAC–1

Title: Long-Term Projections of Operations and Support Costs

Summary: Roughly two-thirds of the DoD budget is spent on Operations and Support (O&S) costs, consisting of the Operations and Maintenance (O&M) and Military Personnel appropriations. In the past, it has been difficult to forecast O&S costs for the out-years of the FYDP, and, in general, forecasts beyond the FYDP have not been available. We will estimate statistical relationships to forecast O&S costs in various sectors of the DoD budget, and develop a computer model to generate O&S forecasts under alternative policy scenarios.

Classification: Secret

Sponsor: OSD P&R (Program Integration), OSD (AT&L), OSD (PA&E)

Performer: CNA Corporation, Cost and Acquisition Team

Dr. James Jondrow, (703) 824-2261

Resources:

FY	*Dollars*	*Staff-years*
03	$150,000	0.67

FY	*Dollars*	*Staff-years*
04	$250,000	1.1

Schedule:

Start	*End*
Jun 03	Sep 04

Database:

Title:	TBD
Description:	Forecasting models for O&S by FY, Service, and sector
Automation:	Microsoft Excel linked spreadsheets

Publications: Interim report (completed), Final report (in the future)

Keywords: Government, Programming, Weapon Systems, Facilities, Infrastructure, Operations and Support, Time Series, Database, Study

CNAC–2

Title: Cost Tradeoffs for Major Acquisition Programs

Summary: The Chief of Naval Operations (CNO) has tasked the Deputy Chief of Naval Operations (Resources, Requirements and Assessments) (N8) to develop a methodology to estimate the costs of major acquisition programs, as an input to making high-level cost/capability tradeoffs during the Navy's planning and programming process. This issue is complex because the costs of any system or platform accrue over many fiscal years and migrate over the system's life-cycle, from the RDT&E appropriation, to the Procurement appropriations, and finally the operating accounts (O&M and Military Personnel). Another complication is that ownership of the resources migrates from the system commands to the fleet, a process that sometimes obscures system-level visibility of costs. In addition, the Navy's budget includes indirect or infrastructure costs, some (but not all) of which can be allocated to particular systems or platforms. Among these costs are recruiting, training, base support, and real property maintenance. However, some other costs (e.g., basic research in the S&T accounts) are probably not allocable in any meaningful way. We will develop a work breakdown structure (WBS) for the costs of major acquisition programs and identify sources of data to populate that structure.

Classification: Secret

Sponsor: Deputy Chief of Naval Operations (Resources, Requirements and Assessments, N8B)

Performer: CNA Corporation, Cost and Acquisition Team

Dr. Matthew S. Goldberg, (703) 824-2455

Resources:

FY	*Dollars*	*Staff-years*
04	$250,000	1.1

Schedule:

Start	*End*
Dec 03	Nov 04

Database: *Title:* TBD

Description:

Automation:

Publications: TBD

Keywords: Government, Programming, Weapon Systems, Life Cycle, Data Collection, Database, Study

CNAC–3

Title: Improving Efficiency of Warfare Support and Manpower

Summary: Force structure—measured in terms of personnel (both military and civilian) and platforms (particularly aircraft)—will be a major driver of resource requirements in POM-06. This study will investigate alternative plans for sizing and phasing the force structure over the POM, and estimate the resource implications of those plans. We will address these issues via data collection, statistical analysis, and interviews with subject-matter experts.

Classification: Unclassified

Sponsor: Office of the Chief of Naval Operations, Director, Programming Division (N80)

Performer: CNA Corporation, Cost and Acquisition Team

Dr. Matthew S. Goldberg, (703) 824-2455

Resources:

FY	*Dollars*	*Staff-years*
04	$275,000	1.2

Schedule:

Start	*End*
Dec 03	Nov 04

Database: *Title:* N/A

Publications: TBD

Keywords: Government, Programming, Weapon Systems, Manpower/Personnel, Operations and Support, Economic Analysis, Study

CNAC–4

Title: Implementing Acquisition Metrics

Summary: The Assistant Secretary of the Navy (Research, Development, and Acquisition) previously asked CNA to examine the Department of the Navy's current metrics for monitoring acquisition programs and to suggest improvements where necessary. Completion of that effort resulted in a proposal to implement a Balanced Scorecard Strategic Management System. In this study we are building on the earlier recommendations to assist in implementation of improved metrics.

Classification: Unclassified

Sponsor: Assistant Secretary of the Navy (Research, Development and Acquisition)

Performer: CNA Corporation, Cost and Acquisition Team

Mr. Gary Christle, (703) 824-2693

Resources:

FY	*Dollars*	*Staff-years*
03	$240,000	1.1

Schedule:

Start	*End*
Feb 02	Apr 04

Database: *Title:* TBD

Description:

Automation:

Publications: TBD

Keywords: Government, Reviewing/Monitoring, Weapon Systems, SD&D, Production, Study

CNAC–5

Title: Business Case Analysis of Performance Based Logistics

Summary: Performance Based Logistics (PBL) arrangements are in place for several major DoD systems, including the F–18E/F, C-17, and F–117. In order to extend the benefits of PBL to additional systems, OSD guidance requires that DoD Components perform business case analyses (BCAs) of each fielded Acquisition Category (ACAT) I and ACAT II weapon system not currently planned to implement PBL. Results will be used to determine whether a PBL arrangement is the preferred means of providing logistics support. Guidance from the Assistant Secretary of the Navy (Research, Development and Acquisition) requires that DoN program managers use sound business judgment (i.e., BCAs) when selecting between alternative logistic support strategies. However, the major USN and USMC buying commands (NAVAIR, NAVSEA, SPAWAR, NAVICP, and MARFORSYSCOM) have developed BCA guidelines to varying degrees, and there is little agreement in these guidelines when comparing among the different commands.

We will apply accepted principles of economic and cost analysis – consistent with all extant OSD and DoN guidance, directives, and instructions – to develop a set of overarching guidelines for BCAs of DoN PBL initiatives.

Classification: Unclassified

Sponsor: Assistant Secretary of the Navy (Research, Development and Acquisition)

Performer: CNA Corporation, Cost and Acquisition Team

Dr. Peter Francis, (703) 824-2094

Resources:

FY	*Dollars*	*Staff-years*
04	$155,000	0.7

Schedule:

Start	*End*
Jan 04	Oct 04

Database: N/A

Publications: TBD

Keywords: Government, Policy, Operations and Support, Economic Analysis, Method, Study

Institute for Defense Analyses (IDA)

Name:	Cost Analysis and Research Division (CARD)		
Address:	4850 Mark Center Drive, Alexandria, VA 22311-1882		
Director:	Dr. Stephen J. Balut		
Size:	Professional:	87	
	Support:	6	
	Consultants:	40	
	Subcontractors:	2	
Focus:	Costs of weapons systems, forces, and operations.		
Activity:	Number of projects in process:		58
	Average duration of a project:		1 year
	Average number of staff members assigned to a project:		3
	Average number of staff-years expended per project:		2
	Percentage of effort conducted by consultants:		20%
	Percentage of effort conducted by subcontractors:		3%

IDA–1

Title: Assessment of Contractor Cost Data Reporting (CCDR) and Software Resource Data Report (SRDR) Systems

Summary: The OSD Cost Analysis Improvement Group (CAIG) maintains an integrated cost research program to improve the technical capabilities of the DoD to estimate the costs of major equipment. The CAIG works with the DoD Services to determine relevant cost components, collect and make available related actual costs, and develop techniques for projecting them. An important part of the CAIG charter is to develop and implement policy to provide for the appropriate collection, storage, and exchange of information concerning improved cost estimating procedures, methodology, and data necessary for cost estimating.

During the past seven years, the Defense Cost and Resource Center (DCARC) has led an ongoing joint DoD and industry effort to re-engineer CCDR policies and business rules to improve the quality, relevancy, and availability of actual cost data. While much has been done, several important areas continually need to be addressed such as exploring alternative reporting approaches, assessing internal process activities, developing performance metrics, and evaluating contractor cost accounting practices.

Recently DCARC and other CAIG representatives have developed and implemented the SRDR system to collect business metrics on software projects costing over $25 million within ACAT I programs. This system will be integrated with the CCDR system to obtain the benefits of an established infrastructure that provides for electronic Internet-based data collection, storage, and remote access to authorized users. Much emphasis will now be directed towards finalizing needed policies, business rules and procedures, and ensuring responsible government and contracting entities plan and execute their responsibilities accordingly.

Classification: Unclassified

Sponsor: OSD(PA&E)
WSCAD/CCDR-PO
Suite 500, CGN
Arlington, VA

Mr. Ron Lile, (703) 602-3169

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Mr. John Bailey (703) 845-2534, jbailey@ida.org

Mr. Jack Cloos, (703) 845-2506, jcloos@ida.org

Resources:

FY	*Dollars*	*Staff-years*
2001	$350,000	
2002	$286,000	
2003	$0	

Schedule:

Start	*End*
Oct 1996	Ongoing

Database: Not applicable

Publications: None

Keywords: Government, Industry, Estimating, Analysis, Labor, Material, Software, Schedule, Study, Overhead/Indirect, Economic Analysis

IDA–2

Title: FYDP Analysis Support

Summary: The overall goal of this task is to investigate ways to improve the effectiveness of OUSD(A&T) participation in the PPBS process. The task's specific objective is to provide more accurate and timely MDAP funding data to the acquisition community. This task will improve the process by which the acquisition community is made aware of funding information that is vital to the decision making process. This task will also develop algorithms that relate Congressional marks to individual RDT&E and Procurement line items and associate the marks to DMCs and OSD OPRs. Data displays will be designed to illustrate the impacts of congressional changes on the investment program to senior decision makers. It will assist the Under Secretary of Defense for Acquisition and Technology in his primary responsibilities to safeguard acquisition investment resources.

Classification: Secret

Sponsor: OUSD(AT&L)/ARA/AR
The Pentagon, Rm. 3D765
Washington, DC 20301

Mr. Steve Dratter, (703) 697-8020

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882
Mr. Ronald E. Porten, (703) 845-2145

Resources:	*FY*	*Dollars*	*Staff-years*
	1999	$75,000	0.6
	2000	$50,000	0.4
	2001	$75,000	0.6
	2003	$50,000	0.3
Schedule:	*Start*	*End*	
	Jan 1999	Indefinite	
Database:	*Title:*	MDAPs	
	Description:	FYDP type data for all DoD RDT&E and Procurement programs to include Defense Mission Categories, Program Element, Procurement Annex Line Item, MDAP Identifier, and OSD OPRs.	
	Automation:	FoxPro, dBASE	
Publications:	TBD		
Keywords:	Government, Programming, Forces, Acquisition Strategy, Operations and Support, Mathematical Modeling, Statistics/Regression, Computer Model		

IDA–3

Title: FYDP Viewers Upgrade

Summary: Much of the data used by the Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD (AT&L)) to manage the investment appropriations comes from the Future Years Defense Program (FYDP) and the RDT&E and Procurement Program Annexes. A software tool called the FYDP Viewers, used to query the FYDP and Program Annexes for many analyses, has become outdated and difficult to maintain. The objective of this task is to rewrite the FYDP Viewers using more modern tools, redesign the underlying databases to provide a structured query generation environment for AT&L analysts, and make the system easier to maintain. The new system should have all of the functionality of the current FYDP Viewers, be expanded to include the ability to query the FYDP using new attributes such as Force and Infrastructure Codes, and operate in the Citrix Server environment. This task will also investigate ways to implement the new FYDP Force and Infrastructure Codes in the DoD Selective Program Element Analysis Report (DoDSPEAR) model vice the Infrastructure Codes currently used.

Classification: Secret

Sponsor: OUSD(AT&L)/ARA/AR
The Pentagon, Rm. 3D161
Washington, DC 20301
Mr. Milt Nappier, (703) 697-6070

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882
Mr. Ronald E. Porten, (703) 845-2145

Resources:	*FY*	*Dollars*	*Staff-years*
	2002	$125,000	0.75
Schedule:	*Start*	*End*	
	Jun 2002	Indefinite	

Database: *Title:* MDAPs

Description: FYDP type data for all DoD programs and RDT&E and Procurement Annexes to include Defense Mission Categories, Program Element, Procurement Annex Line Item, Infrastructure Codes, and Force & Infrastructure Codes.

Automation: Microsoft .Net, Visual Basic 6.0, Access, FoxPro, dBASE

Publications: TBD

Keywords: Government, Programming, Forces, Acquisition Strategy, Operations and Support, Mathematical Modeling, Statistics/Regression, Computer Model

IDA–4

Title: Force and Infrastructure Studies

Summary: The objectives of this task are to (1) provide initial insights into the factors that will drive cost for transformational forces and (2) improve the usefulness of the FYDP in analyzing force and infrastructure activities.

Classification: Unclassified work dealing with a classified database

Sponsor: OD(PA&E), Force and Infrastructure Cost Analysis Division
The Pentagon, Rm. BE798
Washington, DC 20301

Mr. Walt Cooper (703) 697-4312

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882
Mr. Ronald E. Porten, (703) 845-2145

Resources:

FY	*Dollars*	*Staff-years*
92	$ 40,000	.3
93	$220,000	2.4
95	$130,000	1.0
96	$150,000	1.2
99	$250,000	1.5
00	$322,000	1.7
02	$ 80,000	0.3
03	$200,000	0.8
04	$150,000	0.6

Schedule:

Start	*End*
Sep 92	Sep 04

Database: *Title:* FYDP, FYDP Normalization,

Description: FYDP type data for all DoD programs to include Defense Mission Categories, Program Element, Force & Infrastructure Categories

Publications: "Normalizing the Future Years Defense Program for Funding Policy Changes, 2000," IDA Paper P-3543, December 2000

"DoD Force & Infrastructure Categories: A FYDP-Based Conceptual Model of Department of Defense Programs and Resources", IDA Paper P-3660, September 2002

Keywords: Government, Programming, Forces, Infrastructure, Operation and Support

IDA–5

Title: FYDP Improvement, Phase II

Summary: In August 1996, the Deputy Secretary of Defense directed that the responsibility for FYDP update, maintenance, and distribution to be transferred to PA&E. Later the FYDP Improvement Program was initiated to develop electronic submission of the POM and FYDP, pursue integration of data requirements, and to identify systematic improvements to the FYDP data and structure. The program also integrates and consolidates other data sets within the program and budget data submissions required by OSD. These resulting data are integrated into the Defense Programming Database, a single source of data that supports the programming and budgeting processes of the department.

Classification: Unclassified work dealing with a classified database

Sponsor: OD (PA&E), Programming and Fiscal Economics Division
The Pentagon, Rm. 2C282
Washington, DC 20301
Ms Teresa Gerton (703) 693-7827

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882
Mr. Ronald E. Porten, (703) 845-2145

Resources:

FY	*Dollars*	*Staff-years*
99	$400,000	2.1
00	$179,000	.9
01	$300,000	1.5
02	$450,000	1.8
03	$400,000	1.6

Schedule:

Start	*End*
Aug 99	Sep 04

Database:

Title:	*Defense Programming Database*
Description:	*Gathers and Organizes Programming Data the DoD*
Automation:	FYDP, MDAP

Publications: TBD

Keywords: Government, Programming, Forces, Infrastructure, Manpower/Personnel, Life Cycle, Automation, Data Collection

IDA–6

Title: Program and Budget Detail Analysis

Summary: Review the methods for identifying appropriations; manpower, and organizations in the program and budget review support systems. The study is to focus on the methods used in the FYDP, CIS, and PRCP data systems, identify problem areas, and suggest solutions. IDA is to suggest alternative approaches that would integrate and synchronize methods and, as a result, promote efficient and accurate data transmission among these systems.

Classification: Unclassified work dealing with a classified database

Sponsor: OD (PA&E), Programming and Fiscal Economics Division
The Pentagon, Rm. 2C282
Washington, DC 20301
Ms Teresa Gerton, (703) 693-7827

Performer: IDA
Mr. Ronald E. Porten, (703) 845-2145

Resources:

FY	*Dollars*	*Staff-years*
02	$200,000	.9

Schedule:

Start	*End*
Feb 02	Sep 04

Database: *Title:* *Defense Programming Database*

Publications: TBD

Keywords: Government, Analysis, Programming, Budgeting, Review

IDA–7

Title: Contingency Operations Support Tool (COST)

Summary: The objective of this task is to continue to refine procedures for estimating the cost of proposed and on-going military operations, and to further develop the automated tool for conducting such estimates. The OSD(C), Joint Staff, and the Military Departments will utilize these procedures and automated tool to estimate the cost of military operations associated with America's War on Terrorism. IDA will host COST on a continuous basis, available to approved users world-wide as a multi-user tool with a single integrated operations database from a secure SIPRNet server located at IDA.

Classification: Unclassified

Sponsor: Office of the Under Secretary of Defense (Comptroller), Program/Budget

Mr. Roberto Rodriguez

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Michael Frieders, (703) 845-2140, mfrieder@ida.org

Resources:

FY	*Dollars*	*Staff-years*
2002	$600,000	3
2003	$1,200,000	7
2004	$1,400,000	8

Schedule:

Start	*End*
Apr 2004	Apr 2005

Database: Microsoft Access/SQL Server

Publications: COST Users Guide

COST Executables

Keywords: Government, Estimating, Analysis, Budgeting, Computer Model

IDA–8

Title: DoD Enlistment Early Warning System

Summary: This task updates enlistment early warning systems for each Service

Classification: Unclassified

Sponsor: *Curtis Gilroy*, OSD(AP), Accession Policy.

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Dr. Lawrence Goldberg, (703) 578-2831, lgoldber@ida.org

Resources:

FY	*Dollars*	*Staff-years*
2004	125,000	0.5

Schedule:

Start	*End*
Mar 2004	Feb 2005

Database: None

Publications: None

Keywords: Government, Analysis, Manpower/Personnel, Mathematical Modeling, Computer Model

IDA–9

Title: Methods to Assess Schedules for the Strategic Defense System

Summary: The objective of this task is to develop methods for assessing the acquisition schedules of ballistic missile defense systems. The systems include space-based surveillance and interceptor systems, surface-based interceptor systems, and other surface-based elements. Elements include software as well as hardware.

Classification: Unclassified

Sponsor: MDA/RME
2120 Washington Blvd., Suite 100
Arlington, VA 22204

Mr. William Seeman, (703) 604-3764

Performer: IDA

Mr. Bruce Harmon, (703) 845-2510, bharmon@ida.org

Resources:

FY	*Dollars*	*Staff-years*
1999 and prior	$215,000	1.4

Schedule:

Start	*End*
Jan 1991	Sep 2004

Database: *Description:* Schedule and characteristic data on 26 unmanned spacecraft, 22 missile, and 51 software programs.

Automation: None

Publications: "Assessing Acquisition Schedules for Unmanned Spacecraft," IDA Paper P-2766, April 1993

"Schedule Assessment Methods for Surface-Launched Interceptors," IDA Paper P-3014, August 1995

"Schedule Assessment Methods for Ballistic Missile Defense Ground-based Software Development," IDA Paper P-3600, Draft Final, Augusst 2003

Keywords: Government, Estimating, Schedule, Space Systems, Missiles, SD&D, Production, Method, Statistics/Regression

IDA–10

Title: Costs of Developing and Producing Next Generation Tactical Aircraft

Summary: The objective of this task is to collect, analyze and exploit the latest available information to develop databases and methods for estimating the development and production costs of

next generation fighter/attack aircraft. Costs covered include airframe, avionics, propulsion and software. A cost model is presented that includes CERs at the component level, cost progress function relationships and modeling of plant-wide costs.

Classification: Unclassified

Sponsor: OSD(PA&E)
The Pentagon, Room BE779
Washington, DC

Mr. Gary Pennett, (703) 695-7282

Performer: IDA

Mr. Bruce Harmon, (703) 845-2510, bharmon@ida.org

Resources:

FY	*Dollars*	*Staff-years*
Prior to 2001	$550,000	3.5
2001	$200,00	1.5

Schedule:

Start	*End*
Jan 1998	Sept 2004

Database: *Description:* Cost and characteristic data from 20 aircraft programs.

Automation: None

Publications: TBD

Keywords: Government, Estimating, Aircraft, SD&D, Production, Method, Statistics/Regression

IDA–11

Title: Support Labor Cost for Military Aircraft

Summary: The objective of this task is to collect, analyze and exploit the latest available information to develop databases and methods for estimating the support labor costs of military aircraft. Support labor categories analyzed include recurring engineering, tooling and quality control. CERs are presented for each labor category.

Classification: Unclassified

Sponsor: OSD(PA&E)
The Pentagon, Room BE779
Washington, DC

Mr. Gary Pennett, (703)695-7282

Performer: IDA

Mr. Bruce Harmon, (703) 845-2510, bharmon@ida.org

Resources:

FY	*Dollars*	*Staff-years*
2000	$200,000	1.5

Schedule:

Start	*End*
Jan 2000	Sept 2004

Database: *Description:* Cost and data from 8 aircraft programs.

Automation: None

Publications: TBD

Keywords: Government, Estimating, Aircraft, SD&D, Production, Method, Statistics/Regression

IDA–12

Title: Developing a Life Cycle Cost Model and Conducting a Cost Analysis of the Advanced Multifunction RF-Concept (AMRF-C)

Summary: Develop a life cycle cost methodology for analyzing the affordability of AMRF concept, and undertake cost comparisons of AMRF-C to the legacy systems used in specific missions or scenarios.

Classification: Unclassified

Sponsor: OSD/CAIG and Office of Naval Research

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311
Dr. John Hiller (703) 845-6783, jhiller@ida.org

Resources:

FY	*Dollars*	*Staff-years*
2002	$300,000	

Schedule:

Start	*End*
Feb 2002	July 2004

Database: None

Publications: Annotated briefing of final results

Keywords: Government, Estimating, Electronics/Avionics, Life Cycle, Method

IDA–13

Title: Reducing Defense Infrastructure Costs

Summary: This project is designed to find better strategies for managing infrastructure, and thus reducing infrastructure costs. The initial focus is on installation support costs. Service initiatives for developing benchmarks involving the costs and output of different installation support services are being examined. Private sector and other governmental practices are also being studied. The goal is to recommend adoption of an information system and a set of metrics that will allow decision-makers more insight into how to provide the needed installation support at a reduced cost. In addition the project is investigating the nature of quantitative relationships between force structure changes and spending on various portions of the defense infrastructure.

Classification: Unclassified

Sponsor: Director, Program Analysis and Evaluation
The Pentagon, Rm. BE798
Washington, DC 20301

Ms. Terry Gerton, (703) 697-0221

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Mr. Stanley A. Horowitz, (703) 845-2450

Resources:

FY	*Dollars*	*Staff-years*
1998	$600,000	3.2
1999	$300,000	1.6
2000	$300,000	1.6

Schedule:

Start	*End*
Feb 1998	September 2004

Database: TBD

Publications: TBD

Keywords: Government, Analysis, Policy, Infrastructure, Facilities, Overhead/Indirect, Data Collection, Cost/Production Function, Study

IDA–14

Title: Training Transformation Funding and Requirements Validation Study

Summary: This study examines whether the program for transforming joint training to better support Combatant Commander requirements is properly focused and funded.

Classification: Unclassified

Sponsor: Director for Operational Plans and Interoperability
The Pentagon, Rm. 1E1019
Washington, DC 20318

LtCol Lyndon S. Anderson, (703) 692-7255

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Mr. Stanley A. Horowitz, (703) 845-2450

Resources:

FY	*Dollars*	*Staff-years*
2003	$300,000	1.8

Schedule:

Start	*End*
Mar 2003	Aug 2003

Database: none

Publications: "Training Transformation Funding and Requirements," IDA Paper P-3797, October 2003

Keywords: Government, Analysis, Policy, Training, Study

IDA–15

Title: Consolidation of Defense Agency Overhead Functions

Summary: Examine the potential for reducing costs by consolidating overhead functions among Defense Agencies. If possible, develop a quantitative estimate of the potential savings.

Classification: Unclassified

Sponsor: Director Acquisition Resources and Analysis
The Pentagon, Rm. 3D161
Washington, DC 20301

Mr. Milton Nappier, (703) 697-6070

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Mr. Stanley A. Horowitz, (703) 845-2450

Resources:

FY	*Dollars*	*Staff-years*
2002	$ 50,000	0.3
2003	$100,000	0.6

Schedule:

Start	*End*
Mar 2002	Sept. 2004

Database: TBD

Publications: TBD

Keywords: Government, Analysis, Policy, Infrastructure, Study

IDA–16

Title: Total Manpower Cost of Military Personnel

Summary: This study will develop a methodology for identifying and estimating the full cost of military personnel with emphasis on marginal indirect costs. Recognizing the significant role that career management policies have on the total costs for many skill categories, particular attention will be given to developing a methodology that reflects these influences in different specialties and career fields.

Classification: Unclassified

Sponsor: Director, Program Analysis and Evaluation
The Pentagon, Rm. BE798
Washington, DC 20301

MAJ David Trybula, (703) 614-3840

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Mr. Stanley A. Horowitz, (703) 845-2450

Resources:

FY	*Dollars*	*Staff-years*
2002	$200,000	1.2

Schedule:

Start	*End*
May 2002	Sept. 2004

Database: TBD

Publications: TBD

Keywords: Government, Analysis, Policy, Manpower/Personnel, Overhead/Indirect, Study

IDA–17

Title: Workload Forecasting for the Veterans Benefits Administration

Summary: The objective of this task is to forecast the number of veterans who will apply or reapply for VA benefits over a seven-year horizon and the administrative staff levels required to process these claims. These forecasts will be used to track the pending claim totals over the forecast horizon. We will develop a computer model to show the forecasts in various levels of detail and allow the user to perform a variety of what-if analyses. The current schedule calls for the model to be delivered in December 04.

Classification: Unclassified

Sponsor: Veterans Benefits Administration
Ms. Alilia McNeal, (202) 273-7192

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Dr. David E. Hunter, (703) 845-2549, dhunter@ida.org

Resources:

FY	*Dollars*	*Staff-years*
1998	$300,000	2.0
1999	$150,000	1.0
2000	$100,000	0.75

2002	$50,000	0.25
2003	$125,000	0.75
2004	$475,000	2.75

Schedule: *Start* — *End*

Sep 1998 — April 2005

Database: *Title:* VBA Workload Forecasting Model

Description: Demographic data on the actual veteran population; projections of the veteran population for seven future years; and factors for disability claim submission rates within demographic cells

Automation: Visual Basic interface with Microsoft Access database

Publications: "Forecasting Compensation Workload for the Veterans Benefits Administration (VBA): Final Report," IDA Paper P-3536, August 2000

Keywords: Government, Budgeting, Infrastructure, Data Collection, Mathematical Modeling, Database, Computer Model

IDA–18

Title: Future Low Acquisition Cost Tactical Missiles

Summary: Before deciding on what capabilities to acquire, the DoD needs information on both performance and costs of alternative ways of performing the mission of attacking targets in the future. These alternatives have different performance characteristics and costs. In particular, DoD holds a large stock of tactical air-launched PGMs (Precision Guided Munitions) that follow near-ballistic trajectories. These weapons must therefore be dropped close to their intended targets, which makes our aircraft vulnerable to enemy point defenses. The objective of this task is to look for low-cost means of increasing the standoff range of PGMs using solid rocket motors and deployable wings.

Classification: Unclassified

Sponsor: USD(AT&L)/S&TS

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Dr. Daniel B. Levine, (703) 845-2562, dlevine@ida.org

Resources:

FY	*Dollars*	*Staff-years*
2002	$75,000	0.3

Schedule: *Start* — *End*

Jun 2002 — May 2003

Database: *Title:* Cost of Solid Rocket Motors (proprietary)

Description: Unit cost and quantity of solid rocket motors

Automation:

Publications: "Increasing the Standoff Range of Precision Guided Munitions (U)," Confidential, IDA Document D-2910, December 2003

Keywords: Government, Analysis, Missiles, Propulsion, Manufacturing, Cost/Production Function, Study

IDA–19

Title: Evaluation of TRICARE Program Costs

Summary: TRICARE is the DoD's health care benefit that brings together the world-wide health care resources of the Army, Navy, and Air Force and supplements that capability with networks of civilian health care providers. Its goals are to provide better access and quality while controlling costs to the government. Since TRICARE's inception, however, Congress has mandated more and more generous benefits for DoD health care beneficiaries and consequently, the cost to the government has spiraled upward. Earlier IDA evaluations compared TRICARE costs in the year of interest with an estimate of what those costs would have been had the traditional CHAMPUS benefit been continued. Because TRICARE has been in place for almost a decade, the comparison with CHAMPUS is no longer relevant. The most recent evaluations have examined trends in TRICARE utilization and costs over the past few years and compared them with corresponding civilian-sector benchmarks. This year's evaluation continues this approach but adds one more year of data to the trends.

Classification: Unclassified

Sponsor: TRICARE Management Activity (HPA&E)
5111 Leesburg Pike
Suite 517
Falls Church, VA 22041

Lt. Col. Pradeep Gidwani, (703) 681-0368

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Dr. Philip M. Lurie, (703) 845-2118

Resources:

FY	*Dollars*	*Staff-years*
2002	$771,000	3.4
2003	$326,000	2.4

Schedule:

Start	*End*
Apr 2003	Mar 2004

Database: None

Publications: Evaluation of the TRICARE Program: FY 2004 Report to Congress

Keywords: Government, Analysis, Policy, Infrastructure, Manpower/Personnel, Test and Evaluation, Variable Costs, Data Collection, Survey, Mathematical Modeling, Economic Analysis, Database, Study

IDA–20

Title: Resource Analysis for Operational Test and Evaluation (OT&E)

Summary: Conduct resource analysis to support Office of the Director, Operational Test and Evaluation, in its statutory responsibility to advise the Secretary of Defense on the adequacy of T&E resources that support the operational test and evaluation phase of acquisition programs. Conduct analyses to support DOT&E participation in senior level OSD activities associated with the Planning, Programming, Budgeting and Execution System and development of resource related policy recommendations throughout the PPBE cycle.

Classification: Unclassified

Sponsor: Principal Deputy Director, Operational Test and Evaluation
The Pentagon, Room 3D1067
1700 Defense
Washington, DC 20301-1700

Mr. David Duma, (703) 697-4813

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Mr. Dennis O. Madl, (703) 578-2718, dmadl@ida.org

Resources:

FY	*Dollars*	*Staff-years*
1998	$200,000	1.2
1999	$100,000	0.6
2000	$400,000	2.5
2001	$400,000	1.9
2002	$400,000	2.0
2003	$300,000	2.5
2004	$300,000	2.0

Schedule:

Start	*End*
Feb 1998	Ongoing

Database: *Title:* OT&E Resources

Description: Programmed and Budgeted Funds, Manpower

Automation: Excel spreadsheets

Publications: None

Keywords: Government, Analysis, Reviewing/Monitoring, Policy, Programming, Budgeting, Weapon Systems, Facilities, Infrastructure, Manpower/Personnel, Test and Evaluation, Case Study, Data Collection

IDA–21

Title: Resource Analysis for Test and Evaluation (T&E)

Summary: Analysis of resources related to management issues for T&E activities to improve T&E planning and programming—focusing on existing and proposed operations and business practices and policies; and extending ongoing analysis of Major Range and Test Facility Base (MRTFB) resource trends. Analyses include cost comparisons of alternative approaches to developing test and evaluation capability and realigning workload within existing infrastructure. Evaluation will include identification of efficiencies in management, operations, and resource processing. Also, conduct analysis to support DOT&E participation in inter-Agency infrastructure studies, in the FY05 Base Realignment and Closure process and in the Director of Operational Test and Evaluation (DOT&E) Annual Report to Congress.

Classification: Unclassified

Sponsor: Deputy Director, Systems and Test Resources
Director, Operational Test and Evaluation
The Pentagon, Rm. 3D1067
Washington, DC 20301

Mr. Mike Crisp, (703) 681-4024 ext 147

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Mr. Dennis O. Madl, (703) 578-2718

Resources:	*FY*	*Dollars*	*Staff-years*
	FY01	$2,500,000	13.8
	FY02	$2,500,000	13.1
	FY03	$2,400,000	12.5
	FY04	$2,400,000	12.0
Schedule:	*Start*	*End*	
	Oct 00	Ongoing	
Database:	*Title:*	T&E Resources	
	Description	Operating Cost, Investment Projects, Real Property Recapitalization, Cost of Testing	
	Automation:	Excel spreadsheets; Access databases; Knowledge-base information retrieval system	

Publications: "Relocating Jefferson Proving Ground Activities to Yuma Proving Ground," IDA Paper P-2413, August 1990

"Cost Comparison of the Navy's Air Combat Environment Test and Evaluation Facility (ACETEF) and the Air Force's Electronic Combat Integrated Test (ECIT)," IDA Paper P-2727, June 1992

"The Need for Unexploded Ordnance Remediation Technology," IDA Document D-1527, October 1992

"Test and Evaluation Reliance–An Assessment," IDA Document D-1829, June 1996

"A Case Study on the Partnership Between Arnold Engineering Development Center and Loral," IDA Document D-2689, March 2002

"Effect of the Proposed Closure of NASA's Subsonic Wind Tunnels: An Assessment of Alternatives," IDA Paper P-3858, April 2004.

Keywords: Government, Analysis, Reviewing/Monitoring, Policy, Programming, Budgeting, Infrastructure, SD&D, Test and Evaluation, Operations and Support, Acquisition Strategy, Facilities, Infrastructure, Manpower/Personnel, Labor, Overhead/Indirect, Economic Analysis, Study, Database, Case Study, Data Collection

IDA–22

Title: Support to Space Systems Independent Cost Assessments

Summary: The Under Secretary of Defense, Acquisition, Technology and Logistics (AT&L) is taking steps to strengthen the Department's capability to estimate the costs of space systems by realigning management activities and shifting some responsibilities. One of these changes is to transfer responsibility for conducting independent cost estimates for systems under the authority of the DoD Space Milestone Decision Authority from the Air Force to the OSD Cost Analysis Improvement Group (CAIG). IDA has routinely provided the OSD CAIG with data, information and methods for estimating the costs of defense systems. This support is being expanded to include space systems. IDA will provide support to Independent Cost Assessment Teams (ICATs) established to perform independent cost estimates (ICEs) for next generation space systems.

Classification: Classified at various levels

Sponsor: OSD(PA&E)
The Pentagon, Room BE-829
Washington, DC 20301

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Dr. J. R. Nelson, (703) 845-2571, rnelson@ida.org

Resources:

	FY	Dollars	
SBR	2003	$200,000	Mr. Jon M. Sweet, (703) 692-8041
TSAT	2003	$150,000	LTC John Tomick, (703) 692-8039
MUOS	2004	$200,000	Mr. James Wendt, (703) 697-0318
GPSIII	2004	$150,000	Mr. James Wendt, (703) 697-0318

Schedule:

Start	End
Apr 2003	Indefinite

Database: TBD

Publications: TBD

Keywords: Government, Estimating, Space Systems, Life Cycle, Data Collection, Case Study, Mathematical Modeling

IDA–23

Title: Assistance to OSD(PA&E) Independent Cost Estimate of the Pentagon Renovation

Summary: IDA provided assistance to OSD(PA&E) analysts in their independent cost estimate of the Pentagon Renovation and Recovery. The program is a major renovation (roughly $2.5 billion) with unique requirements for force protection and secure information technology and communications infrastructure. The IDA effort had three major elements. IDA prepared a formal description of the renovation program—including information on program content, acquisition strategy, schedule, and areas of risk—that served as the basis and scope of the PA&E cost estimate. IDA also conducted research on commercial construction cost estimating methods, and provided training to the PA&E staff on these methods. Finally, IDA reviewed the final version of the PA&E cost estimate, and assisted in the writing of the final report.

Classification: Unclassified

Sponsor: OSD(PA&E/RA)
Walt Cooper

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Lance Roark (703) 845-2473, lroark@ida.org

Resources:

FY	Dollars	Staff-years
2002	$50,000	0.2

Schedule:

Start	End
Mar 2002	Oct 2002

Database: None

Publications: None

Keywords: Government, Estimating, Reviewing/Monitoring, Facilities, Data Collection, Study

IDA–24

Title: Portfolio Optimization Feasibility Study

Summary: This study began as an investigation of the feasibility of applying optimization technology for defense acquisition planning purposes. Initially we focused on exploring the feasibility of using optimization technology to develop a Master Production Schedule for 80 ACAT1 systems. An initial prototype model was developed for optimizing a Master Production Schedule of 8 systems for 10 years. Beginning August 1999 the study progressed to development of a costing and optimization model for the Master Production Schedule of 80 ACAT1 systems for an 18-year planning horizon, which has since been

expanded to approximately 100 systems. This model was developed in September 2000 and has been deployed to OUSD(AT&L). Since then, RDT&E costs have also been added to the model for ACAT1 systems. The model continues to be modified for performance improvements, updating of underlying data and econometrics, and adding of new ACAT1 systems.

Classification: Unclassified/Proprietary

Sponsor: OUSD(AT&L)
Dr. Nancy Spruill
Mr. Phil Rodgers (COTR)

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Dr. Charles Weber (703) 845-6784, cweber@ida.org

Resources:

FY	*Dollars*	*Staff-years*
1998	$90,000	0.5
1999	$450,000	2.4
2000	$1,200,000	5.6
2001	$450,000	2.4
2002	$200,000	1.1
2003	$200,000	1.1
2004	$200,000	1.1

Schedule:

Start	*End*
Jun 1998	Continuing

Database:

Title: Acquisition Portfolio Scheduling Costing/Optimization Model Database

Description: Production profiles and costs for over 100 ACAT1 and pre-MDAP systems and over 40 production facilities.

Automation: MS ACCESS

Publications:

"Econometric Modeling of Acquisition Category I Systems at the Boeing Plant in St. Louis, Missouri—Revised," IDA Paper P-3548, Revised, June 2001

"Econometric Modeling of Acquisition Category I Systems at the Lockheed-Martin Plant in Marietta, Georgia," IDA Paper P-3590, July 2001

"Econometric Modeling of Acquisition Category I Systems at the Raytheon Plant in Tucson, Arizona," IDA Paper P-3648, June 2002

"The Acquisition Portfolio Schedule Costing/Optimization Model: A Tool for Analyzing the RDT&E and Production Schedules of DoD ACAT I Systems," IDA Document D-2835, October 2003

Keywords: Government, Estimating, Weapon Systems, Production, Acquisition Strategy, Mathematical Modeling, Mathematical Model

IDA–25

Title: Cost-Effectiveness Analysis of Training

Summary: The Under Secretary of Defense (Personnel and Readiness) and the Commander, Joint Forces Command are jointly overseeing a wide-ranging cost-effectiveness analysis of joint and Service training. IDA is providing support for this study effort. This includes consideration of appropriate measures of effectiveness and development of a structure for costing the alternatives.

Sponsor: Deputy Under Secretary of Defense (Readiness)
The Pentagon, Rm. 1C757
Washington, DC 20301

Mr. Fred Hartman, 703-694-6940

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Mr. Stanley A. Horowitz, (703) 845-2450, shorowit@ida.org

Resources:

FY	*Dollars*	*Staff-years*
2004	$519,000	2

Schedule:

Start	*End*
Jan. 2004	Dec 2004

Database: TBD

Publications: TBD

Keywords: Government, Analysis, Policy, Training, Simulation, Study

IDA–26

Title: Analytical Support for the Test and Evaluation Science and Technology (TEST) Program

Summary: IDA activities include research, analyses and special studies to support the management and execution of the TEST Program. Task activities include providing resource analysis, research and analyses of promising technologies, determination of alternative contracting strategies, recommendations on the selection of research and developmental projects, conducting special studies, development of analyses to support preparation of management and resource documentation, and monitoring of research project progress.

Classification: Unclassified

Sponsor: Principal Deputy Director, Director, Operational Test and Evaluation (DOT&E)
1700 Defense Pentagon, Room 3D1067
Washington, DC 20301

Mr. David Duma, (703) 697-4813

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Mr. W. Andrew Wisdom, (703) 845-6962, awisdom@ida.org

Resources:

FY	*Dollars*	*Staff-years*
2001	$ 50,000	.25
2002	$300,000	1.5
2003	$300,000	1.5
2004	$150,000	.75

Schedule:

Start	*End*
Oct 2002	Jan 2005

Database: None

Publications: None

Keywords: Government, Analysis, Test and Evaluation, Study

IDA–27

Title: Resource Analysis for T&E - CTEIP

Summary: IDA activities include research, analyses and special studies to support planning, management and effective execution of the Central Test and Evaluation Investment Program (CTEIP). Primary activities focus on resource analysis to support budget planning, resource allocation to developmental projects, and tracking project-level fiscal execution. Other analysis activities include review of technical justification and documentation for developmental projects to meet joint and/or multi-Service test requirements, identification of project execution issues, and the development of proposed corrective contract or management alternatives.

Classification: Unclassified

Sponsor: Principal Deputy Director
Director, Operational Test and Evaluation (DOT&E)
1700 Defense Pentagon, Room 3D1067
Washington, DC 20301

Mr. David Duma, (703) 697-4813

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Mr. W. Andrew Wisdom, (703) 845-6962

Resources:

FY	*Dollars*	*Staff-years*
2000	$850,000	4.0
2001	$900,000	4.0
2002	$950,000	4.5
2003	$950,000	4.5

Schedule:

Start	*End*
Oct 2002	Sep 2003

Database: None

Publications: None

Keywords: Government, Analysis, Reviewing/Monitoring, Test and Evaluation, Review

IDA–28

Title: Industrial Sector Capability Analysis

Summary: Provide assessments of various weapon production sectors to support DUSD(IP) mission of ensuring that the defense industrial base can reliably provide affordable products and services to support defense needs. Assessments include characterization of the firms' capacity and capabilities, analysis of issues within each of the five Joint Chiefs of Staff capability sectors, and other issues which might affect the industrial base. The task also provides rapid turnaround assessments of breaking issues, particularly the impact of proposed mergers involving defense contractors. Recently completed efforts include analysis of mergers in the areas of solid rocket motors and satellite propulsion, and analysis of capabilities and issues within the Focused Logistics and Command and Control sectors. The task has created and is maintaining a website to allow rapid access to a variety of industrial base research materials, for use by both IDA and sponsor staff. Future scheduled work includes evaluation of methods for designating essential industrial capabilities, and issues within the Force Application capability sector.

Classification: Unclassified Proprietary

Sponsor: DUSD(IP)
3300 Defense Pentagon (Room 3E1060)
Washington, DC 20301-3300
Mr. BJ Penn (703) 607-4046, Ms. Dawana Branch (703) 602-4324

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882
Mr. James Woolsey, (703) 845-2133, jwoolsey@ida.org

Resources:

FY	*Dollars*	*Staff-years*
2001	$700K	3.7
2002	$1.69M	8.5
2004	$165K	0.85

Schedule:

Start	*End*
Jan 2001	Sep 2005

Database: N/A

Publications: TBD

Keywords: Industry, Analysis, Reviewing/Monitoring, Policy, Aircraft, Missiles, Facilities, Infrastructure, Production, Labor, Material, Overhead/Indirect, Manufacturing, Fixed Costs, Variable Costs, Production Rate, Acquisition Strategy, Data Collection, Survey, Economic Analysis, Database, Study

IDA–29

Title: Cooperation with KIDA

Summary: IDA and the Korean Institute for Defense Analyses (KIDA) have been cooperating in the area of cost analysis for several years. KIDA is building a cost analysis capability on their Staff and assisting the MND in developing a similar capability in the Ministry of Defense. IDA is offering advice and assistance and cooperating on joint projects. Visits have been exchanged. A Data Exchange Agreement has been established between the OSD and MND. Cost analysis projects have been conducted jointly by IDA and KIDA.

Classification: Unclassified

Sponsor: IDA
4850 Mark Center
Alexandria, VA 22311-1882
Dr. Stephen J. Balut, (703) 845-2527, sbalut@ida.org

Performer: IDA

Resources:

FY	*Dollars*	*Staff-years*
2004	$10,000	

Schedule:

Start	*End*
Oct 2003	Sep 2004

Database: None

Publications: N/A

Keywords: Estimating, Life Cycle, Case Study

IDA–30

Title: Cost Analysis Education

Summary: IDA and George Mason University (GMU) develop, improve and provide annually a graduate level course in Cost Analysis aimed at novice and intermediate cost analysts who work for or support the DoD. GMU grants credits to those who enroll and successfully complete the course. Government employees are allowed to attend free of charge but receive no credit. This course is one of two core courses in GMU's Master's Degree program in Military Operations Research.

Classification: Unclassified

Sponsor: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Performer: IDA
Dr. Stephen J. Balut, (703) 845-2527, sbalut@ida.org

Resources:

FY	*Dollars*	*Staff-years*
2004	$10,000	

Schedule:

Start	*End*
Jan 2004	May 2004

Database: None

Publications: Course material

Keywords: Estimating, Analysis

IDA–31

Title: Cooperation with MinDef, Singapore

Summary: The Institute for Defense Analyses (IDA) and the Ministry of Defense (MinDef) of Singapore have established collaborative links for the purpose of pursuing topics of mutual interest and benefit. In January, 2003, a workshop was conducted on the topics of Cost Estimation of Development Systems, Political Islam, and Effects-Based Operations. A second workshop was conducted in Singapore later in 2003. A third workshop is in planning for late 2004. These workshops improve IDA's understanding of Asian defense issues, which, in turn, is applied to our work in support of the DoD.

Classification: Unclassified

Sponsor: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882

Performer: IDA
Dr. Stephen J. Balut, (703) 845-2527, sbalut@ida.org

Resources:

FY	Dollars	Staff-years
2004	35,000	

Schedule:

Start	*End*
Oct 2003	Sep 2004

Database: N/A

Publications: TBD

Keywords: Reviewing/Monitoring

IDA–32

Title: Rational Limits on the Standardization of Federal Processes Across Agencies

Summary: This project seeks to develop a methodology for evaluating trade-offs between requiring government-wide use of what is at least nominally a single system and permitting agencies wide latitude to develop their own systems, subject to general guidelines.

Classification: Unclassified

Sponsor: Deputy Under Secretary of Defense (Program Integration) OUSD(P&R)
The Pentagon, Room 3E763
Mr. John Richards, (703) 697-0617
Director, Acquisition Resources and Analysis USD(AT&L)
The Pentagon, Room 3E1025
Mr. Phillip Rodgers, (703)614-5420

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882
Dr. David L. McNicol

Resources:

FY	*Dollars*	*Staff-years*
2003	$269,000	1.1
2004	$81,000	0.3

Schedule:

Start	*End*
Dec. 2003	Dec. 2004

Database: None

Publications: None

Keywords: Government, Analysis, Acquisition Process, Review, Study

IDA–33

Title: Incentivizing Jointness in Department of Defense (DoD) Acquisition Programs

Summary: The objective of this task is to identify ways to increase incentives for jointness, and remove obstacles to achieving it, in DoD acquisition programs. Drawing on recent studies, initiatives, and program experience, the study also will indicate areas in which the need for additional jointness in acquisition seems to be greatest.

Classification: Unclassified

Sponsor: Director, Acquisition Resources and Analysis USD(AT&L)
The Pentagon, Room 3E1025
Dr. Robert Buhrkuhl, (703) 697-0476

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882
Dr. David L. McNicol

Resources:

FY	*Dollars*	*Staff-years*
2004/5	$200,000	0.7

Schedule:

Start	*End*
June 2004	March 2005

Database: None

Publications: None

Keywords: Government, Analysis, Policy, Programming, Budgeting, Study, Acquisition Process

IDA–34

Title: Rolling Capture of Acquisition Lessons Learned

Summary: The purpose of this task is to provide the Under Secretary of Defense (USD) Acquisition, Technology, and Logistics (AT&L), on a rolling basis, lessons drawn from DoD experience with acquisition of major weapon systems. This objective encompasses both studies that draw lessons learned from the experience of particular major programs, or sets of major programs, and efforts to increase the completeness, transparency, and timeliness of the relevant data.

Classification: Unclassified

Sponsor: Director, Acquisition Resources and Analysis USD(AT&L)
The Pentagon, Room 3E1025
Dr. Robert Buhrkuhl, (703) 697-0476

Performer: IDA
4850 Mark Center Drive
Alexandria, VA 22311-1882
Dr. David L. McNicol, (703) 845-4369

Resources:

FY	*Dollars*	*Staff-years*
2004/5	$750,000	2.8

Schedule:

Start	*End*
June 2004	March 2005

Database: TBD

Publications: None

Keywords: Government, Analysis, Reviewing/Monitoring, Acquisition Process, Schedule, Review, Study

IDA–35

Title: Effects of Deployment and PCS on Retention and Readiness

Summary: The objective of this project is to provide DoD policy makers with best existing information, based on careful quantitative analysis, about the effects of different kinds of perstempo and relocations on retention and readiness. Provide an exchange of information among policy-makers and researchers, in order to explore what issues are most crucial and which effects are most in need of further empirical research. Identify the gaps in research and in data that need to be remedied to meet these needs. Formulate a plan of attack to begin to fill the gaps.

Classification: Unclassified

Sponsor: Under Secretary of Defense (Personnel and Readiness)

Performer: Institute for Defense Analyses
Stan Horowitz, (703) 8452450

Resources:

FY	*Dollars*	*Staff-years*
01	150K	0.75

Schedule:

Start	*End*
Aug. 01	Sep. 04

Database: none

Publications: TBD

Keywords: Government, Analysis, Manpower/Personnel, Readiness, Study

IDA–36

Title: Evaluating, Managing and Forecasting Army Equipment Readiness

Summary: This is envisioned as a multi-faceted, long-term research program. It will address the following sub-tasks:

a. Examine the current organization of Army maintenance and supply. This will include consideration of (1) the incentives created by current organization and policy, (2) the adequacy and quality of Army data on failure rates, and (3) organizational or policy changes that might facilitate wartime and/or high-tempo operations. Recent wartime experience will be drawn on to help identify problems.

b. Develop relationships to predict readiness. Historical data and econometric techniques will be used to relate readiness to expenditures and other relevant factors.

c. Develop or adapt multi-echelon sparing algorithms for Army equipment. Illustrate their potential impact in selected cases.

d. Develop a multi-year resource allocation tool that incorporates multi-echelon sparing concept and calculates how best to allocate the spare parts budget over time.

e. Analyze how Army support organizations could best prepare to meet the requirement that they report to the Defense Readiness Reporting System.

f. Analyze how greater attention to reliability and maintainability in the design process could reduce the life cycle cost of Army equipment.

Classification: Unclassified

Sponsor: Director, Program Analysis and Evaluation

Performer: Institute for Defense Analyses
Stan Horowitz, (703) 8452450

Resources:

FY	*Dollars*	*Staff-years*
04	150K	0.75

Schedule:

Start	*End*
May 04	Apr 05

Database: none

Publications: TBD

Keywords: Government, Analysis, Spares/Logistics, Reliability, Sustainability, Study

IDA–37

Title: Modernizing the USAF Air-Refueling Tanker Fleet

Summary: The primary purpose of this task is to provide improved information on the purchase price of the KC-767 aircraft for use in consideration of DoD lease and buy alternatives for recapitalizing the aerial refueling tanker fleet.

Classification: Unclassified/Proprietary

Sponsor: USD (AT&L) and OSD (PA&E)

Performer: Institute for Defense Analyses
Dr. J. R. Nelson (703) 845-2571

Resources:

FY	*Dollars*	*Staff-years*
2003	$535,000	2.5

Schedule:

Start	*End*

	Feb 03 Oct 03
Database:	Proprietary
Publications:	"Purchase Price Estimate for the KC-767A Tanker Aircraft (Redacted Version)," IDA Paper P-3802, July 2003
Keywords:	Government, Estimating, Aircraft, SD&D, Production, Study

IDA–38

Title:	Advanced SEAL Delivery System
Summary:	IDA supported the Naval Cost Analysis Division in estimating the life-cycle cost to complete development and to procure, operate, and sustain a new small underwater delivery system for Navy SEALs.
Classification:	Secret/Proprietary
Sponsor:	NCAD
Performer:	Institute for Defense Analyses Dr. J. R. Nelson (703) 845-2571
Resources:	*FY* *Dollars* *Staff-years* 2003 200K 1.0 2004 30K
Schedule:	*Start* *End* Jul 03 Mar 04
Database:	
Publications:	TBD
Keywords:	Government, Analysis, Estimating, SD&D, Production, Life Cycle, Study

REFERENCES

[1] DoD Regulation 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs," April 5, 2002.

[2] Stephen J. Balut and Kathryn L. Wilson, "The IDA Cost Research Symposium," Institute for Defense Analyses, Document D-647, August 1989.

[3] Stephen J. Balut and Kathryn L. Wilson, "1990 IDA Cost Research Symposium," Institute for Defense Analyses, Document D-828, August 1990.

[4] Stephen J. Balut and Kathryn L. Wilson, "The 1991 Cost Research Symposium," Institute for Defense Analyses, Document D-1003, July 1991.

[5] Stephen J. Balut, "The 1992 IDA Cost Research Symposium," Institute for Defense Analyses, Document D-1204, August 1992.

[6] Stephen J. Balut, "The 1993 IDA Cost Research Symposium," Institute for Defense Analyses, Document D-1414, August 1993.

[7] Stephen J. Balut, "The 1994 IDA Cost Research Symposium," Institute for Defense Analyses, Document D-1569, August 1994.

[8] Stephen J. Balut, "The 1995 IDA Cost Research Symposium," Institute for Defense Analyses, Document D-1754, August 1995.

[9] Stephen J. Balut, "The 1996 IDA Cost Research Symposium," Institute for Defense Analyses, Document D-1863, August 1996.

[10] Stephen J. Balut, "The 1997 IDA Cost Research Symposium," Institute for Defense Analyses, Document D-2025, July 1997.

[11] Stephen J. Balut, "The 1998 IDA Cost Research Symposium," Institute for Defense Analyses, Document D-2173, August 1998.

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14. ABSTRACT
At the annual IDA Cost Research Symposium, the OSD's Cost Analysis Improvement Group (CAIG) meets with representatives from selected Government offices, Federally Funded Research and Development Centers, military universities, and other organizations involved in defense-related cost research to discuss ongoing and planned cost studies. The theme of the 2004 IDA Cost Research Symposium was cost research management. This document contains presentations made by symposium panel members on various topics related to the theme. An appendix contains summaries of current and planned cost research projects at the offices and organizations that participated in the symposium.

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