

**DEVELOPMENT OF AN ASSESSMENT PROCESS FOR THE EVALUATION OF
CONTRACTOR PERFORMANCE MEASUREMENT BASELINES**

by

Christopher D. Mushrush

Project and report submitted to the Faculty of the

Virginia Polytechnic Institute and State University

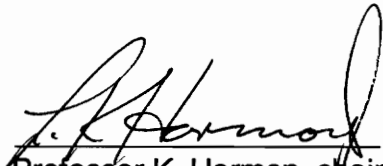
in partial fulfillment of the requirements for the degree of

MASTERS OF SCIENCE

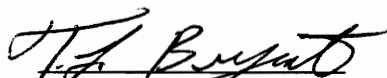
IN

SYSTEMS ENGINEERING

APPROVED:



Professor K. Harmon, chair



Mr. T. Bryant



Dr. B. Blanchard

December 1995

Falls Church, Virginia

Key words: Baseline, Assessment, IBR, PMBA, C/SCSC

C.2

LD
5655
V851
1995
M874
C.2

DEVELOPMENT OF AN ASSESSMENT PROCESS FOR THE EVALUATION OF CONTRACTOR PERFORMANCE MEASUREMENT BASELINES

by

Christopher D. Mushrush

Professor K. Harmon, Chairman

Systems Engineering

(Abstract)

This report details the work performed on an assessment process for evaluating contractor Performance Measurement Baselines (PMBs). The necessity for this effort is justified because if the contractor does not have a realistic PMB (plan) the contract will not be able to be executed on cost, schedule, or including the necessary technical parameters. Unrealistic baselines have been recognized as a problem by the Department of Defense (DoD) Investigator General, and the need for assessing the baselines was endorsed by a multitude of DoD executives.

Progression from defining the need for the process to actually testing it on actual assessments was performed. In defining the need for the process background was given for why this type of assessment is needed as well as providing specific guidance which had been issued up to and including the time of this project. Definition of the operational requirements for the process was the next task accomplished in the performance of this project.

Once the requirements were defined functional analysis was performed. This analysis allowed for a better understanding of what is involved with the assessment.

Next, an assessment team organization was developed. The project details the individuals involved in the assessment as well as their roles and responsibilities.

The Plan of Actions and Milestones (POA&M) was used as the prototype. Detailed tasks and their timing were explained in this section of the report.

A specification provides back-up for the process. This specification includes aspects such as operational requirements, the maintenance concept, training concept, and documentation requirements.

Type 4 testing was used (1). This testing required actually testing aspects of the process on assessments. Lessons learned/results were then included in the text of this report.

The project resulted in a very useful process which will be used in my place of employment. Helping with the implementation of the process will be various tools (POA&M, team organization, reports, etc.) which will be provided on software.

This project was very beneficial in allowing me to get a better understanding of the Systems Engineering Process. While this was not a standard physical system the Systems Engineering Process was still applicable.

Table of Contents:

	<u>Page(s)</u>
Abstract	ii
Project Introduction	1
Conceptual Design	
Definition of Need/Problem Identification	6
Operational Requirements	11
Conceptual Design Criteria	16
Preliminary Design	
Allocation of Requirements/Functional Analysis	18
Trade-off Analysis/Economic Comparisons	25
Preliminary Design Criteria	33
Detail Design	
Management Assessment Team Organization	35
Management Assessment Plan of Objectives and Milestones	40
Discussion Assessment/Concern Area Forms	47
Specification	49
Test and Evaluation	53
Detail Design Criteria	59
Project Feedback	60
References	61

Project Introduction:

The process which was developed was a process for assessing the adequacy of a contractor's Performance Measurement Baseline (PMB). A PMB is a time-phased budget plan against which a contractor's performance is measured on a contract. The problem that this process is trying to address is unrealistic PMBs for the execution of Department of Defense contracts. An unrealistic PMB will not facilitate the execution of a contract on cost, schedule or including the technical parameters needed. In addition, performance against an unrealistic baseline is not always meaningful. While these assessments will not solve the problem of underfunded contracts or unrealistic schedule constraints, problems will be found earlier in contracts allowing program managers more time to act on them.

This project was chosen since there was a vital requirement for this work in my place of employment, the Naval Air Systems Command (NAVAIR). In developing this process progression from defining the need to actually testing and implementing aspects of this process on actual contracts was made. An attempt was made to apply the entire systems engineering process where applicable.

The methodology employed for this project was to follow the systems engineering process. In performing this project, the application of the systems

engineering process began in December 1994 and was concluded in December 1995. Only top level efforts in this area had been performed prior to December 1994. Since assessments were being performed concurrently with this project, as new ideas were found they were incorporated into the methodology used for these assessments.

Even though this is an assessment process the systems engineering process was still applicable. While it is hard to visualize a process which will assess contractor's plans, analogous to this would be an assessment process for evaluating a water sample. In the water sample we may be evaluating particulates, bacteria, or acidity; however, in the PMB assessment process technical scope, budget, schedule, and methods for taking credit for work will be assessed.

Figure 1 is provided to demonstrate how the PMB assessment process impacts the program management process. While the acquisition strategy and plan are the responsibility of the government program manager. The PMB assessment process will affect the other functions of program management for both the government and contractor program manager.

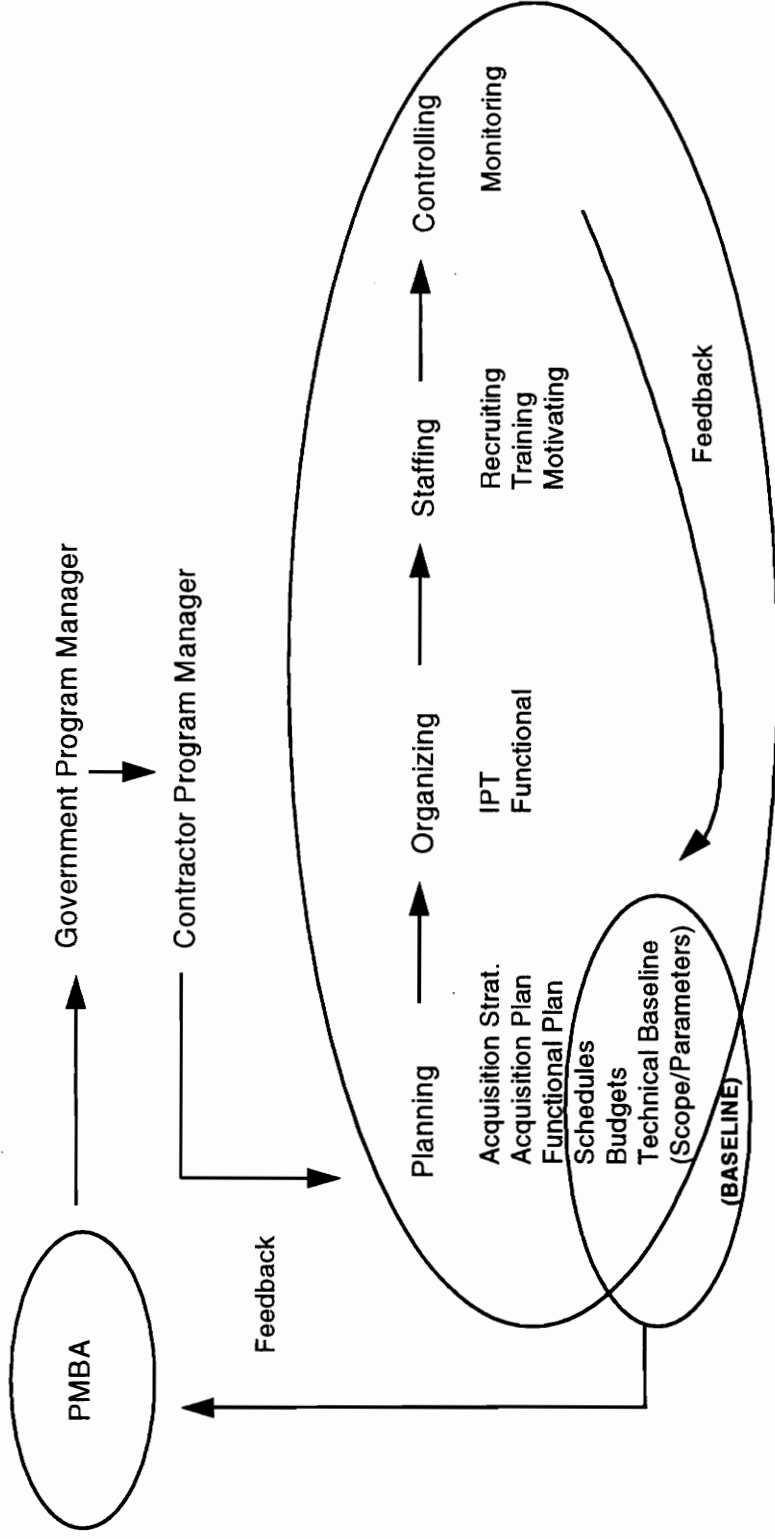
If major concerns are found during the assessment the program manager may decide to change the acquisition strategy or plan. Also, specific functional plans such as the test and evaluation master plan or software development plan may be affected. The schedules, budgets, or technical baseline/parameters,

which is what makes up the PMB, may have to be replanned if warranted. Staffing or the organizational scheme may be affected if better ways of doing business are found. Controlling/monitoring is a major area which will be affected. This is true because now the program manager and their team will have a better understanding of the plan for contract execution, and what the performance reporting data will mean as it is received (2).

An assumption which will be made is that there was not a currently developed process. This is a valid assumption as the initial work performed prior to December 1994 was top level, and the majority of which had been performed by myself. While it appears the project was completed in one semester period, in actuality it was performed in just over one year. Even though the development of this process was performed in concurrence with actual PMB assessments, it was very beneficial to apply the systems engineering process.

The systems engineering process was applied very early in this processes life. Even though this is the case, the process will be evolving throughout its life. As each assessment is performed valuable lessons will be used for future work. Stepping into the development of this process early its life allowed the use of a structured approach for the development.

PROGRAM MANAGEMENT FUNCTIONS AS IMPACTED BY THE PMBA



Program Management Functions as Impacted by the PMBA
Figure 1

Conceptual Design

Problem Identification/Definition of Need:

On 11 March 1993 the Department of Defense (DoD) Inspector General issued audit report number 93-067 entitled "Use of Contractor Cost and Schedule System Data". One of the findings from this audit stated that the sufficiency of PMBs was not adequately determined (3).

Historically the government would go to the contractor after a contract had been awarded with a team of personnel and make sure that the contractor had implemented the existing Management Control System (MCS) or procedures at the facility. This review of a contractor's subsequent application of the MCS on a new contract is called a Subsequent Application Review (SAR). While these reviews were useful in making sure the contractor was following procedures, direct attention was not paid to the technical scope of work that the contractor had signed up to accomplish. Schedule and budget issues were also not focus areas of the SARs.

The major problem with not focusing on technical, schedule, and budget issues is that the PMB may not reflect the actual work being performed or the work consistently with how it will be performed. Another problem is that the government program manager, who is the owner of the PMB that the contractor develops, was not historically a major participant in the SARs. Being the

responsible party for the PMB on the government side the program manager needs to take responsibility/ownership for it.

Each year the government obligates billions of dollars with defense contractor's. The government accepts a large portion of the risk in a majority of these cases by issuing cost type contracts or fixed price contracts with incentives. In an effort to protect the tax payers' money it is important to manage these funds wisely. In many instances budgets for contracts become unrealistic through the negotiation process. There have been many instances where the target cost for a contract has grown over 100% during the life of the contract.

In reviewing the procurement documents that have been routed through the cost department over the last three years approximately 43% of the contracts being awarded required performance measurement reporting on them. This fact indicates the amount of risk involved with the contracts being awarded, and also the necessity to understand the plans that the contractors are making to accomplish the work.

One instance where the PMB was unrealistic, which was highly publicized was with the A-12. A fixed price incentive contract was awarded to McDonnell Douglas and General Dynamics for a target price of \$4.6B in January 1988. Cost performance reporting was required on the contract due to the contract type, length, and nature. As early as March of 1989 trends started indicating that there was a potential overrun to the target cost of this contract. Also, it was

beginning to become evident that the schedule was unrealistic. It was not until March of 1990 that representatives from the Office of the Secretary of Defense briefed a forecast of a potential overrun of \$1B to the contact ceiling (4).

By assessing the contractor's PMB early in the performance of the contract unrealistic plans or budgets may have been unearthed earlier. Many of the problems that it took two years to find in the A-12 example may have been found early after contract award.

Recognizing the need for an evaluation of the PMBs that contractor's develop, very general guidance has been issued. The first of these was 25 January 1994 by the Principal Deputy Under Secretary of Defense. This guidance stated that program managers and their technical staff are expected to assess contract baselines for adequacy within six months of contract award. This guidance further stated that the assessment would be conducted on all contracts which required compliance with the Cost/Schedule Control Systems Criteria (C/SCSC) or require Cost/Schedule Status Reports (C/SSRs) (5).

Next, the Navy followed up this guidance with a memorandum on 22 February 1994 stating that the above guidance should be implemented. Further, the assessments were to be coordinated with the cognizant performance measurement organizations (6).

Keeping in line with the above guidance, on 22 April 1994 the Acquisitions Operations Council of NAVAIR signed the implementing guidance

for NAVAIR which stated the program managers would lead the assessments which were termed Integrated Baseline Reviews (IBRs). Throughout this paper IBRs will be used synonymously with PMB Assessments (PMBAs). The cost department which includes the performance measurement organization was made the process owner as they are the common link on each of the reviews. This is true since each IBR will be led by a different program office. The cost department was also made responsible for the budget assessment since they perform the cost estimates for the contracts. Technical assessments were left to the cognizant engineering groups. The contracting officer was made responsible for incorporating the appropriate contractual language into the contracts (7).

On 13 March 1995 the Assistant Secretary of the Navy for Research Development and Acquisition published a memorandum stating that she was pleased with the implementation of the IBRs to date. She further stated that the performance measurement offices should work closely with the program managers in the baseline assessments (8).

This project will focus on developing a process which will address technical, schedule, budget, earned value, and MCS issues. A major objective of this process will be to get the technical, cost, and program management personnel working together to obtain a global understanding of the PMB that the contractor has developed for the execution of the contract in question. While the

PMB will be the focus of the assessment, Management Reserve (MR) should also be assessed as an adequate MR will be needed for unexpected events that occur in the execution of the contract.

Operating Requirements:

The primary mission of the process is to assess the contractor's PMB shortly after contract award. This assessment will encompass the scope which was included in the contract including the technical parameters needed, the schedule for the contract, the budget which the contractor has spread for the contract completion, and finally how the contractor is planning to take credit (Earned Value) for the work on the contract. As subcontractors can account for a large portion of a contract, steps must be taken to assess these plans as well.

A secondary objective of this process will be to get the government Program Manager and their technical staff more involved with performance measurement data. Since the Program Manager is the owner of the PMB, they need to get more involved with performance measurement and take an active role in assessing the PMB. Also, in the past cost and schedule data was solely the responsibility of cost personnel and engineers were not involved with the information. Since technical, cost, and schedule issues are all dependent on each other it would be beneficial for government technical personnel to be able to understand cost and schedule data and use the information to help them manage the contract or their portion of it.

This process will be defined for two operating conditions which are for contracts which are required to comply with the C/SCSC, or contracts which

require C/SSR reporting. This would include all non-Firm Fixed Price contracts exceeding \$5M in constant FY90\$, extending more than twelve months, and have some tangible end product. C/SCSC, which requires more rigid management procedures, is required on all Research and Development contracts over \$60M in FY90\$. For production contracts the C/SCSC threshold is \$250M in FY90\$ (9). In most instances the report which is generated when C/SCSC is required is the Cost Performance Report (CPR).

The CPR is a more encompassing report than the C/SSR. CPR reporting includes Work Breakdown Structure (WBS), functional or Integrated Product Team, baseline, staffing, and analysis reporting, while the C/SSR only covers WBS and variance analysis reporting. The CPR also provides monthly data while the C/SSR provides cumulative information only. Work scheduled, work performed, actual cost of work performed, and estimates of costs at completion are the major elements reported in both of the reports.

The process must be capable of being employed within six months of contract award. Flexibility is a key to this process as it will be used by multiple Program Managers, who each have a different idea of how they would like to perform the assessment. Also, since each assessment will consist of a different group of engineers it is imperative that the process is able to be taught to multiple individuals in a short amount of time.

This process will be used frequently since a large amount of contracts requiring cost reporting are awarded yearly. The assessment must not require an excess amount of performance measurement personnel since multiple reviews may be occurring simultaneously.

It is expected that the process will require approximately 10-20 personnel to accomplish a typical assessment. This fact is justified in more detail later in this project. A large portion of the work for this assessment will be at NAVAIR; however, an on-site visit to the contractor is required in most cases. Since NAVAIR has contracts all over the world the process must allow flexibility for the on-site visit.

The process will be in use three to six months after contract award. An assessment can not be made until the contractor lays in the PMB which normally occurs within two to three months of contract award. The duration of the review will vary depending on the complexity of the contract. Typically the on-site portion of the review will last one to four days. Also, a large portion of the work will take place prior to going on-site.

The effectiveness of the assessment could be measured in many ways. Some of the methods for measuring the effectiveness would be the tracking the duration of the assessments by contract value, tracking the ability to meet the Plan of Actions and Milestones (POA&M), and also monitoring the issues/

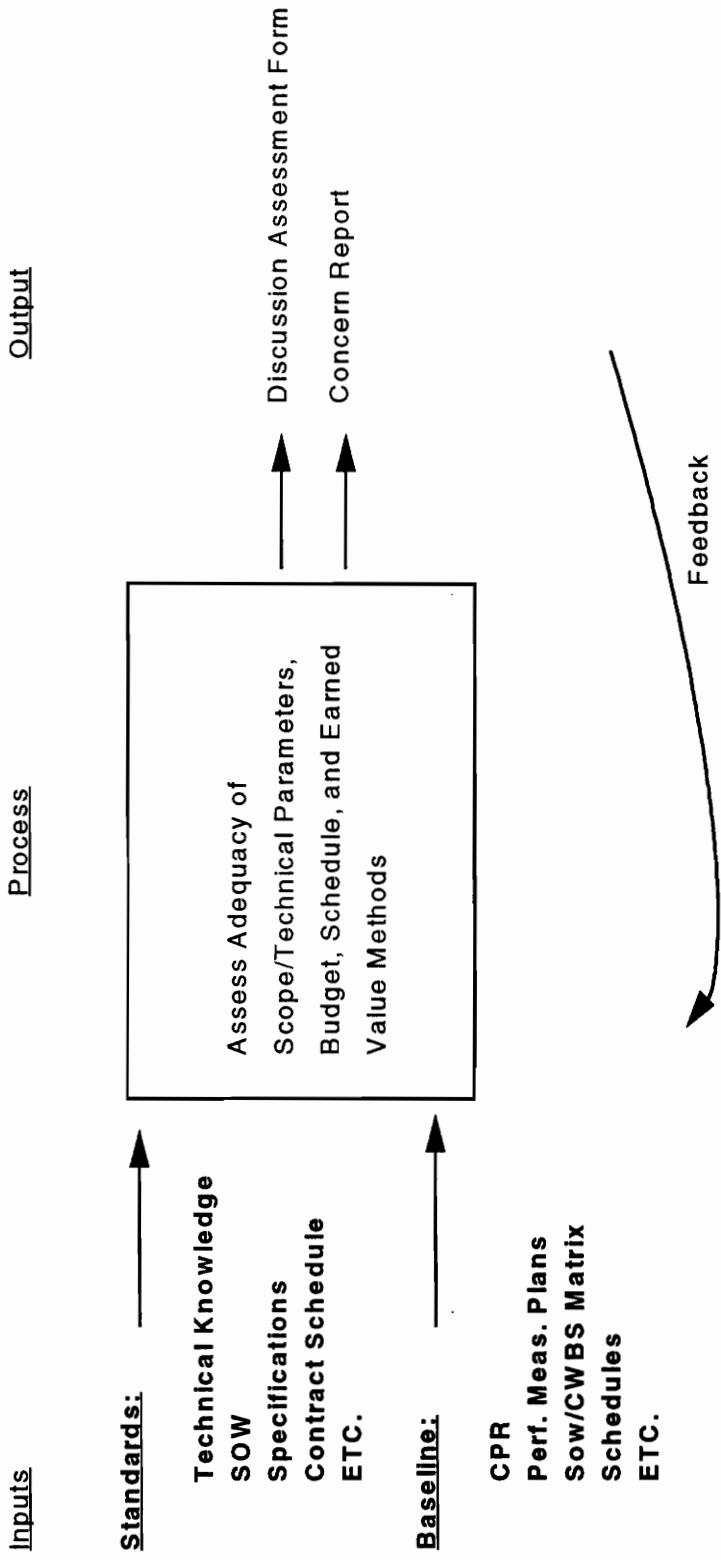
concerns which are generated from the assessments. As the contract progresses the issues/concerns can be monitored and acted on as warranted.

A database of sample findings and lessons learned also needs to be established. This information will help future users of the process in conducting a more efficient assessment. As lessons learned are constantly gathered the PMBA will be a constantly evolving process.

Maintenance of the process will be the responsibility of the cost department as they are the process owners. There can only be one level of maintenance as the NAVAIR cost department is the only common link to the review teams that perform the PMBAs. This level of maintenance could be considered the organizational level since the cost department is involved with each assessment and adjustments can be made on the spot. Maintenance will encompass keeping the process up to date on changes in performance measurement, program management tools, and engineering practices. One of the maintenance practices will be to update the process with the lessons learned from previous assessments. This must occur after each assessment to make sure that the latest techniques/findings are incorporated into the process. These lessons learned will be the backbone for continuous improvement to the process. Representatives from program offices and engineering groups should be used for the updating of the process as they will be the true users.

A conceptual representation of this process can be found in Figure 2.

PERFORMANCE MEASUREMENT BASELINE ASSESSMENT



Performance Measurement Baseline Assessment
Figure 2

Conceptual Design Criteria:

Operational Requirements:

Has the need for the process been established?	Yes
Has the process life cycle been defined?	Yes
Has the operational deployment been defined?	Yes
Have process use requirements been defined?	Yes

Effectiveness Measures:

Have effectiveness measures been defined?	Yes
Can the effectiveness measures be measured?	Yes

Maintenance Concept:

Have the levels of maintenance been defined?	Yes
Have basic maintenance functions been defined?	Yes

Preliminary Design

In the preliminary design phase of this project many systems engineering principles were applied including functional analysis, tradeoff analysis, and economic analysis. A preliminary representation of this process can be found in Figures 3 & 4.

Allocation of Requirements:

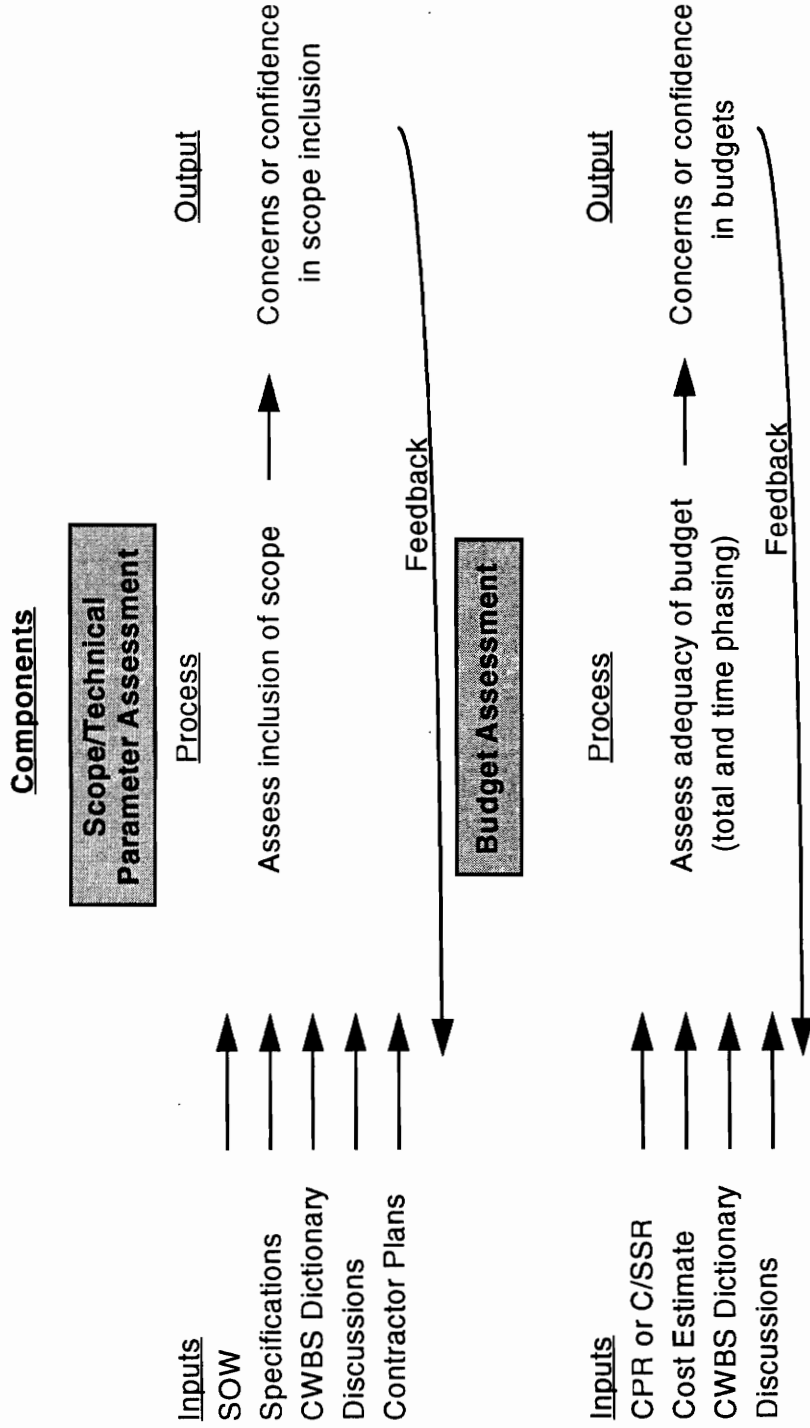
The requirements for this process are at the top level. Since this is the case allocation of requirements is not necessary and would not make sense. If this was a classical physical type system requirements would then be allocated to the subsystem level.

Functional Analysis:

The functional analysis allowed me to identify the critical functions required to accomplish an assessment of a contractor's baseline. Each of the functions will be described in the detail design section of this paper. The five major functions of the process which will be further explored later are the assessment of scope (including technical performance parameters), schedule, budgets, earned value techniques, and management procedure application. All of these items are critical in the assessment. In regards to maintenance there

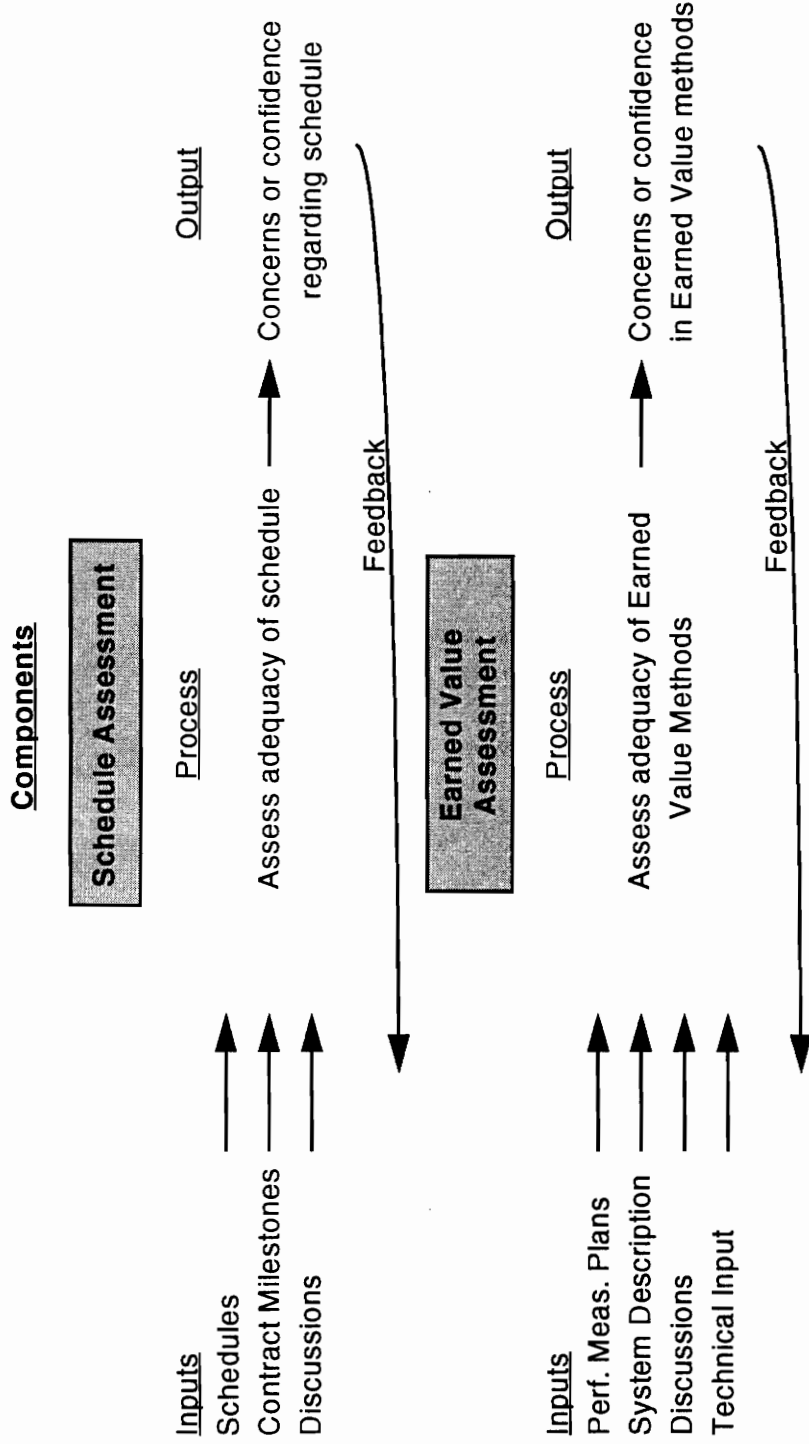
are two activities which can trigger the maintenance of the process which are the assessment of a baseline or a change in policy. See figures 5 through 7 for the functional analysis.

PERFORMANCE MEASUREMENT BASELINE ASSESSMENT



Performance Measurement Baseline Assessment
Figure 3

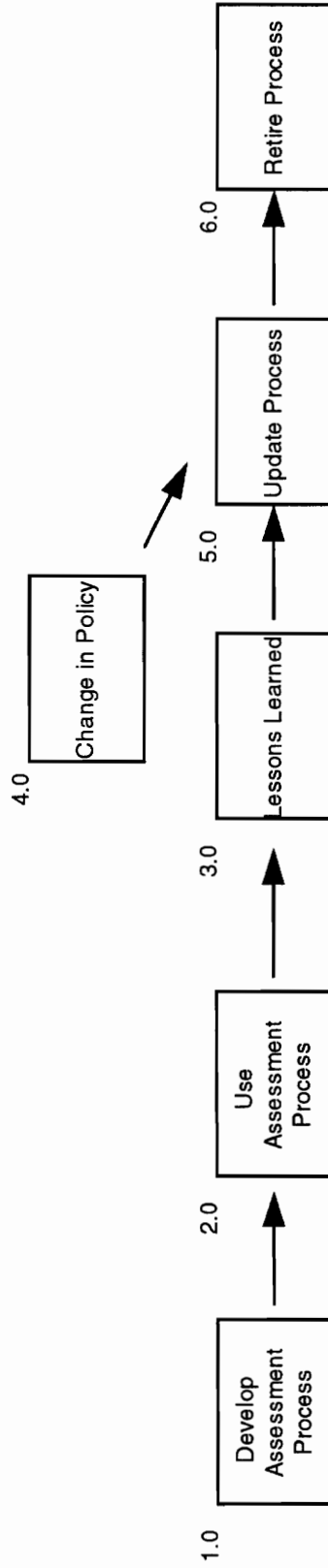
PERFORMANCE MEASUREMENT BASELINE ASSESSMENT (CONTINUED)



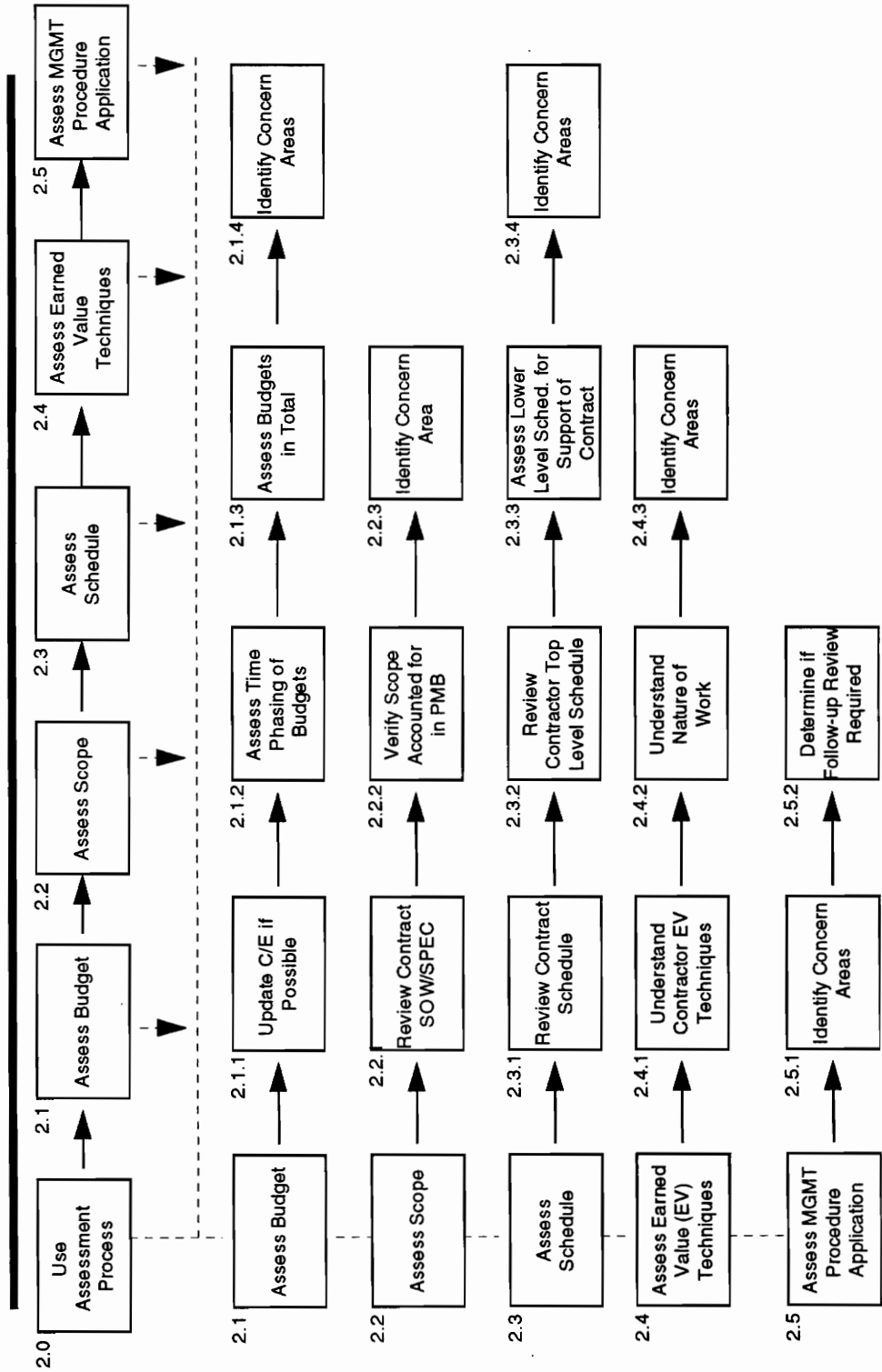
Performance Measurement Baseline Assessment
Figure 4

PERFORMANCE MEASUREMENT BASELINE ASSESSMENT (PMBA) FUNCTIONAL ANALYSIS

Operational Flow

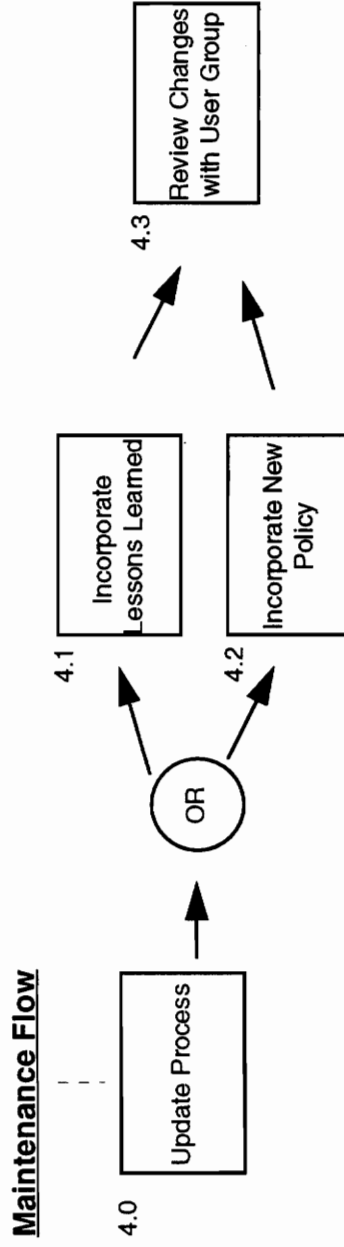


PERFORMANCE MEASUREMENT BASELINE ASSESSMENT (PMBA) FUNCTIONAL ANALYSIS



PMBA Functional Analysis
Figure 6

PMBA FUNCTIONAL ANALYSIS (Cont.)



PMBA Functional Analysis
Figure 7

Trade-off/Economic Analysis:

In performing trade-off analysis for the assessment process four alternatives were considered. The alternatives considered were performing a full PMBA and a SAR, a selective PMBA and a SAR, a full PMBA, or only a selective PMBA. Evaluation factors were the duration of the review, the cost of performing the review(s), and the quality of the product. Details of this comparison can be found in figures 8 through 12.

The duration of the review is important because we are using multiple individuals for the assessment. This is an important fact because these individuals have a large amount of responsibility and can not afford to devote an extensive amount of time to this effort. Also affected by the duration of the review is the contractor. Multiple individuals will be affected from the contractor's organization and shorter amount of time they are diverted from performing the work on the contract the better. In selecting an alternative this was a key factor considered.

Second, is the cost of the assessment. This factor ties directly into the first since time is money. In evaluating the cost, only costs on the government side will be evaluated; however, it can be assumed that costs will be incurred on the contractors side as well. The costs which will be looked at are those that the program manager will be exposed to. This is valid since the program manager

will be leading the review. These costs could be considered life cycle costs of the PMBA as they encompass all of the work for the assessment that a program manager would be exposed to. In evaluating the costs of the reviews various assumptions were made. One assumption is that the average duration for a SAR is five days, and the average duration for a PMBA is three days. This is a valid assumption based on multiple years of performing SARs, and the experience from conducting 12 PMBAs to date. The duration for the PMBAs have ranged from one day to five, but on average the duration has been three days.

Another assumption which was made is that the average size of the team for both the SAR and the PMBA is 15 team members. Further, eight of these team members were assumed to be Expense Operating Budget (EOB), and seven Defense Business Operating Fund (DBOF) personnel. This is important because the program manager must fund DBOF personnel while EOB employees are free to the program manager. The assumption for the team size will be further justified with the team organization which is forthcoming.

It was assumed that seven rental cars would be needed for the review in both the SAR and PMBA cases. This is the case since personnel will be coming from various locations at different times.

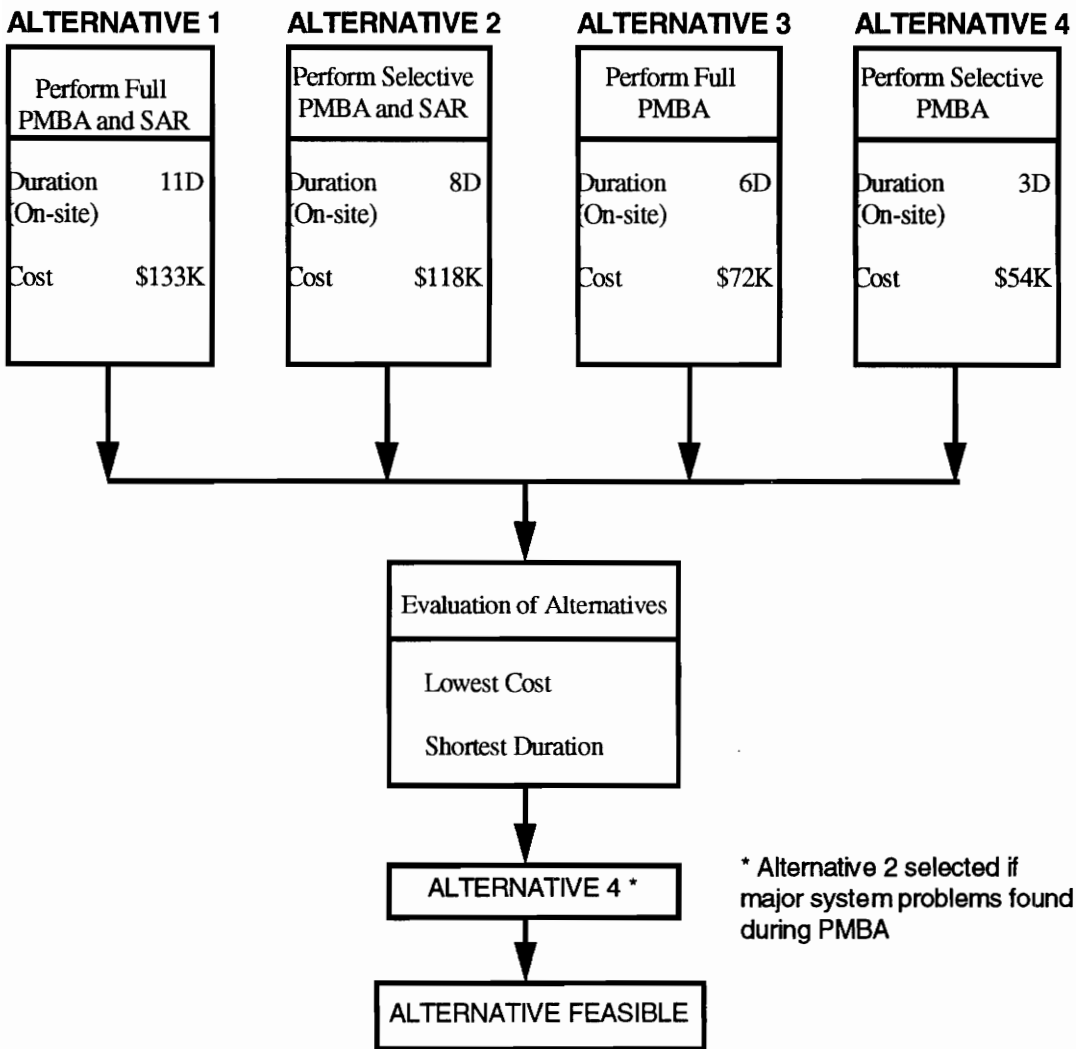
Travel expenses, which include flight, rental car, and Meals and Incidental Expenses (M&IE) were based on averages from the defense travel

guide. Using this type of estimate is valid since the same average costs were used for both the SAR and PMBA.

After a full evaluation was made the alternative of conducting a selective PMBA was chosen with one exception. The exception to the alternative selection was that if after conducting the baseline assessment major concerns were found with the application of the contractor's procedures the government may conduct a SAR or management procedure review. If this were the case it would mean that the second alternative would be valid.

The alternative of a selective PMBA is valid since it requires the least amount of time and money to conduct. Also, it has been found on past reviews that by having discussions with less than 50% of the managers over 80% of the dollarized baseline assessed. In some cases discussions with only 20% of the manager's had the same results. By covering a large portion of the budget as stated we are still getting a highly quality product.

PERFORMANCE MEASUREMENT BASELINE ASSESSMENT (PMBA) TRADE-OFF ANALYSIS



IBRTRDOF.PPT

PMBA Trade-off Analysis
Figure 8

PERFORMANCE MEASUREMENT BASELINE ASSESSMENT (PMBA) VERSUS SUPPLEMENTAL APPLICATION REVIEW (SAR) ECONOMIC ANALYSIS

ASSUMPTIONS

	<u>SAR</u>	<u>PMBA</u>
Number of Days (on-site)	5	3
Prior to on-site	10	10
Team Members	<u>15</u>	<u>15</u>
EOB	8	8
DBOF	7	7
Rental Cars	7	7

ANALYSIS

Direct Effort	$\$120,000/\text{YR} * 15 \text{ Days} * 7 \text{ People} =$ 260 Days/YR	$\$120,000/\text{YR} * 13 \text{ Days} * 7 \text{ People} =$ 260 Days/YR
	<u>\$48,462</u>	<u>\$42,000</u>
Travel	$\$500/\text{Fit} * 15 \text{ People} =$	$\$500/\text{Fit} * 15 \text{ People} =$
	<u>\$7,500</u>	<u>\$7,500</u>
Cars	$\$26/\text{Day} * 5 \text{ Days} * 7 \text{ Cars} =$	$\$26/\text{Day} * 3 \text{ Days} * 7 \text{ Cars} =$
	<u>\$910</u>	<u>\$546</u>
M&IE	$\$32/\text{Day} * 15 \text{ People} * 5 \text{ Days} =$	$\$32/\text{Day} * 15 \text{ People} * 3 \text{ Days} =$
	<u>\$2,400</u>	<u>\$1,440</u>

PMBA Economic Analysis
Figure 9

PMBA VERSUS SAR ECONOMIC ANALYSIS (Cont.)

ANALYSIS

Lodging	\$75/Night * 15 People * 4 Nights = <u>\$4,500</u>	\$75/Night * 15 People * 2 Nights = <u>\$2,250</u>
<u>TOTAL</u>	<u>\$63,772</u>	<u>\$53,736</u>

There is an approximate cost savings of 16% by performing a PMBA versus SAR

The overall benefit of performing an PMBA over a SAR is a better quality product

PMBA VERSUS SAR ECONOMIC ANALYSIS (Cont.)

ASSUMPTIONS

Number of Days (on-site)
 Prior to on-site
 Team Members
 EOB
 DBOF
 Rental Cars

FULL PMBA

6
 10
15
 8
 7
 7

ANALYSIS

Direct Effort

$\$120,000/\text{YR} * 16 \text{ Days} * 7 \text{ People} =$
 260 Days/YR **\\$51,692**

Travel

$\$500/\text{Fit} * 15 \text{ People} =$ **\\$7,500**

Cars

$\$26/\text{Day} * 6 \text{ Days} * 7 \text{ Cars} =$
\\$1,456

M&IE

$\$32/\text{Day} * 15 \text{ People} * 6 \text{ Days} =$
\\$3,840

PMBA Economic Analysis
 Figure 11

PMBA VERSUS SAR ECONOMIC ANALYSIS (Cont.)

ANALYSIS

Lodging

\$75/Night * 15 People *5 Nights =
\$7,875

TOTAL

\$72,363

Preliminary Design Criteria:

Functional Analysis:

Functional analysis completed? Yes

Functional analysis evolve from oper. requir.? Yes

Trade-off Analysis:

Has a trade-off analysis been completed? Yes

Have all feasible alternitives been evaluated? Yes

General:

Has a specification been developed? Yes

Detail Design

Assessment Team Organization:

Next, a representative PMBA team structure was constructed. A representation of this organization can be found in figure 13. As stated early the team leader for the review is the program manager or their designated representative. This is done to ensure that the program manager is taking ownership of the baseline.

In a supporting role is the contractor performance measurement co-team leader. This individual is put in this role to ensure that the contractor has adequately implemented the management procedures on the contract which is being assessed. This individual utilizes the other team members for this assessment.

A government contracting advisor is the next member to be discussed. This individual is responsible for making sure that the contractual language requiring the assessment is levied in the contract. Also, this advisor to the team will make sure that the team members do not make changes to the contract in conducting the assessment. They must make sure that the team members understand that they are only making an assessment, and that they should note concerns and not direct changes to the effort that the contractor is performing. If the concerns warrant action it will be taken through the team leader who is in charge of the assessment.

The number of subteams will depend on the amount of review areas chosen for on-site. The subteams should be broken down by what makes sense. Examples of subteam breakout would be by hardware, software, logistics, testing, etc. On average three subteams have been used to date. The identification of a subteam leader is very important. This individual should be the technical expert for the area; however, this individual also needs to be a strong leader. The sub-team leader is responsible for keeping the discussion with the manager moving, keeping focused on the objectives of the assessment, and making sure that the team members do not spend too long on one area.

Team members should be chosen according to the effort which will be reviewed. A core members of the sub-team is a performance measurement analyst. A performance measurement analyst is needed on each subteam as they have been subjected to other reviews and know how they should operate, understand how the contractor's management procedures should operate, and are key in the evaluation of earned value methods for showing true technical performance. Technical team members need to understand the schedule and scope of work which was signed up to in the contract. Also, the technical team needs to be knowledgeable on the desired technical performance which is required for the item being developed or procured.

A floater between the subteams will be the cost analyst. This team member will float as there will be key areas that they are interested in. The

review schedule should be organized so that the cost analyst can attend the discussions that they are interested in. The cost analyst is part of the team to support the budget assessment. Budget needs to be assessed both in total and lower levels. Also an assessment of the time phasing of the budget needs to be made. These items should be relatively easy if the cost analyst has an updated cost estimate at a level which is comparable to the contractor's PMB.

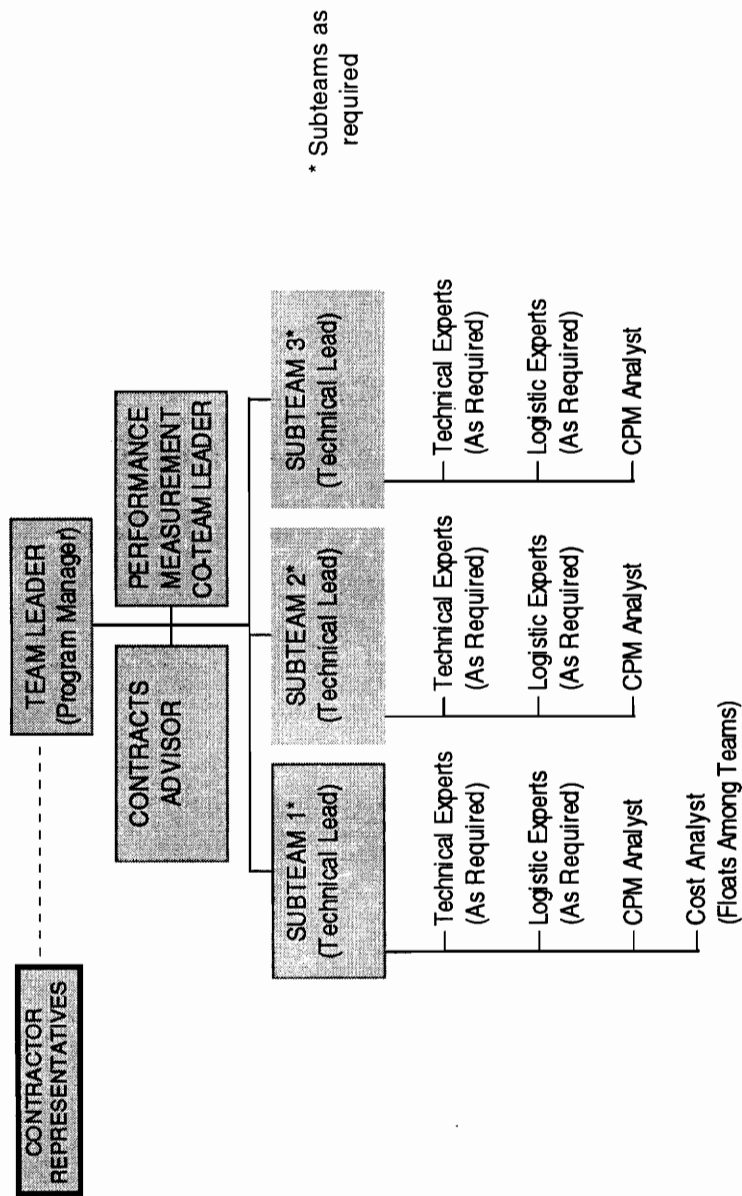
If there is a not a cost estimate developed for the contract in question there are four options for the cost analysts involvement which include develop a detailed estimate, develop a top level estimate, support a sufficiency review, or do not support the review at all and leave the budget assessment to the other team members.

The development of a detailed cost estimate may not be feasible due to the great amount of time required for this effort. This effort could also increase the cost of the review two fold. The next level of involvement for the cost analyst is a top level estimate. This would make sense on contracts where there is data readily available, and this top level estimate would help to focus the team in the areas where there are great discrepancies between the top level estimate and the contractor's budgets. Finally, is the sufficiency review. This effort would simply involve reviewing the contractor's establishment of budgets. The contractor's budgets would be reviewed for estimating methods, productivity factors, inclusion of rework, etc.

The sufficiency review should be chosen in most cases as it requires the least involvement from the cost analyst while still gaining their insight into the budgets. More involvement from the cost analyst may be warranted if the contract being reviewed is very high in visibility. A threshold for a sufficiency review may be all contracts which are less than Acquisition Category (ACAT) I. ACAT I contracts have their milestone review authority with either the office of the secretary of defense or the secretary of the Navy.

Interfacing with the team organization is the contractor. The contractor will be interfacing with the government team leader on issues such as expectations for the review, selected contractor managers for discussions, administrative items, and concern area follow-up.

PERFORMANCE MEASUREMENT BASELINE ASSESSMENT TEAM ORGANIZATION



PMBAPRESPT

PMBA Team Organization
Figure 13

Assessment Plan of Objectives and Milestones (POA&M) (Prototype):

The assessment POA&M is meant to show the steps for implementing the assessment process. A sample POA&M can be found in figure 14. Using the assessment process will take place approximately 3-6 months after contract award, plus any follow-up work which is required after the on-site portion of the assessment. The assessment process must remain very flexible, and the it should be tailored to meet the needs of the program manager who is leading the assessment. Theoretically, the assessments should be similar for a contractor who has a poor record of performance and one who has a good record since the plan that they have developed still needs assessed. If less risk areas are generated then the on-site assessment may be a shorter duration.

First in performing the assessment is identifying the need. This will be done prior to the award of the contract which will be assessed. In identifying the need, the requirement for the PMBA needs to be included in the contract. The cognizant performance measurement organization or program manager needs to get the correct statement of work input to the contracting officer to make sure that it is included in the contract.

The next step is the award of the contract. This is key because it sets off the rest of the steps in performing the assessment of the contractor's baseline. If the contract is not definitized, but the contractor is still performing work it may

still be beneficial to perform an assessment. This should be the call of the program manager who is leading the assessment.

Various information needs to be obtained from the contractor. A major item which is needed is a dollarized Responsibility Assignment Matrix (RAM). The RAM will be used to help identify areas and managers which will be reviewed.

Focus areas for the assessment need to be generated. These focus areas should concentrate on areas where there are technical, schedule, or budget concerns. The program manager should use their program staff to identify the focus areas. While the large budget areas need to be looked at, areas with small budgets may be important if there are technical or schedule concerns. Critical path is a good place to start in identifying areas. The concern areas will come from the program office, technical groups, logistics groups, cost group, and government plant representatives. Areas from subcontractors also need to be explored. Ideally representatives from the subcontractor could be called in if necessary, if not the subcontract manager from the prime contractor should be talked with.

Once the focus areas are identified the program manager, who is leading the assessment, needs to establish the team for the on-site review. In forming the teams the program manager should envision how they are planning to manage the contract. This team should be comprised of subteams, which are

lead by technical representatives. The teams are lead by technical representatives because they have the best position to concentrate on scope, schedule, and earned value being representative of the actual performance. After the subteams are identified they should be filled with the cognizant technical, logistics, and cost personnel. It may be beneficial to have one team which is solely devoted to logistic concerns on the assessment. It may not be necessary to have cost estimators on each of the subteams; however, performance measurement personnel should be on each of the subteams since they will understand the assessment process, the documentation which will be reviewed, and also understand implementation of the contractor's management procedures. Also the performance measurement representatives will be helping make an assessment of the earned value methods the contractor is using.

Next, training needs to be provided to the team that will be performing the review. The training should be provided by the performance measurement team as well as representatives from the contractor. The performance measurement team members should detail out the PMBA process to the assessment team, and the contractor representatives should let the team know how the management procedures work at the contractor's location. Also, the performance measurement team needs to provide general training on what performance measurement is and the various terms the team members may be seeing. This is important because a lot of the documents and terms describing

the PMB will be new to the team members. One of the key things that the contractor representatives should describe is what type of earned value methods they are using. This is an important item so that the government team will understand the methods that the contractor can use for taking credit for work.

An advance party visit to the contractor's plant is recommended. This advance party will get a better understanding of how the contractor's management procedures work, and also gather any pertinent documentation that the advance team feels will benefit the team for the on-site visit to the contractor. This advance party should be comprised of a small amount of people and not last very long so as not to be a burden on the contractor.

Finally, the government team needs to be called together for one last team meeting. This final meeting will serve to reinforce the purpose of the assessment. It is important for the program manager, who is the leader of the review, to take a very active role in this team meeting. During this meeting it should be stressed that the performance measurement baseline which is being assessed will be used for the entire contract. Also, it should be stressed that the team is not to make any changes to what the contractor is planning. Any concerns should be noted and passed to the team leader. It should also be stressed not to get into arguments with the contractor representatives. If

disagreements occur change the topic, and if necessary pass concerns on to the team leader.

The on-site visit to the contractor's plant will consist of the government subteams having discussions with the managers from the contractor. These discussions will be in regards to scope, budget, schedule, and earned value issues. Many of these questions should have been identified prior to going on-site. The subteam leader will be responsible for keeping the discussions flowing, and also making sure that all the areas are covered.

The discussions should be documented during the on-site assessment. Both discussion finding and concern area forms should be filled out after each discussion. Computer disks will be provided which contain the forms for the subteams. The subteam leader is responsible for making sure that these forms are submitted to the assessment leader. Samples of these forms are contained at the end of this section.

While on-site the program manager along with the performance measurement co-team leader and contracts advisor will be evaluating the concerns the subteams have. Since the subteams will be going to multiple discussions, it may necessary for the program manager along with their management team to follow up on some of the concern areas. Also the management team will be looking at the implementation of the contractor's management procedures. Daily, the program manager should provide a debrief

to the contractor letting them know the types of thing which were found that day.

At the end of the assessment the program manager should provide a final debrief and let the contractor know if there is any follow-up action required. If follow on action is required dates should be given for when a response is required.

Both government and contractor personnel should be identified for the follow-up items. Some areas may not need follow up action, and they may just be areas which need to be watched by the program manager and their team. A good place for follow-up/statusing of concerns could be program reviews. These reviews have the benefit of getting all of the government and contractor personnel together, and also occur at specified time periods. Areas which are deemed necessary should be incorporated into the risk management system.

After the assessment is complete the performance measurement personnel need to get with the team to discuss areas of the assessment which the team feels could be improved. It is important to do this early after the completion of the assessment while ideas are still in the minds of the team members. These lessons learned are vital to keep the assessment process as up to date as possible.

Performance Measurement Baseline Assessment Process

(Reference Figure 2)

Activity Name	1995					1996			
	September	October	November	December	January	February	March	April	
Need for Review Identified	▽								
Contract Award	◆								
Obtain Info from KTR				◆					
Identify Focus Areas					△	▽			
Identify Teams						◆			
Assessment Training						◆			
Advance Team Visit						◆			
Final Team Meeting							◆		
On-site Assessment							△▽		
Follow-Up Action Items							△		
Maintenance of System								◆	

PMBA Process
Figure 14

IBRPO&M.FTS

**Contract X, Contract #
PMB Assessment
Date:
Discussion Assessment Form**

Sub-Team:

Manager/Area Assessed:

Technical Findings:

Cost Findings:

Schedule Findings:

Earned Value Findings:

Was a Concern Report Prepared?

Yes

No

Concern Report Number:

**Contract X, Contract #
PMB Assessment
Date:
Concern Report**

Sub-Team:

Manager/Area Assessed:

Subject of Finding:

Discussion:

Follow-up Action:

Yes

No

Assessment Team Leader Signature:

Contractor Response:

Specification:

This process is for assessing the adequacy of a contractor's Performance Measurement Baseline (PMB). The PMB is a time phased budget plan against which the contractor's performance will be measured. The function for this process will be to assess the contractor's plans for adequacy of Scope (have they accounted for all the work on the contract), budget (is the budget adequate to perform the contract), schedule (have they scheduled the contract so that they can meet the milestones that the government has), and earned value methods (does it make sense how they will take credit for the work). In the earned value methods we want to make sure that if they say they are 50% complete, they are 50% complete technically. The process must also encompass subcontractors as they can account for large portions of a contract.

Operationally the process must be capable of being employed within six months of contract award. This is necessary to make sure that the assessment is done early in the contract so that any findings can be acted upon early. Also, the assessment needs the flexibility to operate around the world as DoD contracts are awarded to a wide variety of contractors. Unless there are major changes in the contract it is expected that this process will only be utilized once in the life of a contract. This utilization will be done shortly after the contractor has assembled their plan for contract execution which should be within 90 days

of contract award. While this process will only be used once for a contract, it could be used multiple times through a program's acquisition life cycle.

Separate contracts are issued for each phase of the life cycle, and depending on the contract type an assessment of the contractor's plan may have to be done.

The process must have the flexibility for the wide variety of personnel who may use it. Each assessment will have a different group of individuals working on it. The Naval Air Systems Command, where this process will be used, has approximately 45,000 employees which means it could be a long time before the same person is on a review team. The team will also have diverse backgrounds as individual may be called from program management, engineering (aerospace, structures, producibility, avionics, cost (industrial), reliability), contracts, or high level DoD representatives. This process must allow for training early in the contract so that the individuals will be ready for the assessment in time.

Maintenance to the process should be accomplished at a minimum of once after each review. This should be done because there will be a new group of people on each review that is performed. After the review valuable lessons learned can incorporated into the process for the next time it is used. The cost department, which is the process owner, needs to make sure that the process stays up to date with current policies or methodologies.

The process will be tested by using it on actual assessments. Results and lessons learned will be used to develop the process and sustain it through the systems life cycle.

Training materials will be needed to train the team and the contractor for what to expect. For the conduct of the on-site review conference rooms will be required for each of the subteams attending the contractor's facility. Also, It will be required that the contractor provide the team with security badges so that the team will have access to the facility. Finally, the contractor needs to provide the team with detailed documentation on the PMB that has been constructed.

Following is a list of the documentation that may be required:

Dollarized Responsibility Assignment Matrix - Will show what managers are responsible for what work. This matrix may break the work down by Integrated Product Team or Contract Work Breakdown Structure (CWBS) Element.

Performance Measurement Plans - Detailed plans showing how the contractor plans to accomplish the work on the contract. These plans are either dollarized or by staffing and the team will be able to see scope, schedule, budgets, and Earned Value methods.

Management Procedure Description - Will detail how the contractor's management procedures should operate.

Schedules (all levels) - The schedules will portray how the contractor plans to perform the contract. The master schedule may only be one page; however, the detail schedules may be very extensive. Critical path schedules should be utilized when possible.

CWBS Dictionary - This dictionary will give definitions for what work the contractor has included in which areas. The CWBS dictionary is very important in determining if all of the scope has been planned for.

Testing:

The type of testing which was and will be used on this process is type 4 testing. Type 4 testing is testing which is performed during the product use phase. This type of testing will be beneficial by taking the lessons learned from actual use of the assessment process and incorporating them for future assessments. During the performance of this project a database of testing results was constructed. As lessons learned occurred they were incorporated into the process.

Preparation for the testing was accomplished by letting the team members for the assessments know that potential improvements would be solicited after the assessment. Also the team members were trained on the assessment process which should allow them opportunity to question the process and possibly make beneficial changes. Each new team brings different backgrounds which could provide valuable input.

Following are the results of the testing for the assessments which had been accomplished during the performance of this project. These results are being recorded as lessons learned and have been used to improve the assessment process to allow for better assessments. The lessons learned have been segregated by items before the on-site assessment, during the on-site assessment, and after the on-site assessment.

Before the On-Site Assessment:

The team needs to be broken into subteams. It is more effective to have small groups of individuals in the teams. By breaking into subteams the groups can concentrate on certain areas.

Sub-team size is an important consideration for the assessment. If the subteams grow to larger than 3-5 members it becomes difficult to have discussions smoothly.

The critical path for the contract being assessed may be very helpful in identifying schedule/technical risk areas.

Use the DPRO/DCMAO to whatever extent makes sense. These representatives may have very beneficial information which could help the assessment. Their participation may also reduce the number of individuals traveling to the contractor's plant.

Have a good plan prior to going on-site. The on-site assessment will not be as beneficial if the people are not prepared. Most of the work should be

accomplished prior to going on-site with the team members having questions prepared.

Focus on the objective of the assessment i.e. is the baseline adequate. The assessment is not intended to be a design review.

The depth of the on-site review is important. It may not make sense to look down to the lowest level in every instance.

Picking the right subteam leaders is very important. The subteam leaders must understand the objective of the assessment, and also be a strong enough leader to keep the on-site discussions on track.

The technical, cost, and schedule risk areas need to be identified as early as possible. By doing this it will allow the team members adequate time to prepare for the on-site assessment.

An advance party to the contractor may be beneficial. This advance party could pull together documentation and get an understanding of how things work at the contractor's plant.

To make the assessment a success it is necessary to work very closely with the contractor. The assessment should benefit the contractor as well as the government.

The contractor should be involved in the assessment training. This involvement would allow the contractor to get a better understanding of the assessment as well as allow the team to get an understanding of how things work at the contractor's plant.

Cost estimating involvement should be tailored to what makes sense. If there is not a current cost estimate it may not make sense to perform one.

An assessment of the Management Reserve (MR) needs to be made. If there is not adequate MR later in the contract there may not be budget for unknowns that occur in the future.

During the On-Site Review:

If possible try to tie the assessment into other program reviews. This will reduce the travel cost since many of the individuals may be on-site. Care must be taken with this to make sure that the individuals will be dedicated to the assessment when it is scheduled.

Make sure that the on-site discussions are scoped out to what is actually signed up to on the contract. The team must be up to speed with what is included in the contract.

Sit down after each discussion and discuss the results. It is important to make sure that each person saw the same things. This is also beneficial in recording the results while they are fresh in the minds of the team members.

The assessment team leader should collect documentation after each discussion. If this is not accomplished documentation could become a bottleneck for the assessment.

Do not try to solve technical issues during the on-site assessment. There is a limited amount of time during the discussions, and issues should be written down and followed up at a later time.

On-site it is beneficial to conduct a final team meeting prior to discussions. This will allow one final opportunity to reinforce the objectives of the assessment.

Do not have more than 4 discussions per day. More than this will overload the teams, and the assessment may not be as beneficial.

After the On-Site Assessment:

It may be good to focus on concern areas during program reviews. By using these reviews for follow-up it will ensure that the concerns are looked at again.

Detail Design Criteria:

Have maintainability requirements been defined?	Yes
Has the design stabilized?	Yes
Is the design simple?	Yes
Has training been accounted for?	Yes

Project Feedback:

An integral part of this project has been the incorporation of feedback. This feedback has been incorporated extensively throughout the entire twelve months of the project. It was part of my project methodology to keep the board members up to date on the work I was performing so that there would not be any surprises at the end of the project.

Feedback has come from the board members which were involved with the project as well as multiple individuals that I work with. As input was given on the project it was incorporated. This fact could be seen in the multiple drafts which were performed in the accomplishment of the project and report.

Reference List:

1. Blanchard, Benjamin S.; Fabrycky, Wolter J. Systems Engineering and Analysis. New Jersey: Prentice Hall; 1990.
2. Program Manager's Notebook. Overview of the Functions of Program Management; Defense Systems Management College; 1993.
3. Office of the Inspector General. Audit Report on the Use of Contractor Cost and Schedule Control System Data; 1993; Report No. 93-067.
4. A-12 Administrative Inquiry. 1990. Memorandum for the Secretary of The Navy.
5. Longuemare, Noel R. Improved Cost and Schedule Performance Management. 1994. Principal Deputy Undersecretary of Defense. Memorandum to Department of Defense Services.

6. Harshbarger, E. B. RADM, SC, USN. Improved Cost and Schedule Performance Management. 1994. Deputy for Acquisition Policy, Integrity, and Accountability, Office of the Assistant Secretary of the Navy. Memorandum to Navy Components.

7. Harrison, R. G. Integrated Baseline Reviews. 1994. Deputy Commander for Acquisition and Operations, Naval Air Systems Command. Memorandum to the Naval Air Systems Command Offices.

8. Slatkin, Nora. Integrated Baseline Reviews. 1995. Assistant Secretary of the Navy (Research, Development, and Acquisition). Memorandum to Navy Components.

9. Department of Defense Instruction 5000.2. Department of Defense. 1991.