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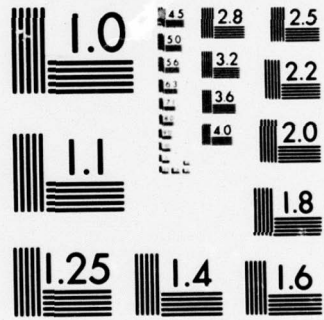
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**STUDY TITLE:** What Is a Management Audit, How and Why it should be Applied to Project Management in the Navy?

**STUDY GOALS:**  
To explain how management auditing concepts can be applied to project management in the Navy.

**STUDY REPORT ABSTRACT**

This report defines management auditing and the resulting benefits, explains why a management audit should be applied to project management in the Navy, and shows how a management audit could be conducted.

**KEY WORDS:** MANAGEMENT    TECHNIQUES    PROJECT MANAGEMENT    AUDITS  
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Paul F. Caron, CIA  
GS-13 Navy Department

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**DATE**  
April 1974

# DEFENSE SYSTEMS MANAGEMENT SCHOOL



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## PROGRAM MANAGEMENT COURSE INDIVIDUAL STUDY PROGRAM

WHAT IS A MANAGEMENT AUDIT,  
HOW AND WHY IT SHOULD BE  
APPLIED TO PROJECT MANAGEMENT  
IN THE NAVY?

STUDY REPORT  
FMC 74-1

PAUL F. CARON, CIA  
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CARON

WHAT IS A MANAGEMENT AUDIT,  
HOW AND WHY IT SHOULD BE  
APPLIED TO PROJECT MANAGEMENT  
IN THE NAVY?

STUDY REPORT

Presented to the Faculty  
of the  
Defense Systems Management School  
in Partial Fulfillment of the  
Program Management Course  
Class 74-1

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by

Paul F. Caron, CIA  
GS-13                      DMC

May 1974

This study represents the views, conclusions, and recommendations of the author and does not necessarily reflect the official opinion of the Defense Systems Management School nor the Department of Defense.

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## EXECUTIVE SUMMARY

The following is presented as a summary of the three major sections of this report:

### WHAT IS MANAGEMENT AUDITING?

A comprehensive and constructive appraisal of management policies, procedures, methods, and use of resources to identify significant management problems, determine waste and deficiencies, probe for causes, assess impact, devise practical solutions and improved methods, and make management oriented recommendations for use in the management decision making process.

### WHY A MANAGEMENT AUDIT?

The socio-political feelings in the United States, for the past six years or so, has not been favorable to most activities of the Department of Defense. Many people have been vociferously criticizing the cost growth of major weapon acquisitions. This is especially important because the trend, since Fiscal Year 1965, has been to allocate less funds out of the Federal Budget for procurement and research and development.

### HOW TO CONDUCT A MANAGEMENT AUDIT

This section broadly explains how to perform a management audit of (1) Plans and Planning, (2) Organization, (3) Contracting, (4) Controls and Controlling, (5) Costing, Pricing and Financial Management, (6) Information System, and (7) Engineering.

This report does not cover these subjects exhaustively, but it does explain, briefly; what management auditing is, why and how this technique can be applied to the project management style of managing.

### ACKNOWLEDGEMENTS

I am deeply and humbly grateful to those faculty members and students who either provided ideas and/or constructive criticism concerning this study paper. Specific faculty members include Mr. A.G. McManamon (Financial Management, and Advisor), Mr. Al Moore (Contract Management), Mr. Roger Klungle, CDR Rudy Matzner, USN, LCDR Joe Callahan, USN, (Information Systems), Mr. D.K. Greene (Graphic Arts), CDR T.K. Hall, USN, (Management Research Officer), and library personnel. Specific student members include Major K.C. Gunn, USAF, and CDR R.J. O'Shaughnessy, USN. I would also like to express my gratitude to my colleague, Mr. Richard M. Crook, CIA, who's constructive criticism of my drafts were very helpful. Finally, my family, for their patience and understanding.

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WHAT IS A MANAGEMENT AUDIT,  
HOW AND WHY IT SHOULD BE  
APPLIED TO PROJECT MANAGEMENT  
IN THE NAVY?

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INTRODUCTION

The Auditor General of the Navy/Naval Audit Service, has not to my knowledge, in the past, performed a management audit of a complete major weapon acquisition project. Although part of a project may have been reviewed, during a scheduled periodic audit, a complete integrated audit has not been performed. The motto of the Naval Audit Service since the early 60's has been "Service to Management World-Wide". I believe that it can be a Service to Management by performing management audits for the Navy in the area of project management.

Although the Defense Contract Audit Agency (DCAA) provides services for reviewing contracts, etc., and the General Accounting Office (GAO) periodically reviews projects, at the request of Members of Congress, there appears to be a need for comprehensive management audits internally. I believe the ability to perform these audits is available in all three Services through their internal audit organizations. The Blue Ribbon Defense Panel report to the President, on 1 July 1970, showed that these internal audit organizations on 30 April 1970, had<sup>2</sup> the following strength:

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<sup>2</sup>  
Page 129. This notation will be used throughout this report for sources of quotations and references used. The first number denotes the source listed in the Annotated Bibliography. The second number is the page in the reference.

	<u>Civilian</u>	<u>Military</u>	<u>Total</u>	<u>%</u>
Army Audit Agency	839	81	920	33
Navy-Auditor General	519	56	575	21
Air Force-Auditor General	<u>545</u>	<u>705</u>	<u>1250</u>	<u>46</u>
Totals	<u>1,903</u>	<u>842</u>	<u>2,745</u>	<u>100</u>

Although the Naval Audit Service accounts for only about 21 percent of all the audit personnel of the three Services, I believe that this additional function could be performed with only 40 to 50 more auditors at an additional annual cost of about \$600,000 to \$750,000. However, this additional function could also be accomplished, on a selected basis, with little or no additional personnel.

This report will attempt to (1) define management auditing and the resulting benefits, (2) explain why a management audit should be applied to project management in the Navy, and (3) show how a management audit could be conducted.

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### WHAT IS MANAGEMENT AUDITING?

The term management auditing and other variant terms such as, operational auditing and performance auditing have been used interchangeably for a number of years by both commercial and government auditors. Although some of us may believe that we have a clear understanding of the concept, others are in doubt. If we gathered practicing auditors from various disciplines from both commercial and government together to discuss and/or debate the definition of management auditing, I believe many conflicting views would surface. This paper will attempt to clarify the definition and concepts involved in accomplishing these types of audits.

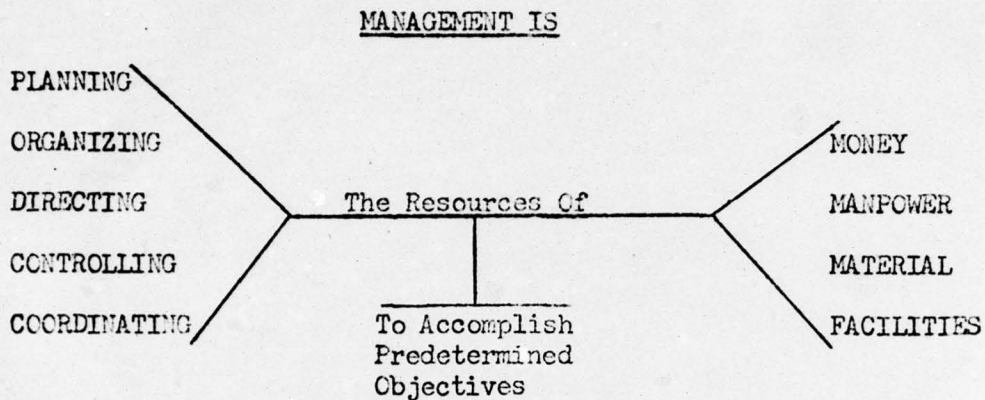
If one picks up a standard dictionary, the following definition of audit is usually found, "a formal or official examination and verification of an account book".<sup>4</sup> From this definition it can readily be seen that this type of audit is traditional in nature, in that it is confined to financial areas, and the emphasis is on the verification of procedures. Further management is defined in standard textbooks as:

The process of planning, organizing, coordinating, directing, and controlling the resources of money, manpower, material, and facilities to achieve pre-determined objectives.

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<sup>4</sup>

The following is a pictorial presentation of management:



It follows that a true management audit should analyze the effect of each management factor upon the use of resources to accomplish the assigned mission.

Another factor used in arriving at a definition of management auditing, that is, the purpose or responsibility of audit. In other words, why do auditors exist? What is our function?

The Naval Audit Service, as its name implies, is a management assistance type organization. As stated before, the motto of the organization is "Service to Management World-Wide". We provide this service by informing management on the efficiency and effectiveness with which policies, procedures and good management practices are being carried out to achieve the assigned mission. From this discussion, one can readily see the answer to the questions, why we exist and what is our function:

1. Serve management
2. Inform management

Consequently, we try to determine whether the job or function can be done better, at less cost, and still effectively and efficiently accomplish the assigned mission.

At this point, using the two definitions given previously, and the discussion of the Naval Audit Service function, it is safe to combine these thoughts and arrive at a new definition as follows:

Management audit is a comprehensive and constructive examination for the purpose of providing information to management concerning the effectiveness of its planning, organizing, coordinating, directing, and controlling the resources of money, manpower, material, and facilities assigned to accomplish the mission.

Looking at this definition you will note it includes the term examination which was included in the previous definition of audit. However, I have preceeded the word examination with the words comprehensive and constructive. Comprehensive is intended to indicate that both the depth and scope of a management audit is increased. The word constructive is intended to indicate that the purpose of a management audit is to provide findings and recommendations that are constructive in nature and designed to assist rather than hinder management decision making. The words, providing information, refer of course to our motto, "Service to Management World-Wide". The words planning, organizing, coordinating, directing, and controlling, are the functions of

management which a management audit should be designed to evaluate. Therefore, it goes without saying that if we are to evaluate the functions of management, we must review management's use of available resources to accomplish the mission. The word mission has been substituted for predetermined objectives. Although these words are synonymous, in the Department of Defense, we use the term mission to denote objectives.

I would like to compare traditional auditing concepts to management auditing concepts. The following tabulation, I believe accomplishes this:

<u>TRADITIONAL AUDIT</u> <sup>9</sup>	<u>MANAGEMENT AUDIT</u> <sup>5</sup>
Verification	Analysis/Appraisal
Historical	Current
Financial Accounts	Extends to all management areas
Asset Records	Asset Records Plans and objectives Policies Systems and procedures Methods of control Means of operation Use of <u>all</u> resources
Identify Noncompliance (What is Wrong)	Identifies the <u>WHY</u> ( <u>Causes</u> )
Advisory Function ( <u>Secondary</u> )	Advisory Function ( <u>Primary</u> )
Money oriented	Mission oriented

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From the previous definition of management auditing, it can readily be seen that management audit concepts are an extension of the traditional or financial type audits. The primary concern of the financial audit is verification of historical, financial, and asset data to identify noncompliance. The management audit in contrast is more concerned with current data, extends to all management areas and consists of an analysis and appraisal of management plans, policies, systems and procedures, methods of control, means of operation, and use of all resources to accomplish the assigned mission. The management audit identifies the WHY (causes) of management problems so that immediate or future improvements can be made. Also significant, in the traditional financial audit, the auditor's role as an advisor is secondary and limited primarily to financial controls. In a management audit, the auditor's role as an advisor is primary and extends to all operations of management even to those areas requiring security clearances. Therefore, it can readily be seen that the management audit is much more mission oriented than the money oriented financial audit.

You may have heard the term compliance auditor from people who have been exposed to auditors who do not use management audit concepts. In the Navy, as all branches of the Department of Defense, top management policies, procedures, and methods are usually prescribed, in detail, in directives for use by lower levels of management. As auditors, we use these directives

to learn what management's goals and objectives are, and how management expects certain missions to be accomplished. Therefore, it is easy for the auditor to be referred to as a compliance auditor.

If we were to look at the definition of compliance auditing, the following would probably emerge:

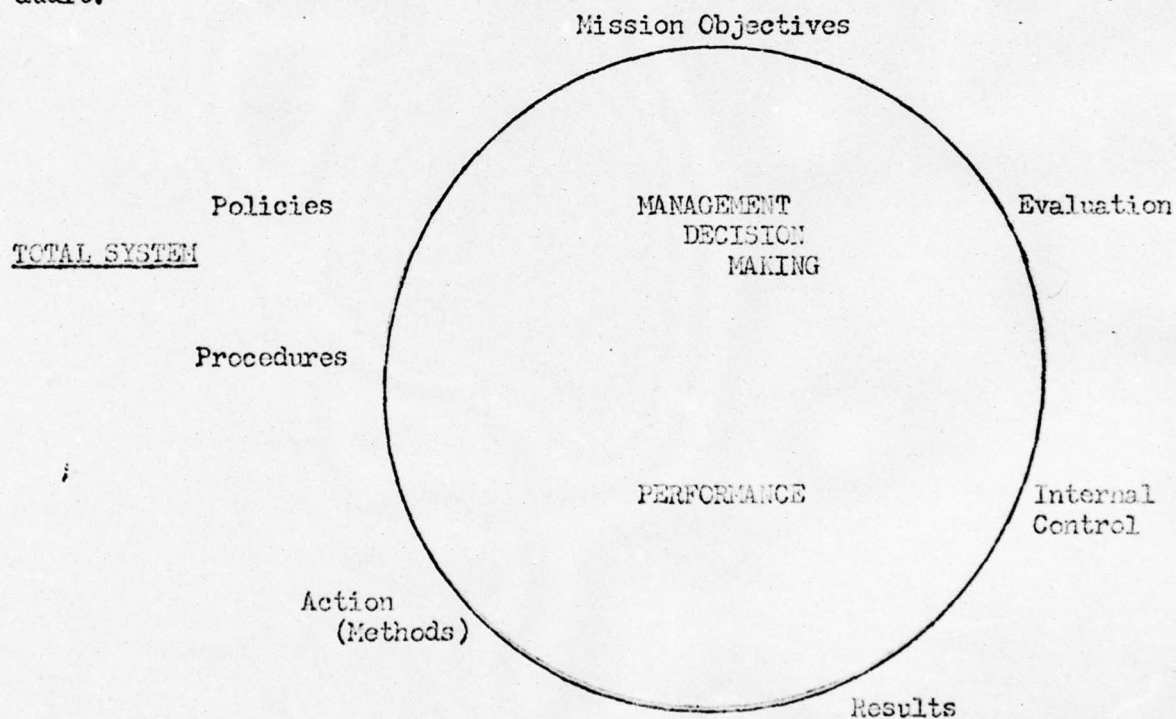
An examination to determine whether top management policies, procedures, and methods as prescribed in directives are being followed at lower management levels.

It can be seen that there is one conspicuous concept missing from this definition. That is, there is no mention as to the effectiveness of, or the need for, policies, procedures or methods. The point here is that management audits begin where the compliance audits end, by determining WHY the policies, procedures or methods, are not being complied with and HOW, if the WHYs are justified, the overall operation can be improved.

Therefore, compliance audits are a part of the management audit for two reasons. First, it provides a basis for reporting to top management on adherences, by lower management, to the policies and procedures of top management. Secondly, it provides a basis for further analysis and evaluation to determine reasons for non-compliance and if these reasons are justified, how the policy, procedure, or method can be improved or changed. The big difference between a compliance auditor and a management

auditor is his initiative, motivation, and imagination to search for a better way to achieve the stated mission, by identifying significant management problems, probing for causes, assessing impact, and looking for practical solutions.

Next I would like to describe briefly and graphically the total management system and how it operates along with a description of the approach taken to performing a management audit.



Beginning at the top, going counter clockwise, the mission objectives are implemented through policies formulated by management. The policies provide guidelines for specific procedural steps that govern the action taken to carry out the policies. The results of the action taken should be fed back to management through the

the internal control system for evaluation and use in the management decision making process. Basically, the management auditor should, when performing a pre-audit survey, review this total system in order to be able to pinpoint weaknesses in the system. This survey will be used to guide the auditors into worthwhile areas, also referred to as areas of emphasis, when the full scale audit begins.

Finally, I would like to end this part of my paper by drawing from the previous definitions given, and combining all the descriptions I have expounded upon to give one comprehensive definition of management auditing.

A comprehensive and constructive appraisal of management policies, procedures, methods, and use of resources to identify significant management problems, determine waste and deficiencies, probe for causes, assess impact, devise practical solutions and improved methods, and make management oriented recommendations for use in the management decision making process.

This final definition, to a motivated and imaginative auditor, proposes quite a challenge in itself.

### WHY A MANAGEMENT AUDIT?

The socio-political feelings in the United States, for the past six years or so, has not been favorable to most activities of the Department of Defense. Many people have been vociferously criticizing the cost growth of major weapon acquisitions. The Department of the Navy has had its share of criticism. The following tabulation is an analysis of the status of major weapon acquisitions still in the acquisition cycle in the Navy as of 31 December 1973:

<u>Number of Systems</u>	<u>Calendar Year Started</u>	<u>Original Development Estimate (In Millions)</u>	<u>Incurred Costs As of 31 DEC 73</u>	<u>Cost Growth As of 31 DEC 73</u>	<u>Percent Of Cost Growth</u>
1	1963	\$ 536	\$ 1,089	\$ 553	103
2	1966	5,010	5,601	591	12
2	1967	3,330	3,942	612	18
3	1968	2,506	4,299	1,793	72
4	1969	12,191	14,150	1,959	17
4	1970	4,690	5,538	848	18
4	1971	7,172	7,760	588	8
1	1972	3,245	3,483	238	7
<u>1</u>	<u>1973</u>	<u>726</u>	<u>756</u>	<u>30</u>	<u>4</u>
Totals	<u>22</u>	\$ <u>39,406*</u>	\$ <u>46,618</u>	\$ <u>7,212</u>	<u>18</u>

\* Trident figures excluded from this analysis.

Source: Selected Acquisition Reports - Cost Summary, as of 31 Dec 1973.

The analysis presented above is not peculiar to the Navy, analysis of the Army and Air Force disclosed that, in summary, the Army for the same period using the same method of analysis had ten systems with original development estimates of \$18,459 million with a cost growth of \$3,667 million or a rate of cost growth of 19.8 percent.

While the Air Force, had 13 systems with original development estimates of \$37,076 million with a cost growth of \$13,583 million for a rate of cost growth of 36.6 percent. Cost growths are attributed mostly to changes in engineering, support, schedule, economics, estimating, and unpredictables.

The amount of funds expended annually on procurement and research and development have been, on the average during the ten fiscal years from 1965 through 1975, about \$28 Billion. During this period, procurement ranged from a high of \$24 Billion in 1969 to a low of \$11.8 Billion in 1965. For research and development, the high this same period was \$8.9 Billion in 1975 to a low of \$6.2 Billion in 1965. For a detailed analysis covering this ten year period see Exhibit A on page 33 . It is also interesting to note that during this same period, the Department of Defense received a smaller percentage of the total United States Budget each succeeding year with the exception of FY 1967 and 1968. The percentage has ranged from 41.9 in FY 1965 to 28.8 for FY 1975. Therefore, it can be stated that the Defense Budget, in relation to the total United States Budget, has been getting smaller almost every year since FY 1965.

Project management, which had its impetus during our earlier space explorations, has been utilized extensively in the Department of Defense during the past five years or so for major weapon acquisitions and research and development efforts.

Consequently, the Department of Defense has established some parameters and policy for establishing project management principles. The following, basically, outlines the criteria established by the Department of Defense:<sup>3</sup>

1. An acquisition having an estimated dollar value for research and development, test and evaluation in excess of 50 million dollars.
2. Having an estimated dollar value for production in excess of 200 million dollars.
3. Being of national urgency.
4. Recommended for such designation by the Department of Defense component head or the Office of the Secretary of Defense officials.

The Department of the Navy concurred by issuing subsequent instructions with the exception that the above specified in 1. and 2. above was reduced from 50 million and 200 million to 25 million and 100 million, respectively.

One of the major problem areas in major weapon acquisitions in the past, had been the inability to locate potential problems in cost, schedule and technical performance from a contractor's management control system. Through contract requirements, elaborate management information systems were imposed on the contractors which were for the most part very costly and ineffective. These elaborate reporting systems were also a fallout from the way

projects had been managed during early space exploration. As a result of extensive analysis and reviews by the Department of Defense, a joint implementation guide has surfaced to preclude some of the costly mistakes made in the past. This guide is entitled Cost/Schedule Control Systems Criteria Joint Implementation Guide.<sup>1</sup> This guide does not impose a system on a contractor, it merely states the "criteria" which is required of the contractor's management system in order to be certified or validated for major weapon acquisitions. The criteria basically assures that the contractor's management systems are sound, and once this is accomplished, to rely on these summarized data for contract management requesting detailed data only in those areas where problems exist. The contractor's management system must be capable of basically providing, to meet Cost/Schedule Control Systems Criteria requirements, the following:

1. Budgeted cost for work scheduled and performed.
2. Actual cost of work performed.
3. Estimated and budgeted cost at completion.
4. Cost and schedule variances with explanations.
5. Traceability or auditability of management's system.

As can be seen from the above criteria, nothing is imposed that the contractor should not already be doing to effectively manage his business. It should be borne in mind that if a contractor is inefficient and the majority of his business is Defense Weapon

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Systems, then the Department of Defense is paying for inefficiency and the contractor is not as competitive as he could be for his other business.

One of the most powerful tools that can and is used for the pinpointing of problem areas is the Work Breakdown Structure (WBS).<sup>6</sup> The WBS is a formal method used for defining and identifying contract effort. See Exhibit C, page 35 for an example of a summary WBS. Although a contractor may have his own unique management system for planning, scheduling, budgeting, accounting, variance analysis, and controlling costs, etc., his management system can usually be used by the Government Program Manager for monitoring costs and progress. Therefore, saving a substantial amount of funds by not requiring the contractor to maintain his management system and imposing a different one for the convenience of the Government when it is wholly unnecessary. Further, accounting systems and procedures which are acceptable to the Defense Contract Audit Agency (DCAA), are usually compatible to the requirements set forth for a WBS. A good rapport between Program Manager and/or his representative and DCAA auditors is absolutely essential to evaluating and monitoring contract performance.

In the Navy the procurement of a weapon system can be a horrendously complex one requiring an extensive amount of inter-responsibilities. See Exhibit B on page 34 for a graphic example of a major combatant ship acquisition. The responsibility

for procurement of major weapon systems in the Navy rests with the Chief, Naval Material Command (NAVMAT), through basically four subordinate systems commands (SYSCOMS). The following is presented to show the basic responsibilities of these various SYSCOMS.<sup>7</sup>

Naval Air Systems Command (NAVAIRSYSCOM)

The following is only a partial list of the duties and support responsibilities assigned:

1. Navy and Marine Corps aircraft systems including components thereof and fuels and lubricants therefor;
2. air-launched weapon systems and components thereof but not including torpedoes and mines except for aircraft compatibility aspects, which are a joint responsibility to be exercised with the NAVORDSYSCOM;
3. airborne electronics;
4. air-launched underwater sound systems;
5. airborne pyrotechnics;
6. catapults, arresting gear, visual landing aids, and jet blast deflectors;
7. photographic equipment

In addition, the responsibility of total system integration with respect to aircraft weapons and spacecraft systems, is to be

exercised jointly with other SYSCOMS or Project Managers who are assigned responsibility for other supporting systems.

Naval Ship Systems Command (NAVSHIPSYSCOM)

The following is only a partial list of the duties and support responsibilities assigned:

1. ships, submersibles, amphibious craft and vehicles, boats, floating drydocks, ship hulks and manned surface and submerged targets, bathescopes, etc.;
2. propulsions;
3. auxiliary power generating and distribution;
4. navigation equipment, except radio navigation;
5. ship systems integration and coordination;
6. coordination of shipbuilding, conversion and repair;
7. naval nuclear propulsion;
8. salvage and diving;

As can be seen from the broad responsibilities listed above, integration and coordination is extremely complex.

Naval Electronic Systems Command (NAVELECSYSCOM)

The following is only a partial list of the duties and support responsibilities assigned:

1. command/control/communications systems (platform to platform), complete;
2. undersea and space surveillance;

3. navigation aids, air traffic control, and automatic landing systems, less airborne;
4. common equipment, components, and parts;
5. interior communications;

In addition, systems integration with other SYSCOM's or Program Managers who are assigned responsibilities for specific platforms.

Naval Ordnance Systems Command (NAVORDESYSCOM)

The following is only a partial list of the duties and support responsibilities assigned:

1. shipboard weapons systems and components thereof;
2. guided missiles;
3. air-launched mines and torpedoes;
4. small arms, infantry equipment;
5. explosive ordnance disposal, including developing rendering-safe procedures;

Finally, the responsibility of systems integration of ship ordnance systems, with other SYSCOM's and Project Managers as appropriate.

Many problem areas of project management in major weapon acquisitions have surfaced which appears to justify the application of internal management audits. For instance, the U.S. General Accounting Office,<sup>10</sup> and the Blue Ribbon Defense Panel,<sup>2</sup> have expressed opinions in the area of program management. The following

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<sup>10</sup> Pages 20-27.

<sup>2</sup> Page 74.

is a brief summary of the problem areas that these two bodies found:

1. Levels of review authority contributing little to the process of formulating decisions.
2. Project managers operate under charters that tend to be written very generally, and most charters could be applied to almost any project.
3. Written agreements between program managers and other functional managers tend to be too vague to be helpful.
4. Stricter limitations of elements of systems to essentials to eliminate "gold-plating".
5. More use of competitive prototype and less reliance on paper studies.
6. A general rule against concurrent development and production, with production decision deferred until successful demonstration of development prototypes.
7. Continued trade-offs between new weapon systems and modifications to existing weapon systems currently in production.
8. Assurance of such matters as maintainability, reliability, etc., by other means than detailed documentation by contractors as a part of design proposals.

9. Appropriate planning early in the development cycle for subsequent test and evaluation, and effective transition to the test and evaluation phase.
10. Flexibility in selecting type of contract most appropriate for development and the assessment of the technical risks involved.

## HOW TO CONDUCT A MANAGEMENT AUDIT

In this section I will attempt to describe how a management audit, of a major weapon acquisition, could be accomplished. Management auditing is extremely flexible, in that, it can be applied to current, past or future (planning) objectives or missions. Unlike a financial audit it is not stagnated by traditional concepts. Therefore, the amount of flexibility is only limited to the participating auditors initiative, imagination and motivation. Exhibit D, page 36 contains a fictitious example of a management audit finding, to illustrate to the reader what one of these findings look like and how they are usually presented to management.

### PLANS AND PLANNING

Planning is a commitment to action on an orderly, realistic, systematic basis. It is a reasonable choice of courses of action. These statements have the virtue of making it clear that planning and plans are a process of relating conceptual phases in an orderly fashion. Some of the benefits that are derived from good planning are (1) focuses action, (2) reduces risk, (3) reinforces objectives of missions, (4) simplifies coordination, (5) facilitates control, creates opportunities for tradeoffs, etc.

In program management, most of the planning revolves around the system acquisition cycle. This cycle has three distinctive phases which involves the Defense Systems Acquisition Review Council (DSARC). This council receives three Development Concept

Papers (DCP) during the system cycle. The first DCP is received for DSARC I during the conceptual phase, the second DCP is received for DSARC II between the validation and full scale development phase and the third DCP is for DSARC III which is submitted between the full scale development and production phase.

Review and evaluate the adequacy of estimates, back-up, information, schedules, etc., on the DCP's as appropriate. Some of the areas to consider follow:

1. Process
2. Issue
3. The problem
4. The threat analysis
5. The concept formulation
6. Summary of advanced development
7. The program alternatives
8. Detailed description of the alternatives
9. Test and evaluation
10. Management and procurement
11. Reliability, availability, and maintainability
12. Tradeoffs
13. Risk assessment
14. Other factors, if any
15. Overall evaluation
16. Security
17. Subsequent DCP requirements
18. Recommendations

Determine the reasonableness of the DCP's reviewed and present management with any findings.

There are other areas of planning and plans which should be also considered. Such as, planning often suffers from the lack of genuine top-level interest and support; the degree of involvement needed frequently leads to executive avoidance and consequent dilution of the quality of the planning process; the actual work of building the plan is often left to subordinates who usually are comparatively inexperienced and formalistic; planning is more often done for the approvers than for the doers; planning done at high levels usually reflects top management's views but seldom is realistic to those people in the field who have to carry out the actions called for; planning too often is rich in relevant information but poor in resources for critically evaluating projections and assumptions; the process becomes traditional or habitual, with the result that it responds more to philosophy or perspective rather than to economic opportunities; and finally, plans are too general or they have insufficient detail to permit the establishment of selective controls.

#### ORGANIZATION

An organization is a means by which resources can be accumulated, coordinated, integrated, mixed, and motivated to achieve a decided objective. To measure effectiveness, the auditor will have to look for indications of deficiencies.

Some of the common problems that plague organizations are:

1. Frequent plan changes
2. No arrangements for succession
3. Late decisions
4. Inadequate information
5. Impossibility of accountability
6. Short tenure
7. Excessive communicating
8. Incompetence
9. Purposeless redundancy

Evaluate the above factors and proceed as required to form an opinion or recommendation.

Evaluate the type of organization established, is it functioning well or could a different type of structure result in a more effective organization. Sizes and types of systems/project offices (S/PO) vary from a one man operation, to a staff CADRE type organization, a medium size 30 to 50 personnel, or a near self supporting type organization of between 150 to 500 personnel. The amount of integration and dependency on other organizations is directly proportionate with the size of the project office. The following is a list to consider:

1. Is the office organized to solve problems?
2. Is it organized to minimize the gap between the designed and the real structure?
3. Look at the span of control.

4. Is responsibility divided or assigned in wholes?
5. Has each class of activity been assigned to one person in charge?
6. Assignment of responsibility should be documented.

Review the PM's charter and determine if it adequately permits him to discharge his assigned task.

#### CONTRACTING

Review method of contracting used and/or the advanced procurement plan and determine the adequacy of the plan and/or method, to insure that competition, if applicable, has not been circumvented. Cost plus incentive fee (CPIF) is usually the preferred method of procurement for major weapon acquisitions, See Exhibit E, page 37 for an example of how to structure a CPIF contract.

If CPIF is the method of contracting used, insure that it is justified. If CPIF is not used determine the rationale for using another type if CPIF appears justified. If performance is incentivised, check to see if costs have also been incentivised to preclude the encouragement of cost growth, also the auditor should be alert of the following:

1. Incentivising essential parameters which only have one acceptable achievement level, these should be contract requirements.
2. Incentivised parameters should have value.
3. Performance parameters should be independent variables.

4. Range of incentive effectiveness should be established before target levels.
5. The relative importance of the parameters should be established.
6. Fee pool should be allocated according to the relative importance of parameters.

If the contract plan or contract is a negotiated type, review and evaluate the pre-negotiation preparations. These preparations should consider things such as, cost estimating, requirements, analysis of proposals, assumptions, contingencies, contractors bidding strategy, and the contract negotiator's negotiation strategy. Also, a review of price negotiation memorandum should be made to determine how negotiations were conducted.

Constructive change orders usually come about as a result of Department of Defense personnel making statements such as, direct, request, want, authorize, suggest, and recommend, to the contractor or his representatives when they shouldn't. The following list shows some of the more typical constructive change orders that were upheld by the courts, because these persons were defined as being implied agents of the Government:

1. Defective specifications
2. Erroneous contract interpretation
3. Change in place or manner of tests
4. Excessive inspection requirements

5. Acceleration
6. Deceleration
7. Improper rejection and rework
8. Failure to disclose superior knowledge

While reviewing this area determine the adequacy and reliability of controlling constructive change orders.

#### CONTROLS AND CONTROLLING

The main purpose of control is to make things happen, such as, to achieve an objective within budgeted cost. Controls that do not have a positive purpose, that are repressive, and that do not appear to support the higher aims of the project invite evasion by employees. When they contribute to a project, it is because they are vitally linked with other functions such as planning and directing. Controls should not be established unless there is reasonable assurance they can work.

During this part of the review, the following should be considered:

1. Determine the necessity of selected controls.
2. Insure that measurability has been employed.
3. Are the controls which have been established enforceable?
4. Are the controls more elaborate than necessary?
5. Is the same person that is responsible for the plan also responsible for the control?

6. Are controls used to compare standards?

COSTING, PRICING, AND FINANCIAL MANAGEMENT

Costs have powerful influences on the fortunes of a project and effect almost every aspect. If costs are not maintained in some proper relation to objectives, the whole project can erode away. Information on costs is significant for decision making in every aspect of the project. Understanding costs and the factors that affect them and that create both favorable and unfavorable variances is probably the most useful aspect of managing a project.

Insure that cost information received from the Cost/Schedule Control Systems Criteria by the Program Manager's (PM's) Organization is utilized effectively. Cost variance is an especially effective tool, it provides the difference between the budgeted costs for work scheduled and the actual costs for work performed. At any point in time, this type of information will show whether the work actually performed has cost more or less than budgeted, thereby, revealing problem areas at an early stage so that remedial action can be effected.

Budget personnel prepare a report called, contract fund status report. This report has to agree with the estimated cost at completion report which is prepared by forecasters. If they do not agree, this may be a sign that the reporting system does not track, evaluate accordingly.

Detail cost estimates have a variety of uses, insure

that they are used for the following:

1. Budget refinement and justification as program becomes more specifically defined.
2. Ratification of program decisions as program moves through progressive phases.
3. Contract value establishment when contractors have definitized proposals.
4. Fund and control management for ongoing contracts.

#### INFORMATION SYSTEM

An effective information system should be accurate, predictable, private, relevant, and timely, so that the information can be used by management to help make decisions. Knowledge arises from the mind acting upon information, it is no exaggeration to say that the success of any project is greatly affected by the quality of information it has and the efficiency of its internal communications. See Exhibit F, page 38 for a graphic presentation of information sources. An effective information system, manual or computerized, is a risk reducing discipline which permits the integration of planning, forecasting, measuring and control.

From a list of reports that are generated through various media, perform the following:

1. Determine who generates the report.
2. Determine who uses the report.
3. Determine the need for the report.
4. Determine what action is taken when reports are no longer needed.

From the above, form an opinion and recommend remedial action if appropriate. An information system (report) that does not alert management to departures from plans and point out unforeseen potential threats is of little value.

#### ENGINEERING

One of the more difficult functions to audit is engineering, mainly because the results of engineering activity are not always directly measurable and often show up more meaningfully elsewhere. Like scientists and physicians, engineers place a premium on technical knowledge and have little appreciation of or competence in administration.

Like other professionals, engineers tend to be highly individualistic. They tend to develop their own style of working and, typically, do not care much for controls, formal procedures, or any other constraints on their professional freedom. It takes a long time and a large investment to build up a competent engineering effort, and the effort can be kept effective only through sound planning and control.

The following points should be looked at closely when reviewing engineering:

1. Do engineering managers and project managers tend to pay too much attention to their engineering responsibilities than their administrative ones?
2. Are visual methods used to measure performance such as Gantt charts or program evaluation review technique (PERT)?

3. Is responsibility and accountability defined for personnel in the different disciplines of engineering?
4. Are project status reports reviewed regularly to help pinpoint problem areas?
5. Is there a standard routine and thoroughly understood procedure for change orders?
6. Are change orders definitized in a timely manner, what controls are there?

Consideration should also be given to maintainability of the total system. Such things as maintenance levels, maintenance practices, tools and materials, test equipment, training personnel, and the establishment of controls thereof should be evaluated.

Other considerations are (1) equipment maintenance cycle, (2) maintenance force levels, (3) replacement policies, (4) crew sizes, (5) preventive maintenance versus repair policy, (6) equipment downtime, (7) parts replacement, (8) parts inventory, etc. The source for this type of information is historical data, technical information on specifications for operating, maintaining and repairing the equipment, etc.

Review the controls and procedures in effect over Government Furnished Equipment (GFE). Determine who is responsible and accountable for coordinating the timely arrival of the GFE at the prescribed location so as to reduce unnecessary costs to the Government through claims for holding up work.

### CONCLUSION

Although the title of this paper specified the management auditing of project management in the Navy, I believe that this technique can be used by any Government Agency or any Commercial industry using the project management approach to managing.

If funds are to be used in the most efficient and effective manner, then I firmly believe that there is a very strong need for management auditing. Especially now, with the Department of Defense competing vigorously, on an annual basis, for a fair share of the total Federal Budget.

I do not want the reader to think that I have covered the subject of management auditing exhaustively. I merely attempted to describe, define, and show how in general it can and is used. The section, entitled, "How to Conduct a Management Audit" is far from being a comprehensive treatise of how one of these audits could be performed.

ANALYSIS OF BUDGET OUTLAYS  
IN THE DEPARTMENT OF DEFENSE  
FOR PROCUREMENT AND RESEARCH  
AND DEVELOPMENT (R&D) FOR THE  
PERIOD FY 1965 TO 1975

<u>FY</u>	<u>Total Defense Budget</u>	<u>Portion Attributed to</u>				<u>Totals</u>	
		<u>Procurement</u>		<u>R&amp;D</u>		<u>Procurement and R&amp;D</u>	
		<u>\$</u>	<u>%</u>	<u>\$</u>	<u>%</u>	<u>\$</u>	<u>%</u>
1965	49.6	11.8	23.8	6.2	12.5	18.0	36.3
1966	56.8	14.3	25.2	6.3	11.1	20.6	36.3
1967	70.1	19.0	27.1	7.2	10.3	26.2	37.4
1968	80.5	23.3	28.9	7.7	9.6	31.0	38.5
1969	81.2	24.0	29.6	7.5	9.2	31.5	38.8
1970	80.3	21.6	26.9	7.2	9.0	28.8	35.9
1971	77.7	18.9	24.3	7.3	9.4	26.2	33.7
1972	78.3	17.1	21.8	7.9	10.1	25.0	31.9
1973	76.0	15.7	20.6	8.2	10.8	23.9	31.4
*1974	80.6	15.1	18.7	8.4	10.4	23.5	29.1
*1975	82.7	16.4	18.7	8.0	10.1	25.3	28.8
Totals	<u>\$818.8</u>	<u>\$197.2</u>	<u>24.1%</u>	<u>\$2.8</u>	<u>10.1%</u>	<u>\$280.0</u>	<u>34.2%</u>

\* Estimated

Source: The raw data for the above analysis, was extracted from the U.S. Budget in Brief for FY 1975, printed by the Government Printing Office.



PARTIAL SUMMARY WORK BREAKDOWN STRUCTURE  
FOR AN AIRCRAFT SYSTEM

LEVEL 1

Aircraft System

LEVEL 2

Air Vehicle

Training

Peculiar Support  
Equipment

Systems Test  
and Evaluation

System/Project  
Management

Data

Operational/Site  
Activation

Common Support  
Equipment

LEVEL 3

Airframe  
Power Plant  
Other Propulsion  
Communications  
Navigation/Guidance  
Fire Control  
Etc., Etc.,

Equipment  
Services  
Facilities

Organizational  
Intermediate

Development Tests  
Technical Evaluation  
Operational Evaluation  
Mockups  
Test and Evaluation  
Test Facilities

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\* Not filled out - for illustration only.

FICTITIOUS EXAMPLE OF  
A MANAGEMENT AUDIT  
FINDINGS AND RECOMMENDATION  
(FOR ILLUSTRATIVE PURPOSES)

Incentivising costs and specifications on cost type contracts

a. Incentivising costs in addition to specifications, on contract XXXX000, would have prevented cost growth in the amount of \$XXX,XXX and fee of \$XX,XXX.

b. During our review of contract administration, we noted that the contract for System X, contract XXXX000, had been negotiated to a cost plus incentive fee (CPIF) contract. Analysis of costs and incentive parameters showed that only system specifications had been incentivised. Therefore, the contractor expended \$XXX,XXX plus fee to increase, in this instance, System X availability from .97 (system specifications) to .972.

c. Discussions with cognizant technical personnel, disclosed that an additional increase of .002 in system availability did not warrant the amount of funds expended to achieve it. We believe that, had the contract been written where no fee would be paid to the contractor for exceeding system specifications without also exceeding the costs, in other words incentivising costs as well as the specifications, the contractor would not have expended \$XXX,XXX to increase availability by .002.

d. Further review disclosed that the incentive parameters had been established by the cognizant contracting officer. It was also noted that the contracting officer was not under the cognizance of the program manager, but was merely providing his services.

Recommendation: We recommend that the program manager, along with his technical staff, insure that when contracts are incentivised that they are incentivised to reduce costs and encourage contractor efficiency.

EXAMPLE OF HOW TO STRUCTURE A CPIF CONTRACT

<u>ESTIMATED</u>	<u>T A R G E T</u>		
	<u>LOW</u>	<u>"LIKELY"</u>	<u>HIGH</u>
Total Costs	292,800	332,000	417,000
Total Fee	<u>38,000</u>	<u>30,000</u>	<u>18,000</u>
Total Price	<u>\$330,800</u>	<u>\$362,000</u>	<u>\$435,000</u>

Range of Incentive Effectiveness (RIE) then becomes:

(\$417,000 - \$292,800) or (\$124,200)

Computation of Fee Pool:

Target Cost	\$332,000	
Target Fee	30,000	
Minimum Fee	18,000	Fee Pool is <u>\$20,000</u>
Maximum Fee	38,000	<u>(\$38,000 - \$18,000)</u>

How to calculate contractor's share ratio:

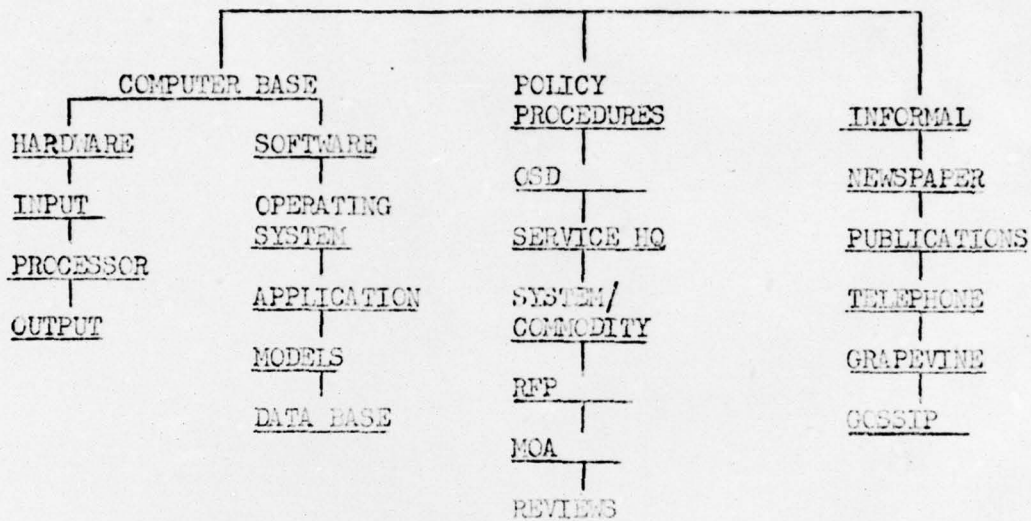
For: Under Target:

$$\frac{\text{Fee Pool}}{\text{RIE}} = \frac{\$38,000 - \$30,000}{\$332,000 - 292,800} = \frac{\$8,000}{39,200} = .20 = 80/20$$

Over Target:

$$\frac{\text{Fee Pool}}{\text{RIE}} = \frac{\$20,000 - 18,000}{\$417,000 - 332,000} = \frac{\$12,000}{85,000} = .14 = 85/14$$

SOURCES OF INFORMATION



Definitions:

CSD     Office of the Secretary of Defense  
HQ     Headquarters  
RFP     Request for Proposal  
MOA     Memorandum of Agreement

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This report was a good source of information for pointing out problem areas in the DoD and also for statistics and general information.

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9. Sawyer, Lawrence E., The Practice of Modern Internal Auditing, The Institute of Internal Auditors, Inc., 1973.

A comprehensive book on internal auditing. The traditional method of auditing is stressed more than the operations or management method of auditing.

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This report points out some of the major problem areas in the management of projects in the DoD.