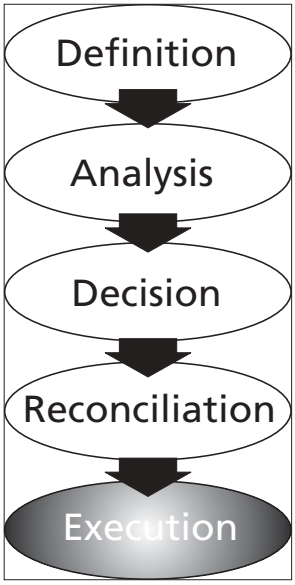
CHAPTER 12

EXECUTION



Be always sure you are right—then go ahead.
—Davy Crockett, Autobiography, 1834

NOW THAT THE DECISION IS MADE AND RECONCILED, we have an alternative that we are ready to implement. The Execution Phase is where the program or policy becomes operational on time, within budget, and fields a system, changes a process, or achieves a policy effect. Most decisions that unravel do not fail because of hostility or opposition to implementing an alternative, rather because the organization plans inadequately, manages or oversees poorly, or fails to enforce requirements and standards.

After a course of action is agreed upon and funded, good decision makers direct their attention to meeting objectives, specifications, schedules, and budgets. The process may seem overwhelming, but there are tools available to help manage complex, interrelated tasks. In this chapter we extend the Executive Decision-Making Framework to encompass implementing a force planning alternative and verifying that what we plan is actually accomplished.

Implementation

The Execution Phase begins as we plan how we will commit the money, material, time, and personnel resources necessary to field a system or execute a policy. We consider three essential aspects. The first is to describe, plan, and schedule tasks. The second is to identify or create an organization and make it responsible for executing the alternative according to the plan. Third, we install a control process to ensure the implementation is done according to the plan. Many graphic techniques and computerized aids may assist us planning, organizing, monitoring, and controlling the process of implementation. These planning methodologies range from informal outlines to highly structured, technical computer programs.

A PLAN FOR IMPLEMENTATION

The implementation plan is the road map for carrying out the decision. Although the plan changes throughout the life cycle of the system or policy, our initial planning efforts remain important. Many facets of implementation planning occur well before the decision is made, e.g., cost, schedule, performance, and risk are usually part of our formal analysis. Performance goals, cost estimates, and the time projected to field and test a system probably affected our preference among options. Now they can serve as an outline for execution planning.

The criteria we used to assess alternatives are often appropriate controls for execution. The systems approach to analysis gives us a useful set of ideas about what must be done, when to do it, and the risks involved as we implement an alternative.

AN ORGANIZATION FOR IMPLEMENTATION

Regardless of which planning system we select, we must identify the people who will carry out the tasks. Who will do the contracting? Who will check on fabrication? Who will oversee and integrate the training? Who will monitor the system's progress? The answers to these questions characterize the responsible implementing organization. An organization may already exist that is capable of executing this project. For simple programs and small projects, ad hoc organizations are adequate. Large projects may require a new formal program office with hundreds of people. The decision maker must approve the organization, define its responsibility, and delegate the authority to execute the alternative.

CONTROLS FOR IMPLEMENTATION

After creating a plan and identifying the force planning organization that will execute it, the next step is to install a management control system to monitor the implementation progress. This control system monitors three critical factors: actual timing of scheduled events, levels of performance, and cost. The control system regularly compares the status of these facets against the program or policy objectives. When deviations from the plan occur, the executing organization fixes the problem. During the life of the program, trade-offs frequently take place between cost, schedule, and performance objectives. A well-designed management information system is a key part of this control system for monitoring trade-offs during implementation.

In essence, the Defense Acquisition System (see Chapter 4 in our *Resource Allocation: The Formal Process*) is an implementation, control, and monitoring system, one that is closely related to the world of analysis. After a need with a material solution emerges from the Requirements Generation System, it enters concept development in the acquisition process. Proponents compete different alternatives against each other as we described earlier in the Definition and Analysis Phases. Once a project matures and the concept narrows, the program managers craft the documents of the formal process, e.g., the Capstone Requirements Document and the Operational Requirements Document. They codify the Key Performance Parameters, Thresholds, and Objectives that will be quite similar, if not identical, to the criteria that enabled the decision itself.

The Acquisition Program Baseline and Acquisition Strategy are key management tools that program managers create to aid implementation. They are iterative (reviewed at each of the milestones) and self-regulating processes that constantly focus and re-focus the implementation of the decision on the mission need. The acquisition process is punctuated by these milestone reviews; after each, a program passes into its next formal procurement phase. The decision makers conducting these reviews may consider many issues beyond the program under review and its supporting analysis.

AIDS TO IMPLEMENTATION

The decision maker will find many tools and techniques in management textbooks that will help him or her implement a major decision. Some are more appropriate than others for a project. Most of these aids are available in computer programs but they may also be used efficiently for less structured manual applications. We include several representative methods here to famil-

iarize you with their attributes; you will probably observe that many have applications beyond decision making and project management. These aids are often the basis for presentations and reports to senior defense executives, therefore it is important we understand what kind of information they do and should contain.

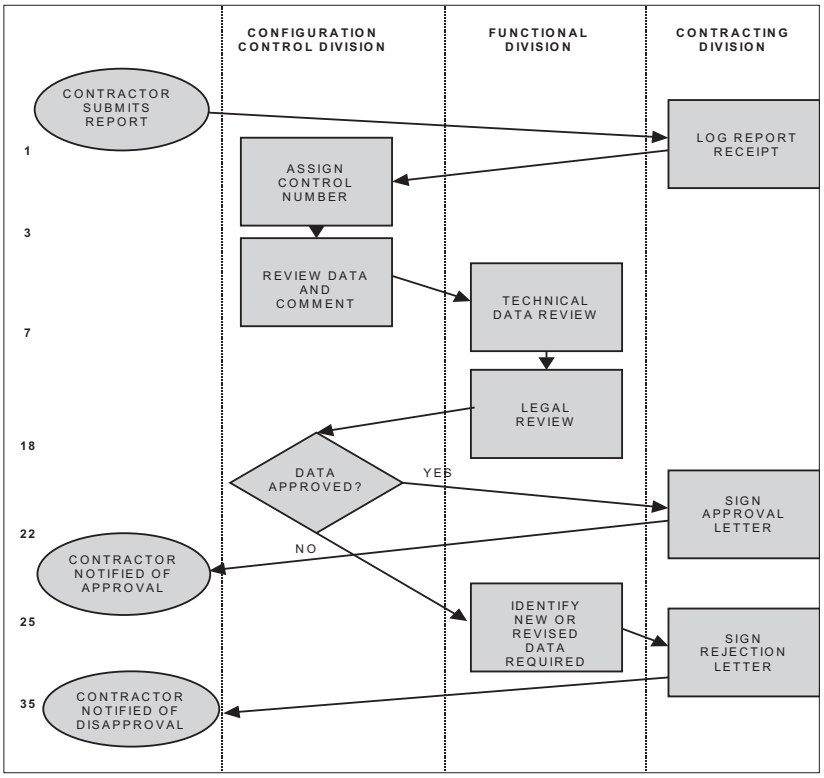


Figure 12-1. Correspondence Routing Flowchart.

Flowcharts

A flowchart is a schematic drawing that shows the steps of a process and how they interact. We place the steps inside geometric shapes that show their function and we connect with arrows to indicate their sequence. As shown in figure 12-1, ovals mark the beginning or end of a process, rectangles describe activities, and diamonds show decision or inspection points. The numbers on the left are days into the process. Flowcharts may be used to plan an activity or to compare actual processes with ideal processes. They can also point out measurement points and duplicative steps. They are not good for showing steps that can be performed concurrently.

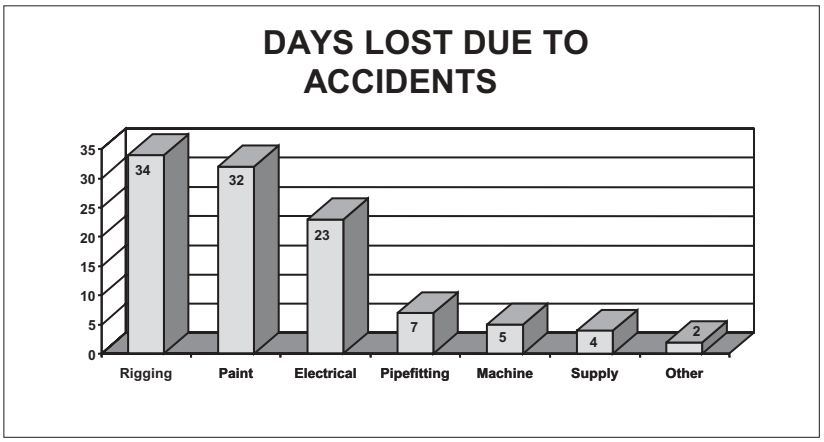


Figure 12-2. Serious Accident Pareto Chart.

Displays for Large Collections of Data

After we begin measuring, we may find that we have an overwhelming amount of data to sort. There are several ways to distill large amounts of data. A Pareto Chart is a bar graph that presents data in its descending order of occurrences. This type of chart focuses attention on a few significant events by separating them from a much larger batch of data with many insignificant ones. It is useful for displaying the effect of changing a policy. Careful selection of what to measure, as with any criterion, is very important because many statistics are misleading. For example, graphing the number of injuries in each department of a command may lead us to focus our safety effort on the department with the most injuries. It is possible, however, that department has the most injuries simply because it is the largest department while another department has many more injuries per person or man-hour. It is also possible that the injuries in the largest department are relatively minor while another department has injuries that result in much more lost time. It may be more appropriate to graph lost time due to injuries per capita for each department, as shown in figure 12-2, if we want to focus our safety attention on the area with the most impact on the organization or verify we have an effective policy.

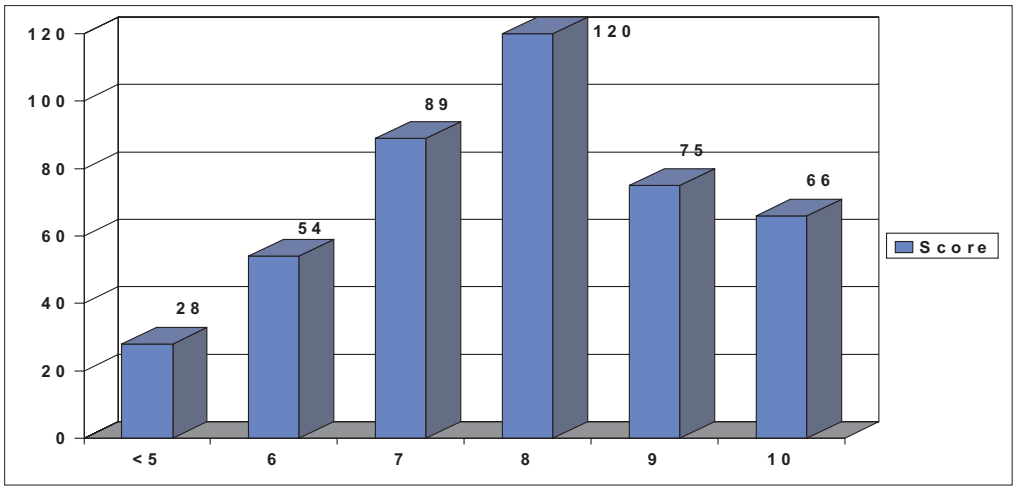


Figure 12-3. Marksmanship Histogram.

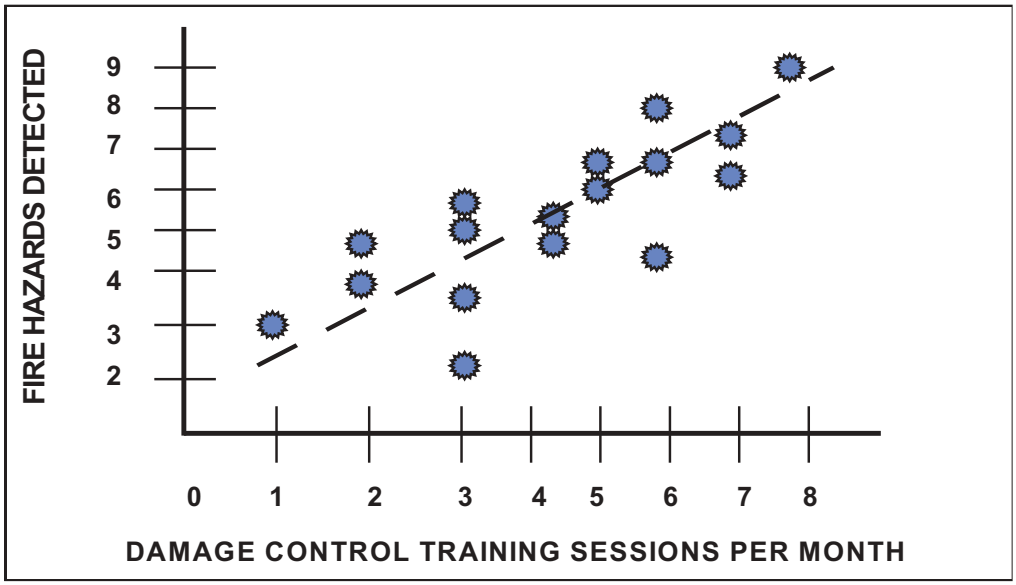
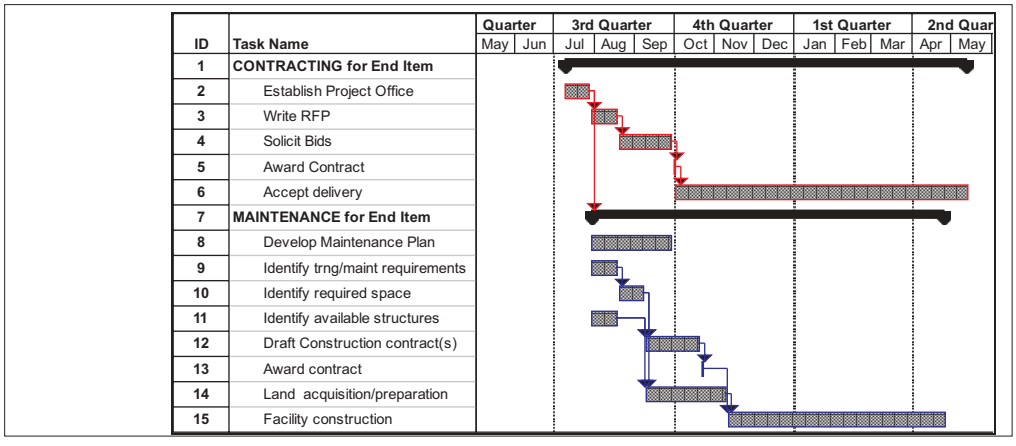


Figure 12-4. Hazards vs. Training Frequency Scatter Diagram.



ID	Task Name
1	**CONTRACTING for End Item**
2	Establish Project Office
3	Write RFP
4	Solicit Bids
5	Award Contract
6	Accept delivery
7	**MAINTENANCE for End Item**
8	Develop Maintenance Plan
9	Identify trng/maint requirements
10	Identify required space
11	Identify available structures
12	Draft Construction contract(s)
13	Award contract
14	Land acquisition/preparation
15	Facility construction

Figure 12-5. Procurement Program Gantt Chart.

Histograms are like Pareto Charts, but they are arranged to show the frequency distribution of data over a range of values. We place the largest concentration of data in the center of the range and values with less frequent occurrences in bins to either side. Histograms readily show the amount of variation in the data set and its distribution. Figure 12-3 is a histogram of marksmanship results for riflemen who score between 0 and 10 on their tar-gets.

Scatter Diagrams contain a raw plot of two variables related by cause and effect, for example fire hazards detected versus damage control training sessions. We seek to know if a change in one variable has an effect on the other. We plot the raw data on the chart with the independent variable on the x-axis and the dependent variable on the y-axis. After all the data is plotted, we construct a line of best fit through the data field to see if there is a trend that connects the two variables as shown in figure 12-4.

Gantt Charts

These charts list tasks vertically on the left side and their schedules graphically (horizontally) along the right side as shown in figure 12-5. The timelines for each task display its start and completion dates. We indicate slack time with dotted lines. Tasks may be broken down into sub-tasks and, for large projects, managers may create a series of charts that show increasing levels of task detail.

Gantt charts are very helpful tools for managing the Program Evaluation and Review Technique—PERT. They easily represent which tasks depend on the earlier completion of other tasks in a daisy chain effect. By building such a chart for the entire implementation, we can identify the Critical Path from the start to finish of the project. The critical path is the sequence of interdependent tasks that have no slack time between them; a delay in any of these tasks moves the completion to the right (further in the future). Gantt charts also make it easy to identify tasks that may be performed simultaneously or non-sequentially.

Critical Path Management has become its own discipline. If more resources become available, managers may apply them to the critical path to finish the project sooner, which will mean savings in fixed cost and possible performance incentive awards. If a task along the critical path is slipping, managers know this is an immediate cause for concern. Industrial activities, such as shipyards, use Gantt charts extensively for construction and overhaul estimates, planning, and management. There are computer programs that generate Gantt charts quickly and we can vary their displays and their level of detail easily.

We may use Gantt charts to graph our resources. Instead of listing tasks to be accomplished, we list our resources (personnel, equipment, contractors, etc.) on the left side and on the right indicate when they are involved with various activities. This prevents scheduling a unique resource simultaneously for two different projects. Computerized programs can link the resources to the project. If the project is rescheduled or delayed, all of the resources assigned to that project automatically reschedule, and the computer flags conflicts for resources. Most fleets and type commanders use a form of Gantt chart to schedule ships and squadrons. If several ships are involved in an exercise that is delayed by a week, the computer indicates which ships remain available to participate and which ships have conflicts with another commitment.

Activity Network Diagrams

An activity network diagram is a variant of a flowchart that incorporates time, the critical path, and all the tasks required to complete the project. It uses a series of circles (events), arrows (processes), and numbers (duration) to show the sequence and relation of activities in a project. The critical path is the sequence of events that determines how long the project will take; each delay in a critical path activity lengthens the overall project by a like amount. For example, in figure 12-6, the critical path follows the bold arrows from Event 1 through Events 2 and 5 and ends at to Event 6. Events 3 and 4 must be completed before Event 5, but they consume less time than Event 2 on the critical path; Path 1-3-4-5 has one week of slack time. If the engineers reevaluated Process 4-5, for example, and decided it would take three rather than one week (and nothing else changed), then Path 1-3-4-5 would become the new critical path. Often, activity network diagrams are drawn to a time scale to provide a visual sense of the duration of each task and the impact of delays along the critical path day-by-day.

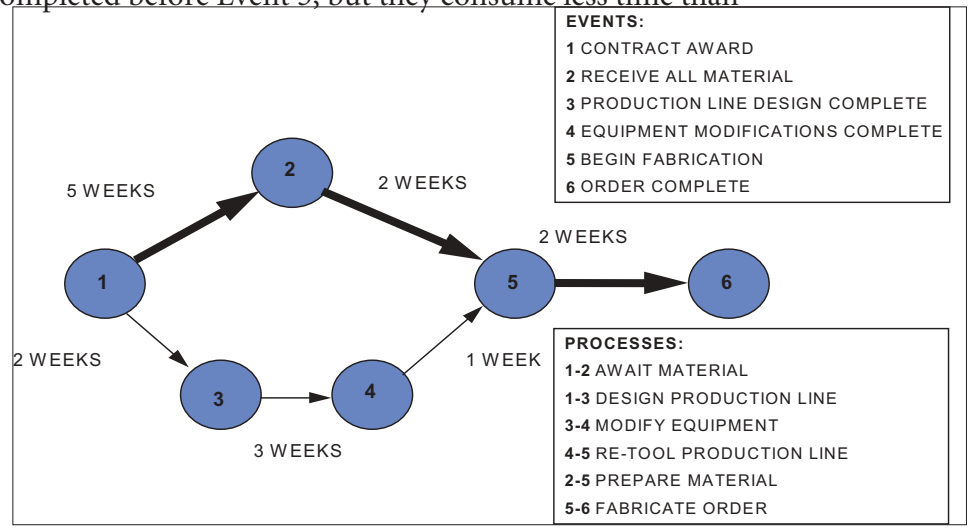


Figure 12-6. Product Activity Network Diagram.

Atlantic Undersea Test and Evaluation Center

PLAN of ACTION and MILESTONES

GOAL: Upgrade operational procedures, communications practices, range safety procedures, and training. Provide higher quality services to various range users while minimizing the risk of range safety violations.

OVERALL RESPONSIBILITY: LT D. P. Montague **APPROVED:** CDR M. WATERS

REVIEW DATE: _____ **REVIEW DATE:** _____

REVIEW DATE: _____ **REVIEW DATE:** _____

COMPLETION DATE:_____ Page 1 of 4

ACTION STEPS/TASKS	START DATE	COMP DATE	PERSON(S) RESPONSIBLE	REMARKS
1. Establish written policy on roles, responsibilities, and interaction of RSO/CDO/RSWO				
2. Establish written policy on RSWO relief reports.				
3. Establish written policy on CDO and RSWO log keeping.				
4. Establish written policy on communication casualty procedures.				
5. Establish written policy on time allowed to process/transmit various types of messages.				

Figure 12-7. Service Improvement Plan of Action and Milestones.

Plans of Action and Milestones

A Plan of Action and Milestones lists all the steps that must be accomplished to implement a program or policy. It specifies by name or department who is responsible for each task and its due date, as shown in figure 12-7. The managers review and update the Plan of Action and Milestones periodically and maintain their portions continuously. The Plan of Action and Milestones may be based on a Gantt chart.

Verification

The purpose of verification is to ensure our implementation of the force planning alternative conforms to our expectations, guidance, and to regulations. Our expectations about the project started to form in the Definition Phase when we posed such questions as: What is the expected or required outcome from this decision? What different perspectives or opinions exist with respect to the problem? What are the key facts and assumptions?

During the Analysis Phase we identified criteria to choose between alternatives. These criteria are often reflected in formal documents from the Defense Acquisition System as Key Performance Parameters and by targets or policy goals. By the time the reconciliation process was complete, we codified additional expectations into the Acquisition Program Baseline and procurement specifications and validated or modified our policy goals.

Verification is the process of measuring the product and process and comparing the results to the expectations. This feedback may be used in a variety of ways, from making minor adjustments to system performance to termination of the entire project. As the Execution Phase progresses, verification ensures we meet our cost, schedule, and performance goals. Verification continues during the system's or policy's operational phase to monitor performance and identify improvements or changes to the system.

VERIFICATION MEASURES

The key to verification is deciding what to measure. For the hardware product or new policy, all attributes of the system are candidates for verification. The criteria we used in the analysis are excellent starting points for deciding what to measure. We use the same logic and tests for validity, reliability, and practicality while selecting what to measure. Verification measures with high

validity compare the projected costs and schedules to what is actually happening. More frequent measurement intervals contribute to reliability and permit less dramatic adjustments and corrections. How often it is practical to measure depends upon the policy, type of system, the data measured, the urgency of conducting the measurements, and the penalties for making a mistake in implementation. It also depends on the accuracy and feedback requirements of the overseeing organization.

Once we decide what to measure, we must choose techniques with high levels of reliability and practicality to gather and track data. Some of the more common verification measurements are test programs, audits, sampling, exercises, and simulations:

- Formal test programs are an integral part of the acquisition of any major weapon system. The contractor will normally provide performance data as a contract deliverable. The potential for biases in contractor-provided data might necessitate the use of in-dependent testing agencies. The scope of such tests must be balanced against their cost and the perceived reliability of the contractor's data.
- Audits are systematic examinations of program plans and data to determine the efficiency and effectiveness of the implementation activities. They check for compliance with organizational procedures as well as accuracy and completeness of administrative records and reports. Finally, they ensure public funds and resources are properly protected and effectively used in achieving the system objectives.
- Statistical sampling is a practical way to gather data without actually observing the entire population. Sampling saves time and money. When done properly it is also very accurate and reliable. It is commonly used to verify a defense system's cost, schedule, and performance characteristics during development, test, and operational deployment. The data may be used to predict the system's ability to meet its objectives.
- Exercises test the system under operational combat-like conditions. Conducting regularly scheduled exercises provides the decision maker with important information on a system's ability to achieve the objectives over its life cycle.
- Simulation is used to test and predict system performance when real operational tests are not practical or when verification depends on some future uncontrollable event. War gaming is a type of simulation widely used in DoD.
- Surveys are the usual tool for verifying policy effectiveness just as they were used to choose a policy alternative in the first place; see Chapter 9, "Policy Analysis."

MEASUREMENT OBJECTIVITY

Once we know what and when to measure and how the data will be collected, we need to decide who will measure. To ensure objectivity, the organization that manages implementation should not be asked to perform verification. Each service has an Inspector General and there are several government audit agencies like the Congressional Budget Office and the General Accounting Office that have the professional and potentially unbiased ability to independently evaluate force planning implementation. These audit teams verify system or policy effectiveness using a variety of techniques such as inspections, testing, correlation analysis, simulated activities, and surveys. The services each have independent testing and evaluation commands that subject new weapons and support systems to exhaustive series of physical and simulator tests before the service resource managers, in a separate chain of command, can approve them for production.

Who receives these audit reports depends upon the program or policy and the service charged with execution. Clearly program managers and contractors have a strong and vested interest in an independent comparison of their hardware's actual performance to its actual performance. Many other stakeholders in the decision have an interest in test data. The other services are interested in the joint aspects of the project. Congress and comptrollers are interested in cost performance. A host of others, including other nation's governments, academics, businessmen, environmentalists, etc. all seek data that serves their interests and objectives.

Summary

Successful execution of a force planning alternative depends entirely on the earlier phases of the decision making process. The roots of implementation and verification begin with the problem definition and we embellish them in each subsequent phase, thus the direction implementation and verification will take is well set before we enter the Execution Phase.

Implementation is the process of shifting from choosing and reconciling a program or policy alternative to fielding an operational system or implementing a policy change. Implementation includes three principal activities: developing a plan to achieve the objective, organizing the resources to do the job, and managing the process until successful completion. There are a variety of powerful management tools available to achieve these ends.

Verification begins once implementation is underway. It ensures that system cost, schedule, and performance objectives are met. Verification uses technical measurements and professional judgment to compare the system's actual performance with targets and goals - our expectations. Organizations free from conflicts of interest, without bias or advocacy, provide oversight of implementation. The process of verification, if done properly in peace-time, will provide reasonable assurance of that our force planning objectives in peace will lead to success in war.