

DTIC FILE COPY

ADVANCED ANALYSIS DIVISION NOTE
AADN 90-1

**AN APPLICATION OF PLANNING THEORY TO
INDUSTRIAL MOBILIZATION PLANNING**

AD-A218 288

December 1989

by
Richard A. Fontaine
John J. Mulhern

Approved by
Neal Kochman
Division Manager

Approved for public release;
distribution unlimited.

DTIC
ELECTE
FEB 22 1990
S E D
E

ANSER
Suite 500
1215 Jefferson Davis Highway
Arlington, Virginia 22202

90 02 13 059

This document reports research sponsored by the *Military Deputy for Acquisition, SAF/AQ*, under *Contract F49620-86-C-0047*. These results do not necessarily represent Air Force official opinion or policy.

ANSER was established in 1958 as an independent, not-for-profit research corporation to contribute to the security and public welfare of the United States. ANSER's principal activity is to provide government agencies with objective, timely research and unbiased recommendations on complex technical and management problems. The ANSER staff contributes directly and significantly to problem solving in the public interest through systems analysis and evaluation, operations research, investigation of technical feasibility, and development and application of planning methods.

ADVANCED ANALYSIS DIVISION NOTE
AADN 90-1

AN APPLICATION OF PLANNING THEORY TO
INDUSTRIAL MOBILIZATION PLANNING

December 1989

by
Richard A. Fontaine
John J. Mulhern

Approved by
Neal Kochman
Division Manager

Approved for public release;
distribution unlimited.

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	



ANSER

EXECUTIVE SUMMARY

It is unlikely that the factories currently performing defense production could provide military items in sufficient quantities to meet wartime demand; sufficient quantities of material could only be produced by adding plants. While the cost of acquiring emergency stockpiles for a major conflict would be staggering, the cost of planning for the required production capacity is relatively low. However, planning for industrial mobilization needs to be integrated with other military planning activities. A major obstacle to effective industrial mobilization planning has been the reliance on capacity-based planning.

The expression "planning," as used in this paper, is not merely "deciding what to do in advance" but the integrated performance of five distinct functions.

1. Formulating a Goal or establishing what is to be done and when is the cardinal function of planning.
2. Selecting a Course of Action requires creativity. This then becomes the operational concept for the plan.
3. Identifying Resources entails specifying required and available resources to achieve the stated goals.
4. Designating Implementors. Resources are allocated by specifying how each implementing activity is to perform.
5. Establishing Control. This links plan development to plan execution.

Planning is also distinguished by dimensions including time horizon, organizational level, and amount of detail. These dimensions tend to be related. Long range plans are usually high level general plans, while short range plans tend to be more detailed and developed at a lower level. Realistic goals are linked to the external situation; goals driven entirely by internal procedural considerations should be suspect.

We believe industrial mobilization planning would be more effective within a framework that projects the five planning functions onto the military objectives of readiness, sustainability, and force expansion. These strategic objectives correspond to partial, full, and total mobilization.

The current Industrial Preparedness Planning (IPP) program includes several methods for planning, of which the most commonly used are the production planning schedule method using DD Form 1519 and the data item description (DID) method.

In 1519 planning, the acquisition activity identifies the contractors to be surveyed, enters production requirements on the 1519, and forwards the form to the appropriate Armed Services Production Planning Officer (ASPPO), who contacts the contractor. If the producer cannot meet required deliveries, the contractor and the ASPPO identify industrial preparedness measures (IPMs)-- actions to increase emergency production capacity. The ASPPO and the contractor can initiate additional 1519s that are forwarded to appropriate subcontractor ASPPOs for planning with subcontractors. This can be repeated down to the lowest level of the subtier.

Planning with the data item description (DID) method is performed under contract. The DID method incorporates gathering information on subcontractor emergency production capability, correlating this subtier data with prime contractor capacity and constraints information, and determining the total capacity to produce end items. The information collected through DID planning is essentially the same as that found in 1519 planning. Although time-phased quantified goals are normally established, these goals are often based on available capacity, and not on wartime requirements. DID planning today rarely includes planning for the many additional production facilities needed to sustain the programmed force and build the planning force.

The goal of readiness planning for partial mobilization should be to reach maximum production rates as quickly as possible with existing brick and mortar. Industrial preparedness measures (IPMs) to increase production capacity may not be funded until an actual crisis begins. The 1519 and DID methods, as currently practiced are appropriate for readiness planning.

Sustainability planning must address production requirements far beyond peacetime production capacity. Expanding capacity under full mobilization entails more than removing emergency production bottlenecks at existing factories. Sustainability requires a modification of the operating style that is appropriate to the peacetime acquisition environment. It requires that industrial mobilization planning look beyond current capacity in order to meet warfighting requirements. The sustainability phase would be supported by new plants, probably owned by the government and operated by defense

contractors, and additional subtier plants converted from producing civilian goods to producing military components, supplies, and materials. Acquisition activities and their contractors should identify the production factors and capacity of the optimum plant for an item. This information can be combined with macroeconomic analyses of labor availability in order to site the additional plants needed to support sustainability.

Total mobilization to support force expansion preempts the production of nonessential civilian goods. Here, the additional plants would nearly all be converted civilian plants operated by their owners, with technical advice from the peacetime producers of the military items. Significant increases in production would be required to support a war-winning strategy. The peacetime definition of the planning force provides useful planning targets until an actual scenario can provide the basis for refining force structure objectives. There are currently no plans to build or convert plants for emergency production of war materiel and no plans for the wartime conversion of nonessential civilian production. To enhance traditional industrial preparedness planning, there is a need to utilize the strategic objectives framework and develop requirements-based plans that include planning for additional plants. For force expansion planning, national level macroeconomic analyses needs the participation of FEMA and the Department of Commerce, to help determine the location of nonessential civilian industry, and assistance from the Department of Labor to help determine the number of available workers and their skills for every geographic area that includes industry that would be considered nonessential in a total mobilization.

Improved industrial mobilization planning will not change the harsh realities facing the industrial base or the hard choices confronting national security strategy. But sound planning might accelerate the pace of industrial mobilization should we ever need it and the difference could be important.

CONTENTS

	<u>Page</u>
I. INTRODUCTION	1
II. BACKGROUND	3
III. PLANNING THEORY	6
A. Planning Functions	6
1. Formulating a Goal	7
2. Selecting a Course of Action	7
3. Identifying Resources	8
4. Designating Implementors	8
5. Establishing Control	9
B. Planning Dimensions	9
C. Conclusion	11
IV. CURRENT PLANNING METHODS	14
A. Planning with Production Planning Schedules (DD Form 1519)	14
1. Description of 1519 Planning	15
2. Planning Theory Perspective	16
B. Planning with Data Item Descriptions (DD Form 1664)	18
1. Description of DID Planning	18
2. Planning Theory Perspective	18

CONTENTS--Continued

	<u>Page</u>
C. Summary	19
V. A STRATEGIC OBJECTIVES FRAMEWORK	20
A. Readiness (Partial Mobilization)	20
B. Sustainability (Full Mobilization)	21
C. Force Expansion (Total Mobilization)	24
D. Comparison of Frameworks	27
E. Summary	30
VI. CONCLUSION	31

Figure

1	Industrial Mobilization Planning Synopsis	1
2	Planning Functions	10
3	Planning Theory	13
4	Planning Methods	17
5	Industrial Mobilization Plants	25
6	Strategic Objectives Framework	29

I. INTRODUCTION

The planning for industrial mobilization that has been done in recent years seems inadequate. One of the major shortcomings is the lack of focus on military goals. In this paper we will examine the five essential functions of effective planning, evaluate the adequacy of existing methods, and develop a new framework for industrial mobilization planning.

We will present a concept for industrial mobilization planning based on planning theory and a strategic objectives framework. Being capable of winning a conventional war requires planning to support our forces through the three phases of conventional war, with the strategic objectives of readiness, sustainability and force expansion, as shown in Figure 1.

Figure 1

INDUSTRIAL MOBILIZATION PLANNING SYNOPSIS			
Phase	Strategic Objective	Time Horizon	Mobilization
First	Readiness	Short Range (Weeks)	Partial
Second	Sustainability	Midrange (Months)	Full
Third	Force Expansion	Long Range (Years)	Total

The objective of the first phase of nonnuclear conflict is readiness--to support high consumption rates during the first few weeks of combat. The second phase objective is sustainability, with the goal of producing and delivering sufficient material to restore and supply the force. The objective during the third phase is force expansion, requiring massive increases in production to create and support a much larger force.

The three-phased strategic objectives approach represents a useful concept for industrial mobilization planning based on the short, medium, and long range requirements of war.

Developing separate industrial mobilization plans for partial, full, and total mobilization provides the national leadership with graduated response options to initiate execution of one, two, or all three plans at any point in a developing crisis.

This paper assumes that any amount of industrial mobilization planning would accelerate the process of actual mobilization should the need ever occur. It is further assumed that more planning is better than less, particularly if the incremental cost is low in comparison to other expenditures for national security. There is no intent to oversell industrial mobilization planning or oversimplify mobilization itself.

II. BACKGROUND

In recent years the Services and DLA have performed industrial preparedness planning (IPP) at the direction of the Department of Defense. The objectives of IPP have included surge (the ability to expand production quickly in a peacetime environment) and mobilization (the ability to support forces waging war).

Industrial mobilization planning is one aspect of IPP. Yet over the years, there have been obstacles to effective industrial mobilization planning. One obstacle is the focus on capacity-based planning over requirements-based planning. In capacity-based planning, plans are made to increase production to maximum plant capacity rather than to produce the number of items required to support national military objectives.¹ Surge planning is an example of capacity-based planning for increasing production up to the maximum capacity of existing facilities.²

Another obstacle is emphasizing the needs of the peacetime programmed force. The programmed force is only a subset of the force that would provide reasonable assurance of successful execution of the national strategy--winning a conventional war.

The sustainability phase of a war would be a prolonged defensive crouch during which the U.S. would urgently develop additional military production capacity. This period of vulnerability could last many months. Existing factories currently dedicated to defense production could not provide sufficient quantities of military items. Only additional

plants could produce the quantities of material needed to meet sustainability requirements. Hence there is a need for peacetime planning, and some funding, to meet sustainability requirements. The other alternative, stockpiling for sustainability, has been consistently rejected by Congress as unreasonably expensive.

The programmed force, constrained by peacetime funding realities, would probably have to be expanded over time to win a large scale conventional war. A war-winning force structure, such as the planning force, would need to be several times the size of the current programmed force. Building and supporting the planning force would require far more industrial output than sustaining the programmed force. Force expansion to planning force levels would require many additional production facilities. These facilities should be planned ahead of time, although in less detail than the additional facilities needed to support sustainability.

While the effectiveness of acquiring emergency stockpiles for sustainability and force expansion would be high the cost would be staggering; whereas the cost of industrial mobilization planning is relatively low. Industrial mobilization planning has much in common with other forms of planning in this respect; for example, the cost of an architect's plan is negligible when compared to the cost of constructing a building. While planning on paper is no substitute for actual hardware, the time that might be saved because prior planning was performed could make effective industrial mobilization planning highly cost effective.

Advanced planning, coupled with contract awards consistent with mobilization requirements, is the key to industrial mobilization. Industrial mobilization planning can make a major contribution to national security, particularly if it is carried out in the context of three time-phased strategic objectives for industrial mobilization--readiness, sustainability, and force expansion.

We will now review the precepts of planning theory before applying them to industrial mobilization planning.

III. PLANNING THEORY

As planners have accumulated experience in the military and other fields, planning experts have developed a body of theory which can make the planning process more systematic. This body of theory should apply to industrial mobilization planning.

The expression "planning," in this paper is used to mean the integrated performance of five distinct functions.

- Formulating a goal
- Selecting a course of action
- Identifying resources
- Designating implementors
- Establishing control

The effectiveness of planning depends on the performance and integration of these five functions, while considering the three planning dimensions of time, level, and clarity. Planning functions and planning dimensions provide a framework that increases the utility of planning.

A. Planning Functions

In developing a plan, the five functions should be addressed sequentially, with each subsequent function incorporating

all of the prior ones. In this manner integration of functions is achieved and continuity of the planning process is preserved.³ Let us consider each of the five functions in turn.

1. Formulating a Goal

Formulating a specific goal--establishing what is to be done, and when--is the cardinal function in planning. In general, a goal statement should be stated in terms of three elements-- task, quantity, and time to facilitate exercising control during plan execution.⁴

Planning theorists emphasize that formulating goals leads to a better understanding of the situation, an important product of the planning process. Both the overall management goal and plan incremental goals need to be stated and documented early in the planning process. Planning documents enable both planners and other members of the organization to review the goal statements and select a course of action to achieve the goals.

2. Selecting a Course of Action

The second planning function--selecting a course of action--requires creativity. After considering all the courses of action one can think of for achieving the stated goals, planners select the best course of action from the alternatives.⁵ This then becomes the operational concept for the plan.

It helps to restate the goal in documenting the selected course of action. This process of integration needs to be repeated with each function to make sure that planning continuity is achieved.

Attention to planning continuity helps to reduce the likelihood that the goal will be displaced. Goal displacement can be the result of preoccupation with a constraint or procedural matter. Goal displacement typically renders the plan ineffective.

3. Identifying Resources

The third planning function entails identifying both required and available resources to achieve the stated goals based on the selected course of action. Required resources may be readily available or they may require considerable imagination to identify and acquire.

Once valid goals have been formulated, planners must identify a course of action that is consistent with available resources. Resource availability should not be considered rigidly fixed. Resources for a given project can often be found if the overall plan inspires confidence in those who control resources.

4. Designating Implementors

In the fourth planning function, the plan implementors are organized and responsibilities assigned. Resources are allocated by specifying how each implementing activity is to perform. All parties should be informed through the

dissemination of documents that also summarize the results of the first three planning functions.

5. Establishing Control

The fifth and final planning function is to establish a control mechanism. This links plan development with plan execution. This control mechanism lets managers know whether they need to make adjustments during plan execution.

Establishing controls is frequently the most difficult aspect of planning, and planners are often forced to select imperfect control mechanisms in the interest of economy. But clear delineation of control mechanisms to monitor plan execution greatly increases the likelihood of success when the plan is executed.

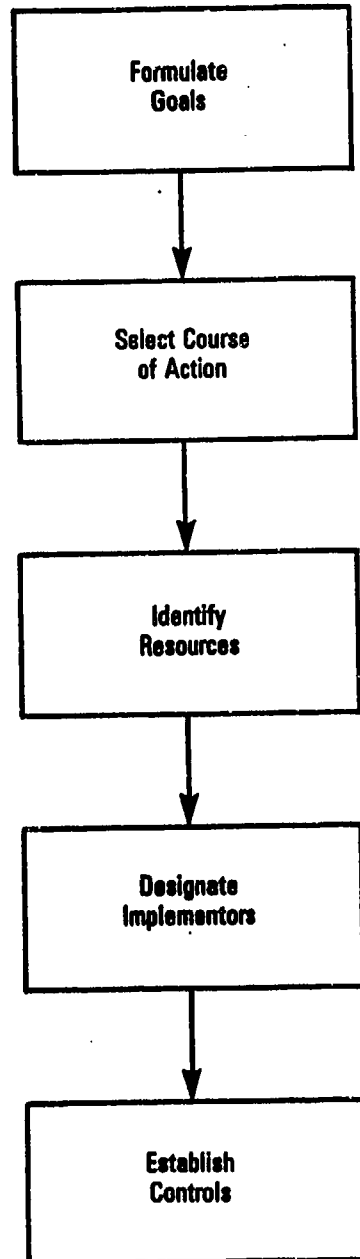
The planning process is complete only when each of the five planning functions shown in Figure 2 is adequately performed and integrated with the other planning functions.

B. Planning Dimensions

Planning dimensions include time horizon, organizational level, and clarity or specificity of the plan. There are long range plans and short range plans, high level plans and low level plans, general plans and detailed plans. These dimensions tend to be related. Long range plans are usually high level general plans, while short range plans tend to be more detailed and developed at a lower level.

Figure 2

PLANNING FUNCTIONS



The most familiar planning dimension is the time horizon. Long range can mean 1 year, 5 years, or 20 years, depending on the situation; short range can vary in the same manner.⁶ The time horizon is frequently related to the level of detail in a plan.

The time horizon normally determines the organizational level that should perform the planning. Organizations may be viewed as having three levels--strategic, coordinative, and operational. Long-range planning usually occurs at the strategic level. Managers and planners at different organizational levels normally plan for different time horizons. For industrial mobilization planning, for example, the thought of the huge quantities required for force expansion (long range) planning would overwhelm the acquisition managers at the operational level, while the amount of detail needed to plan for readiness (short range) would overwhelm and fail to interest the Pentagon.

C. Conclusion

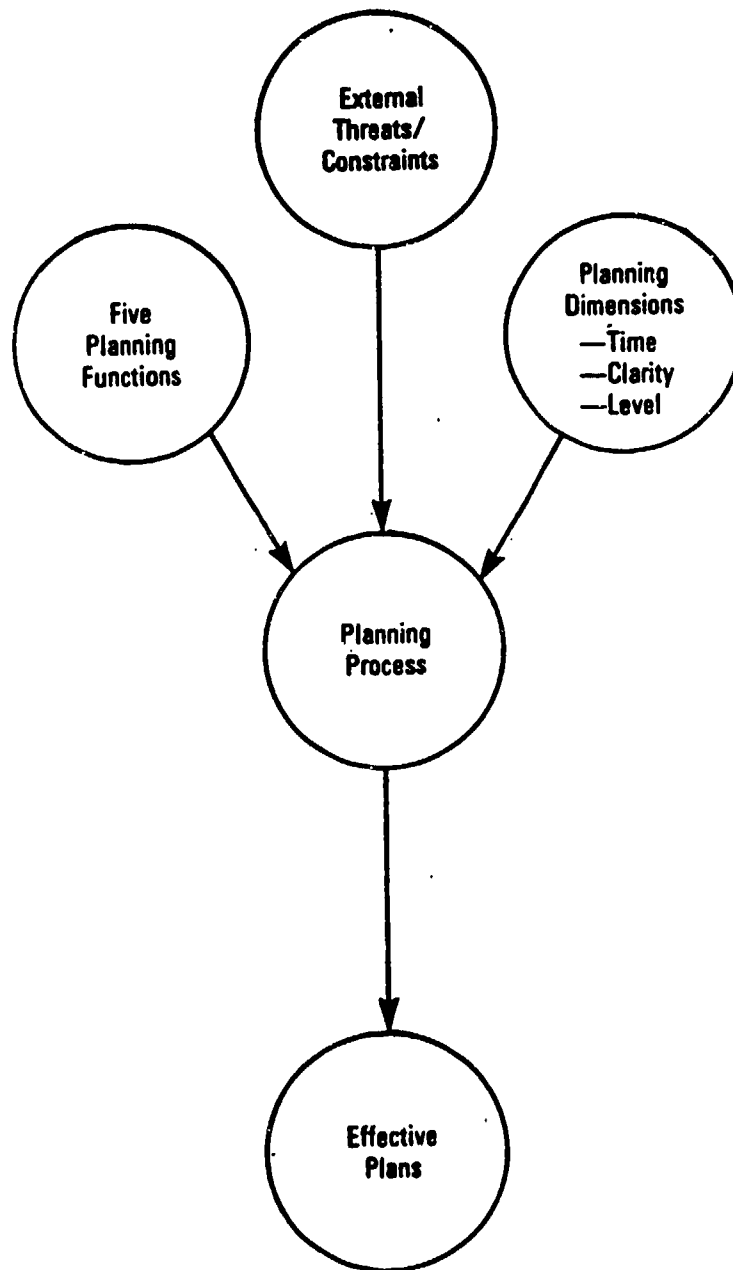
Planning theory divides the planning process into five distinct functions. If any function is missing, the planning process will be incomplete; if any function is unrelated to the others, there will be discontinuity; and if any function is defective, the planning process will break down at that point. Without careful attention to planning dimensions, even planning that is functionally sound can deteriorate.

Realistic goals are linked to the external situation; goals driven by internal or procedural considerations should be suspect. Planning theory provides a syntax for goal statements that includes task, quantity, and time; it associates time horizons and planning detail with the different management levels in an organization. A planning process should incorporate sound planning practices, in addition to realistically reflecting the threats and constraints of its environment as shown in Figure 3.

Returning now to industrial mobilization planning, let us examine the current methods for performing industrial mobilization planning and determine where improvements can be made based on planning theory.

Figure 3

PLANNING THEORY



IV. CURRENT PLANNING METHODS

The Industrial Preparedness Planning (IPP) program is designed "to maintain an adequate industrial base to support DOD requirements for selected military items in a national emergency."⁷ The IPP program lists several methods for planning in a D-to-P context, where D-day is the day on which military operations commence and P-day is the day on which production of war material equals consumption. Of the planning methods, the most commonly used are the production planning schedule method using DD Form 1519 and the data item description (DID) method. We will examine these two industrial mobilization planning methods and apply the standards of planning theory to each of them.

A. Planning with Production Planning Schedules (DD Form 1519)

In the production planning schedule method, government representatives contact vendors to negotiate emergency production agreements. For the contractors this is voluntary planning; they are not reimbursed and they do not always cooperate or provide credible data.

The production planning schedule method uses DD Form 1519 to gather information from production facilities that are then designated planned emergency producers. The DD Form 1519 method has been appropriate for gathering information from many sources at low cost, and where the item is relatively simple. Examples of successful 1519 planning include ammunition planning and planning for many spare parts.

1. Description of 1519 Planning

In 1519 planning, the acquisition activity selects the items to be planned, identifies the contractors to be surveyed, enters production requirements on the 1519, and forwards the form to the appropriate Armed Services Production Planning Officer (ASPPO), who contacts the contractor. After the contractor conducts any necessary subcontractor planning, the ASPPO and the contractor sign a production planning agreement and the ASPPO returns the 1519 to the acquisition activity.

In the Air Force, the Air Force Logistics Command (AFLC) tasks the Air Logistics Centers (ALCs) to survey the current suppliers of Industrial Preparedness Planning List (IPPL) consumables, spare parts, and support equipment. The ALCs then provide the suppliers with statements of monthly item requirements under emergency conditions. These time-phased requirements are goal statements in the sense of planning theory. The contractors are asked to forecast their ability to meet the requirements under various circumstances based on present facilities and equipment while considering other commitments. If the initial forecast indicates that the producer cannot meet required deliveries, the contractor and the ASPPO identify industrial preparedness measures (IPMs)-- actions to increase emergency production capacity. If the producer's emergency production capacity is constrained by the capacity of one or more subcontractors, the ASPPO and the contractor initiate additional 1519s that are forwarded to the appropriate subcontractor ASPPOs for planning with the subcontractors. This process can be repeated as often as needed down to the lowest level of the subtier.

Only when DD Form 1519 is used to perform industrial preparedness planning for items that have been difficult to acquire in peacetime, or for items with insufficient war reserves, are the identified IPMs likely to be funded in the peacetime budget process. For many items, however, funding IPMs is too costly. Such items are planned and the IPMs are held for funding early in a crisis situation.

2. Planning Theory Perspective

All five planning functions described earlier can be recognized in the 1519 method. Goals are expressed as monthly required delivery schedules. It is implied that the appropriate course of action is to satisfy demand by increasing output from the existing plants of current producers and other contractors on the Register of Planned Emergency Producers (RPEP). Additional resources needed can be identified as IPMs required to meet the goals. Facilities designated to implement the emergency production plan are the RPEP contractors that sign agreements. Once the signed 1519s are returned to the originating acquisition activities, they can be attached to letter contracts that, if executed, can be used to monitor actual production.

The 1519 method, while formally complete, does not address the full range of mobilization requirements. Summarized in the middle column of Figure 4, the 1519 process as currently performed is only effective for surge planning and readiness mobilization planning.

Since the 1519 method relies on voluntary contractor participation, another kind of planning is appropriate for complex weapon systems requiring extensive planning.

Figure 4

PLANNING METHODS

		Planning Methods	
		Form 1519	Data Item Description
P l a n n i n g F u n c t i o n s	1. Articulate Goals	Required Delivery Schedules	Capacity-Based Requirements
	2. Select Course of Action	Existing Plants	Existing Plants
	3. Identify Resources	Industrial Preparedness Measures	Remove Bottlenecks to Maximize Facilitized Production Rates
	4. Designate Implementors	Planned Emergency Producers	Current Producer and Subtier
	5. Establish Controls	Signed Agreement	Deliverable Contract Report

B. Planning with Data Item Descriptions (DD Form 1664)

In contrast to the voluntary 1519 method, planning with the data item description (DID) method is performed under contract. System contractors are paid to review their vendor base and plan for emergency production. The DID method of industrial preparedness planning incorporates gathering information on subcontractor emergency production capability, correlating this subtier data with prime contractor capacity information, and determining the total emergency capacity to produce end items.

1. Description of DID Planning

In DID planning, the program director contracts with the prime contractor to perform industrial preparedness planning. DID planning envisions correcting bottlenecks to bring the existing plants up to maximum production rates.

The information collected through DID planning is essentially the same as that found in 1519 planning. In DID planning the prime contractor obtains the subtier information. Another difference is the quality control imposed by the fact that DID planning is performed as a contract deliverable.

2. Planning Theory Perspective

How well does DID planning measure up to the standards of planning theory? The scorecard is mixed. Although time-phased quantified production goals are normally established, these goals are often based on available capacity and not

on realistic wartime requirements. Courses of action and resources required are identified, but they are frequently limited to removing bottlenecks to production using existing "brick and mortar." Implementation of the plans developed through DIDs would be the responsibility of the prime contractors under existing contracts.

Although DID planning gets fairly high marks for completeness and continuity, the mobilization goals frequently fail to reflect wartime requirements. DID planning rarely includes planning for the many additional production facilities needed to sustain the programmed force and build the planning force.

The cost of DID planning tends to restrict its use to major end-item weapon systems and major items of government furnished material (GFM). The problem in DID planning is not the method, but that it is often based on incomplete goals.

C. Summary

Both of the primary planning methods currently used for industrial preparedness planning can produce plans that are complete and continuous. Both 1519 planning, which is appropriate for a large number of relatively uncomplex items, and DID planning, which is appropriate for a small number of complex items, could serve industrial mobilization planning better if they were always driven by proper goal setting and they considered additional production facilities. Let us then examine a planning framework that incorporates these traditional methods with goals that are based on the military requirements associated with three strategic objectives: readiness, sustainability and force expansion.

V. A STRATEGIC OBJECTIVES FRAMEWORK

Despite the acknowledged value of the 1519 and DID planning methods, they have not always provided effective industrial mobilization plans. An effective planning framework should project the five planning functions onto the military objectives of readiness, sustainability, and force expansion. On the time horizon, these objectives represent short, medium, and long range military requirements. These strategic objectives also correspond to partial mobilization, full mobilization, and total mobilization. This section considers the three-phased approach to industrial mobilization planning in light of what we have seen about planning theory and the current methods for performing industrial mobilization planning.

A. Readiness (Partial Mobilization)

Readiness represents the ability of forces to perform the missions or functions for which they were organized or designed.⁸ Readiness planning is an appropriate application for the 1519 and DID methods as currently practiced. Readiness planning, like surge planning, should be based on existing facilities. It is focused on being able to quickly produce items at an increased rate. Though the required production rates in the readiness phase would exceed peacetime rates, they would be much lower than the production rates required for sustainability or force expansion.

Readiness is based on prescribed levels of war reserve materiel (WRM). Although WRM could only provide logistic

support for a short period of time, it is considered vitally important by unified commanders as demonstrated by their testimony before the Congress. Planning for readiness should benefit from the recent emphasis on surge and mobilization planning in the responsibilities assigned to program managers.⁹

Since readiness items should be available when war begins, they would normally be acquired in peacetime. However, adequate peacetime funds for WRM are not always provided. The resulting shortfalls become the industrial mobilization planning goals for the readiness phase.

Since the Services and DLA buy WRM from their peacetime suppliers, the logical course of action for readiness planning is to increase production at existing facilities. Additional production capacity may be available through the implementation of previously identified actions to remove production bottlenecks and increase capacity. The control mechanism for partial mobilization is provided by information systems that exist in each Service and DLA to monitor WRM inventory. Thus the five planning functions can be readily performed for readiness planning.

B. Sustainability (Full Mobilization)

In contrast to one-time readiness goals, sustainability goals are stated as monthly production rates that would be required for an extended period. For sustainability to be achieved, production rates must equal consumption rates. As a result, sustainability planning must address production levels far above peacetime production capacity. It must develop additional emergency sources.

Some insight into the nature of the sustainability challenge can be gained from the testimony of the unified commanders before Congress. In his 1986 testimony, for example, General Bernard Rogers deplored the lack of sustainability items.¹⁰ These items cannot be supplied by an unmobilized economy and they cannot be provided for an extended period merely by maximizing the production of current defense plants.

The appropriate course of action for the sustainability phase leads us beyond capacity-based planning to an entirely different sort of planning that is required to expand production capacity as quickly as possible. Expanding capacity under full mobilization entails more than removing emergency production bottlenecks at existing factories; it involves allocating additional factors of production-- facilities, labor, financial capital, material, and management--on a priority basis. As materials are shifted from civil to military use, many new factories would be converted or constructed, the defense labor force would be enlarged, and an expanded production management team would take on new responsibilities. For sustainability to be achieved as quickly as possible, the allocation of these production factors must be planned ahead of time so that plant conversion/construction, production tool acquisition, and training of the labor force can be accomplished concurrently with similar capacity expansion actions by subcontractors and subtier suppliers. Capacity expansion in the subtier would come from the conversion of civilian goods manufacturers.

Locating available land for new construction should be accomplished in advance of the need to build. Computerized models can estimate the availability of additional labor. Management for new plants can be identified from the ranks of the peacetime producers who would be contracted to provide cadres to manage new facilities.

While sustainability planning should be performed jointly by government and industry, the implementation of full mobilization would be accomplished by industry, with government providing funding and oversight. At this time sustainability lacks reporting systems to facilitate control of full mobilization plan execution.¹¹

Sustainability, to a far greater extent than readiness, requires a modification of the operating style that is appropriate to the peacetime acquisition environment. It is not sufficient to rely on the economy as it is organized for peacetime activity. The strategic objective of sustainability introduces a new dimension: it requires that industrial mobilization planning look beyond current capacity and adopt planning methods consistent with warfighting requirements. Planning actions that can be accomplished at minimal cost, such as siting additional plants, should be pursued immediately. However, selecting locations for additional plants cannot be performed at the operational level without assistance from the strategic level of management. DOD must obtain assistance from FEMA and the Department of Commerce to assign general plant locations to Service Program Directors.

Full mobilization to support sustainability does not necessarily curtail production of nonessential civilian goods. Hence, the sustainability phase would be largely supported by new plants, mostly owned by the government and operated by the defense contractors who are the peacetime producers. Since mobilization planning for new plants only requires government and defense industry participation, detailed planning can be performed in peacetime. Subtier planning for converting civilian plants to producing military components, supplies, and materials should be performed by the strategic level of management.

C. Force Expansion (Total Mobilization)

As shown in Figure 5, additional factories to support force expansion are required by total mobilization, which preempts the production of nonessential civilian goods. Here, the additional plants would be converted civilian plants operated by their owners. The involvement of many civilian participants suggests that macroeconomic planning by FEMA, OSD, and the Joint Staff is the appropriate method of performing force expansion planning. This is an example of planning dimensions, with long range (force expansion) planning being performed by the strategic (national) level of management.

Significant increases in production would probably be required to support a war-winning strategy. Large inventories could be needed to support major operations; production must exceed consumption for an extended period to support force expansion.

A war effort might require as much as half of the nation's economic output in support of total mobilization if the adversary pursues an effective program of total mobilization.

The industrial mobilization goals under total mobilization are to build and maintain the force level required to win. The goal statements for force expansion planning can be less specific than readiness and sustainability goals. The peacetime definition of the planning force can provide useful planning targets until an actual scenario can provide a basis for refining force structure objectives.

Figure 5

INDUSTRIAL MOBILIZATION PLANTS			
Strategic Objective	Plants In Production	Plant Operators	Plant Owners
Readiness	Current	Current Producers	Mixed
Sustainability Primes	New	Current Producers	Government
Sustainability Subtier	Converted	Current Owners	Industry
Force Expansion	Converted	Current Owners	Industry

The course of action for force expansion involves a major shift in production from nonessential consumer goods to military items. Peacetime planning for force expansion need only be concerned with output at the industrial sector level and with interindustry impact. It is not necessary to designate precise plants, but it would reduce chaos during the execution of total mobilization if the civilian industries providing the additional plants were determined ahead of time.

Major industrial companies would be the main implementors of the force expansion phase of industrial mobilization, and they would probably gain their authority through presidential emergency boards. These boards would establish control systems to track output as well as requirements for material, labor, facilities, and other factors of production.

While the force expansion phase (as well as the sustainability phase) would require additional plants, a major difference is that under total mobilization all nonessential civilian production would be curtailed, freeing up companies, workers, and facilities for military production. Thus while the new sustainability phase plants should be managed by peacetime producers of military items, converted plants to support both sustainability and force expansion would be managed by the manufacturers of nonessential civilian goods with technical advice from the peacetime producers of the military items. While the government probably would not own the converted plants to support force expansion, it would almost certainly pay for conversion costs along with reconversion costs at the end of the war.

For peacetime planning purposes, the number of force expansion plants should be the number of plants required to support and sustain the planning force once it has been created. This results in force expansion production capacity many times larger than the sustainability phase, since the size of the force being supported is several times larger.

The industrial mobilization goals for force expansion cross Service lines and involve interaction with other Executive departments, especially FEMA, Commerce, and Labor. The individual Services cannot address the civilian production issues effectively. The Defense Secretariat and the Office of the Joint Chiefs should conduct the industrial mobilization planning to support force expansion.

D. A Comparison of Frameworks

The strategic objectives framework is measured against the five planning functions in Figure 6. While the three-phased concept is relatively new and lacks established control mechanisms for the later phases, it shows dimensional strength with its explicit treatment of short, medium, and long range objectives.

From the functional standpoint, the strategic objectives framework is distinguished by its articulation of goals for each phase of industrial mobilization planning. The goals represent more realistic wartime production requirements than have generally been considered in industrial preparedness planning. The existence of three discreet goals leads us to three plans. Depending on the world situation, all three plans could begin execution at the same time, or they could be executed serially as a crisis deepens.

In the planning function of selecting the best course of action, additional plants appear under sustainability and force expansion. It is not enough to identify industrial preparedness measures to optimize production within existing brick and mortar. While maximum production rates by current and planned producers may be adequate for the readiness phase, the sustainability and force expansion phases require that and a great deal more. Plans are needed for the new and converted plants that would produce material for sustainability and force expansion. Plans for force expansion plants should be general in nature and based on macroeconomic analysis. Sustainability plans should incorporate vertical planning by program directors and their contractors and use quantified requirements to determine how many plants will be needed for each weapon system.

With the strategic objectives framework, it is easier to envision the magnitude of required war production. Nondefense manufacturers would be responsible for a large part of military production, augmenting the output of planned emergency producers who would be responsible for managing new plants and advising converted plants.

The control functions also differ. With readiness, the unit reporting systems become important. With sustainability and force expansion, direction of production is shifted to civilian boards that will need to exercise control of industrial mobilization based on military requirements. Hence the need for a JCS sustainability reporting system and, under total mobilization, a national system for tracking military production.

Figure 6

STRATEGIC OBJECTIVES FRAMEWORK

		Strategic Objectives		
		Readiness	Sustainability	Force Expansion
P l a n n i n g F u n c t i o n s	1. Articulate Goals	Authorized WRM and Equipment	Utilization and Attrition Rates	Planning Force
	2. Select Course of Action	Existing Plants	New/Converted Plants	New/Converted Plants
	3. Identify Resources	Industrial Preparedness Measures	Need Specific Plans	Need General Plans
	4. Designate Implementors	Planned Emergency Producers	Current Producers	Nondefense Manufacturers
	5. Establish Controls	Many Existing Systems	Need JCS System	Need National System

While the entries for the planning methods framework in Figure 4 are descriptive, those for the strategic objectives framework in Figure 6 are prescriptive, especially for sustainability and force expansion. They are intended to prescribe some of what needs to be done and not merely describe what is already in place. There are currently no plans to build or convert plants for emergency production of war materiel and no plans for the wartime conversion of nonessential civilian production.

E. Summary

The strategic objectives framework offers significant advantages for existing planning methods. Superimposing planning theory over the strategic objectives of readiness, sustainability, and force expansion identifies actions that should be taken to increase the effectiveness of traditional industrial preparedness planning. There is a need to incorporate the strategic objectives framework so that industrial mobilization planning can be based on military requirements for a conventional war of indefinite duration.

VI. CONCLUSION

In this paper we have examined the five essential functions and three important dimensions of effective planning. We have analyzed two different frameworks for industrial mobilization planning from the standpoint of planning theory. One framework focuses on existing planning methods, the other on proposed strategic objectives.

In the absence of realistic requirements both the 1519 and DID methods have been generally limited to current suppliers and existing facilities. Both methods are adequate functionally but are restricted dimensionally by their general preoccupation with peacetime constraints. Both methods need to plan to reach the maximum capacity of existing facilities as quickly as possible and also provide production factors information needed to plan for additional plants.

Sustainability planning has been delegated entirely to the operational level of management when it also needs long range planning (siting plants) that should be performed by the strategic level of management.

Under the strategic objectives framework, military objectives are the driving force for industrial mobilization planning. Applying planning theory to industrial mobilization planning in the strategic objectives framework should help to develop sound planning. The strategic objectives of readiness, sustainability, and force expansion correspond to short, medium, and long range planning horizons for industrial mobilization. The strategic objectives framework not only

presents an excellent way of thinking about industrial mobilization, it can also yield improved planning results.

The goal of readiness planning for partial mobilization should be to reach the maximum production rates possible with existing brick and mortar. Peacetime planning for partial mobilization should consist of identifying the pacing items and processes that would constrain increased production, and identifying the actions necessary to overcome these constraints. These industrial preparedness measures (IPMs) may not be funded until an actual crisis.

In the case of sustainability planning, the efforts of program directors and their contractors, along with the Armed Services Production Planning Officers (ASPPOs), must be augmented by national-level planning to determine where labor and facilities would be available for the new and converted plants. Vertical planning by acquisition activities and their contractors should identify the capability and production factors of the optimum plant for an item. This information can be combined with macroeconomic analyses of labor and housing availability in order to site the additional plants needed to support sustainability. Additional subtier capacity needed to support sustainability would be derived from converting nonessential civilian industry; this type of planning should not involve the actual companies so it must necessarily be very general.

In the case of force expansion planning and sustainability subtier planning, national level macroeconomic analyses need the participation of FEMA and the Department of Commerce to help determine the location of nonessential civilian industry,

and assistance from the Department of Labor to help determine the number of available workers and their skills for every geographic area that currently includes industry that would be considered nonessential. Planning for force expansion should be performed entirely at the national level using the results of vertical planning, as well as macroeconomic analyses. The Pentagon should plan for the conversion of the many additional plants that would be needed to support force expansion.

Improved industrial mobilization planning will not change the harsh realities facing the industrial base or the hard choices confronting national security strategy. But sound planning might accelerate the pace of industrial mobilization should we ever need it and the difference could be important.

REFERENCES

^{1/} David L. Asbury et al., Service Methods for Determining Inventory and Mobilization Numerical Requirements for Weapon Systems (Washington: Industrial College of the Armed Forces, May 1983), p.33.

² Department of Defense Industrial Preparedness Planning Manual, DODD 4005.3M, November 1985, pp. xiii-xiv.

³ This list of planning functions and some subsequent observations are adapted from Russell L. Ackoff, A Concept of Corporate Planning (New York: John Wiley & Sons, Inc., 1970), pp. 5-6 and passim. Planning theorists define these functions more or less inclusively and so count different numbers of planning functions. Also, some authors isolate environmental assessment as a separate function instead of including it in other functions or treating it dimensionally. Michael H. Moskow, for example, Strategic Planning in Business and Government (New York: Committee for Economic Development, 1978), p. 4, asserts "Assessing and forecasting the external environment, such as economic growth, inflation rates, changes in government regulation, exchange rates, actions of foreign governments, etc." between "Setting goals or objectives" and "Designing and assessing alternative courses of action."

⁴ This treatment of goals both restricts and extends the work of J. N. Warfield, "Intent Structures," IEEE Transactions on Systems, Man, and Cybernetics, SMC-3, 2 (1973), pp. 139-140, and R. J. Volkema, "Problem Formulation in Planning and Design: What We Know and What We'd Like to Know," Proceedings of the 1987 Conference on Planning and Design in Management of Business and Organization (New York: American Society of Mechanical Engineers, 1987), pp. 91-95. The syntax of a goal statement has the logical form $F(q,t)$ --for example, "to produce 40 ships in 1991." An entirely different approach to the place of goals in planning is found in authors such as Michael B. McCaskey, who suggests that directional planning may be more appropriate than planning with goals under certain circumstances, for example, "A Contingency Approach to Planning: Planning With Goals and Planning Without Goals," Academy of Management Journal, 17,2 (June 1974), pp. 281-291.

⁵ In a classic work, G.E. Moore noted that one must "distinguish a possible action from an action of which it is possible to think" in discussing human action. See Principia Ethica (Cambridge: Cambridge University Press, 1903), p. 151.

⁶ A classic treatment of planning dimensions is given in Preston P. LeBreton and Dale A. Henning, Planning Theory (Englewood Cliffs: Prentice-Hall, Inc., 1961), Chapter II. LeBreton and Henning distinguish thirteen different planning dimensions.

⁷ AFLC Regulation 78-8, Industrial Preparedness Planning (IPP) with Industry, 25 June 1987, p. 7. See also Department of Defense Directive 4005.1, Industrial Preparedness Program, November 1985 and Department of Defense Instruction 4005.3, Industrial Preparedness Planning, April 1985.

⁸ Joint Chiefs of Staff, Dictionary of Military and Associated Terms, June 1987, page 264.

⁹ Department of Defense Directive 5000.1, Major and Non-Major Defense Acquisition Programs, September 1987, page 5. Many other sources emphasize industrial preparedness planning for surge and mobilization early in the acquisition process.

¹⁰ The CINCs and the Acquisition Process, Institute for Defense Analyses, IDA Paper P-2113, September 1988, pp. B-46, B-47.

¹¹ James H. Jobe, Department of Defense (JCS) Sustainability Model: How To Grade Budget Proposals Versus Satisfaction/Fixes Applied to Most Critical Warfighting Constraints (Washington: Industrial College of the Armed Forces, 1983), p. 27. A look at readiness reporting of the various Services reveals that each has some methodology for receiving reports from field commanders concerning readiness; however, these reports are not standardized, nor are they usable for measuring sustainability.

BIBLIOGRAPHY

Ackoff, Russell A., A Concept of Corporate Planning. New York: John Wiley & Sons, Inc., 1970.

Asbury, Donald L., et al., Service Methods for Determining Inventory and Mobilization Numerical Requirements for Weapon Systems. Washington: Industrial College of the Armed Forces, May 1983.

Bidwell, Percy W., If War Comes: Mobilizing Machines and Men. New York: Council on Foreign Relations, 1940.

Ewing, David W., The Human Side of Planning. Toronto: Collier-Macmillan Canada Ltd., 1969.

Guth, William D. and Tagiuri, Renato, "Personal Values and Corporate Strategy," Harvard Business Review, September-October 1985, pp. 123-132.

Haffa, Robert P., Jr., Rational Methods, Prudent Choices: Planning U.S. Forces. Washington: National Defense University Press, 1988.

Industrial Mobilization Planning for Logistics Support, Logistics Management Institute, April 1984.

Jobe, James H., Department of Defense (JCS) Sustainability Model: How to Grade Budget Proposals Versus Satisfaction/Fixes Applied to Most Critical Warfighting Constraints. Washington: Industrial College of the Armed Forces, 1983.

Joint Chiefs of Staff, Dictionary of Military and Associated Terms, JCS Pub 1, 1 June 1987.

LeBreton, Preston P. and Henning, Dale A., Planning Theory. Englewood Cliffs: Prentice-Hall, Inc., 1961.

Libicki, Martin C., Industrial Strength Defense: A Disquisition on Manufacturing, Surge, and War. Washington: National Defense University, n.d.

McCaskey, Michael B., "A Contingency Approach to Planning: Planning With Goals and Planning Without Goals," Academy of Management Journal 17, 2 (June 1974), pp. 281-291.

Moore, G.E., Principia Ethica, Cambridge: Cambridge University Press, 1903.

Moskow, Michael H., Strategic Planning in Business and Government. New York: Committee for Economic Development, 1978.

Nelson, Donald M., Arsenal of Democracy: The Story of American War Production. New York: Da Capo Press, 1973.

Pfaltzgraff, Robert L., Jr. and Ra'anan, Uri (Eds.), The U.S. Defense Mobilization Infrastructure: Problems and Priorities. Cambridge: Institute for Foreign Policy Analysis, Inc., 1981.

Schlesinger, James R., Organizational Structures and Planning, Rand Corporation, 1966.

Senate Report 101-81, National Defense Authorization Act for Fiscal Years 1990 and 1991, U.S. Senate, 19 July 1989.

Tobin, Harold J. and Bidwell, Percy W., Mobilizing Civilian America. New York: Council on Foreign Relations, 1940.

U.S. Air Force Logistics Command Regulation 78-8, Industrial Preparedness Planning with Industry, 25 June 1987.

Vawter, Roderick L., Industrial Mobilization: The Relevant History, Washington: National Defense University, 1983.

Volkema, Roger J., "Problem Formulation in Planning and Design: What We Know and What We'd Like To Know," Proceedings of the 1987 Conference on Planning and Design in Management of Business and Organization: New York: American Society of Mechanical Engineers, 1987, pp. 91-95.

Warfield, J. N., "Intent Structures," IEEE Transactions on Systems, Man, and Cybernetics, SMC-3, 2 (1973), pp. 139-140.

Weidenbaum, Murray and Rockwood, Linda, "Corporate Planning versus Government Planning," The Public Interest, Winter 1977, pp. 62-72.

A Roadmap for Implementation of the Graduated Mobilization Response Concept, The Analytic Sciences Corporation, TR-5479-1, 5 October 1987.

Department of Defense Directive Industrial Preparedness Program, DODD 4005.1, November 1985.

Department of Defense Directive Major and Non-Major Defense Acquisition Programs, DODD 5000.1, September 1987.

Department of Defense Instruction Industrial Preparedness Planning, DODI 4005.3, April 1985.

Department of Defense Manual Industrial Preparedness Planning, DOD 4005.3-M, November 1985.

Department of Defense Master Mobilization Plan, DOD 3020.36-P, May 1988.

Joint Service Production Base Analysis: Precision Guided Munitions, Phase I: Prime Contractor Analysis, 15 February 1985; and Phase II: Subcontractor Analysis, 17 November 1985.

The CINCs and the Acquisition Process, Institute for Defense Analyses, IDA Paper P-2113, September 1988.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION Unclassified		1b. RESTRICTIVE MARKINGS N/A	
2a. SECURITY CLASSIFICATION AUTHORITY N/A		3. DISTRIBUTION/AVAILABILITY OF REPORT Distribution statement on reverse	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE N/A		5. MONITORING ORGANIZATION REPORT NUMBER(S) N/A	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) AADN 90-1		7a. NAME OF MONITORING ORGANIZATION SAP/AQCM	
6a. NAME OF PERFORMING ORGANIZATION ANSER	6b. OFFICE SYMBOL (If applicable)	7b. ADDRESS (City, State, and ZIP Code) Washington, DC 20330-5040	
6c. ADDRESS (City, State, and ZIP Code) 1215 Jefferson Davis Highway, Suite 800 Arlington, VA 22202		9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER F49620-86-C-0047	
8a. NAME OF FUNDING/SPONSORING ORGANIZATION	8b. OFFICE SYMBOL (If applicable)	10 SOURCE OF FUNDING NUMBERS	
8c. ADDRESS (City, State, and ZIP Code)		PROGRAM ELEMENT NO. 070801F	PROJECT NO.
		TASK NO.	WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) An Application of Planning Theory To Industrial Mobilization Planning (U)			
12. PERSONAL AUTHOR(S) Richard A. Fontaine and John J. Mulhern			
13a. TYPE OF REPORT Interim	13b. TIME COVERED FROM 1/89 TO 10/89	14. DATE OF REPORT (Year, Month, Day) 1989 December	15. PAGE COUNT
16. SUPPLEMENTARY NOTATION Prepared in conjunction with providing program management support to the Air Force Industrial Base Program			
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB-GROUP	
		Industrial Mobilization	
		Industrial Preparedness Planning	
19. ABSTRACT (Continue on reverse if necessary and identify by block number) Planning theory identifies five planning functions that are vital to effective planning. This paper examines existing industrial preparedness planning (IPP) methods against the standards of planning theory. To remedy the major deficiency of current procedures, capacity-driven goal setting, the paper proposes an industrial mobilization planning framework based on strategic objectives for three phases of war requirements: readiness, sustainability, and force expansion. It considers planning for each phase using planning theory to develop the concept and demonstrates that the barriers to effective industrial mobilization planning can be surmounted.			
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION Unclassified	
22a. NAME OF RESPONSIBLE INDIVIDUAL Lt Col R. Fountain		22b. TELEPHONE (Include Area Code) (202) 695-3235	22c. OFFICE SYMBOL SAP/AQCM

DD FORM 1473, 84 MAR

83 APR edition may be used until exhausted.
All other editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE

UNCLASSIFIED

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

Block 3

Approved for public release; distribution unlimited.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE