DOCUMENTED BRIEFING

DB-177

R

Shaping and Integrating the Next Military

Organization Options for Defense Acquisition and Technology

Paul Bracken
John Birkler
Anna Slomovic

19970317 022

National Defense Research Institute

DTIC QUALITY INSPECTED 3

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

Preface

This briefing documents a presentation to the Director, Acquisition Program Integration, Office of the Under Secretary of Defense (Acquisition and Technology). Our purpose was to provide alternative organizational frameworks that would better allow the Under Secretary of Defense (Acquisition and Technology) to carry out his mission. Our proposed organizational frameworks are unconstrained by the existing organization, the current staffing paradigm, or political considerations. If one of our frameworks or a similar one is adopted, considerable additional work will be necessary to develop a fully detailed organizational structure, a transition plan, and a schedule.

This briefing should be of wide interest—to members of Congress, to staff of the Department of Defense, to general officers in the military services, and to anyone interested in how to reengineer a large government bureaucracy.

This documented briefing is a product of the study, "New Directions for Change at OUSD Acquisition and Technology," sponsored by the Under Secretary and carried out within the Acquisition and Technology Policy Center of RAND's National Defense Research Institute. The institute is a federally funded research and development center sponsored by the Office of the Secretary of Defense (OSD), the Joint Staff, and the defense agencies.

In conducting the study reported here, the authors benefited greatly from the advice and encouragement of Irv Blickstein, Director, Acquisition Program Integration. We also wish to thank our colleagues at RAND, particularly Glenn Kent and John Friel, for their constructive criticisms of our drafts.

Summary

Despite many changes in the international security environment and in the worlds both of technology and management, DoD (Department of Defense) acquisition and technology organization remains structurally similar to where it was a decade ago. In particular, the structure of the Office of the Under Secretary of Defense for Acquisition and Technology (A&T) has not changed in a way that parallels new DoD initiatives in such areas as greater use of commercial technology, lean production, outsourcing, and joint warfare.

This report offers several options for A&T to restructure itself for the new world of defense management. Our guiding principal in presenting these options is that *structure should match strategy*. We use *strategy* to mean approaches to technology, implementation of national security policy, and a meaningful application of the widely accepted principle of civilian control. A&T plays many important roles; overseeing acquisition, providing advice to the Secretary and Deputy Secretary, and setting policy for the current military. These activities consume the majority of the time and intellectual effort of the current A&T staff. However, this existing structure leaves little time for long-term thinking about the emerging roles, functions, and characteristics of the next military and the military after next. We believe that *shaping future forces should be one of A&T's primary objectives.* Because of its civilian leadership and rank in OSD, A&T is in a strategic position to integrate service programs, along with many new areas of activity, such as commercial and military technologies.

In recognition of this force-shaping focus, we propose structures for A&T that center on the importance of formulating new concepts and identifying and developing enabling technologies, system integration, and acquisition oversight. No one best way exists to achieve these objectives organizationally. This report proposes three different organization options. First, a set of formal and informal teams could be overlaid onto the existing organizational structure. Second, an option called "Focus" could reorganize around operational objectives such as control of land or space operations. These objectives would be intrinsically joint in character and would replace organizing around either functions (logistics, cost analysis, testing, etc.) or platforms (planes, ships, etc.). Third, A&T could reorganize around operations (option 2) and incorporate command, control, communications, and intelligence into this organization as well. This would entail eliminating a separate, stand-alone office of an Assistant Secretary of Defense for Command, Control, Communications, and Intelligence. Efficiencies would follow from this option, but more important, better weapons systems would emerge.

The two latter options are more ambitious than the first, and both rely on a structure having the following parts.

- A science and technology office with a broader charter than the current one. This new office would be responsible for

  - Identifying new technologies and seeing that selected ones mature
  - Advising the Under Secretary on technology transfer issues
  - Scanning science and commercial technology developments to understand their implications
  - Supporting or conducting research and demonstrations that generate basic technical information to reduce technological risk.

- A concept development and joint integration office with a charter to *formulate, evaluate,* and *define* concepts in each mission area. This office would be organized around two themes: operational concepts and system concepts and their demonstration.

- An acquisition office, which would oversee platforms and systems. This office would be organized according to type of platform.

Finally, our view is that independent of any organizational options, A&T suffers from doing too many things—of managing such a diverse range of activities that it is seriously affecting its fundamental purpose of ensuring civilian input to the control of acquisition for shaping both the next military and the military after next. A&T needs to do fewer things. It should divest activities not directly related to its primary mission. This housecleaning is important. Debate may follow regarding A&T's mission, but once that mission has been defined, A&T must not allow itself to again house so many activities that senior management's attention to its primary mission is diluted.

ACRONYMS

A&T	Acquisition and Technology (DoD)
ACTD	Advanced Concept Techology Demonstrations
AE	Atomic Energy
API	Acquisition Program Integration
AR	Acquisition Reform
ASD	Assistant Secretary of Defense
ATSD	Assistant to the Secretary of Defense
C^3I	Command, control, communications, and intelligence
C^4I	Command, control, communications, computers, and intelligence
CAS	Close air support
CINCs	Unified Commanders in Chief
COG	Concept option group
COTS	Commercial off the shelf
DARO	Defense Airborne Reconnaissance Office
DARPA	Defense Advanced Research Projects Agency
DBA	Dominant battlefield awareness
DDR&E	Director, Defense Research and Engineering
DepSecDef	Deputy Secretary of Defense
DLA	Defense Logistics Agency
DoD	Department of Defense
GSA	General Services Administration
HR	Human resources
IPT	Integrated product team
JCS	Joint Chiefs of Staff
JROC	Joint Requirements Oversight Counsel
JWCA	Joint Warfighting Capability Assessment
LIC	Low-intensity conflict
MRC	Major regional contingency
OASD	Office of the Assistant Secretary of Defense
ODUSD	Office of the Deputy Under Secretary of Defense
OR	Operations research
OSD	Office of the Secretary of Defense
OUSD	Office of the Under Secretary of Defense
PEO	Program Executive Officer
R&E	Research and Engineering
S&T	Science and Technology
SAE	Service Acquisition Executive
SecDef	Secretary of Defense
T&E	Test and Evaluation
UAV	Unmanned aerial vehicle
WMD	Weapons of mass destruction

Purpose and Method

NDRI

- Identify Organizational Options for OUSD/A&T
- Consider Processes
- Summer Study '95
- Interviews
- "Simple Theory"
- Unconstrained Option Space

R

1 8/7/96 10:00

The purpose of this study is to develop organizational options for the Office of the Under Secretary of Defense for Acquisition and Technology (A&T), including related process changes. The idea behind the study was the recognition that a great deal has changed in the past few years. The security environment is much more variable than it was during the Cold War. The defense industry in the United States is undergoing major restructuring. Finally, major DoD options are either nearing implementation (as is the case with acquisition reform) or are set to be fully launched (as is the case with increased use of commercial off-the-shelf products).

The method used in this study took a relatively short period of time—the summer of 1995—to put together ideas and options. About 40 interviews were conducted with present and former acquisition officials, DoD experts, and other knowledgeable individuals.

The interviews provided a good sense of how A&T operates. Such an understanding was important because A&T is a very complex organization when viewed from the outside. To reach our conclusions, we synthesized ideas and concepts drawn from organization and management theory, common sense, and some comparisons with other large complex organizations. We were allowed a virtually unconstrained option space; i.e., no outcomes or areas were considered off limits.

Some definitions are useful. *Organizational structure* refers to relatively enduring patterns of behavior, those that change slowly. A&T's organization chart is structural because authority lines among offices change only over years, not days. By *process* is meant flows of work and information within an organization. Passing information up and down a hierarchy is a process. The use of hierarchies and teams are different integration tools to connect different departments.

Outline

NDRI

- A&T's role
- A&T's current "businesses"
- Capability assessment
- A&T's future tasks
- Management and organizational structure
- Recommendations

R

2 8/7/96 10:00

The briefing is divided into six parts, as shown.

A&T's Role in the Higher Organization of Defense

NDRI

- **A&T is the primary *civilian control* and discipline mechanism that exists in DoD**
- **A&T is *future*-oriented: the next military and the military after next**
- **A&T is *technology*-oriented; it should know technology better than anyone else**

R

3 8/7/96 10:00

The issues raised in this study are important primarily because of the first item on this chart. It is easy to think of A&T's mission as fielding weapons for the forces, but this is an inadequate conceptualization of the problem. Civilian control of the military is not restricted to operational issues on the use of force but must include decisions on what the next U.S. military—and the military after next—looks like. Acquisition, as contrasted with policy, has an enduring impact. Issues of nuclear and conventional deterrence, warfighting, flexible response, and revolution in military affairs have no meaning unless they are institutionalized through the acquisition process. Otherwise, they are ideas on a vugraph, without any real existence. Another way of saying the same thing is that policies can change very rapidly, but techno-institutions change slowly. Often, civilian control over policy—in the sense of strategy selection—is illusory or empty because there are no technological institutions to carry it out.

A&T must be future-oriented. *Today's* forces work for the Commanders in Chief (CINCs) and the Joint Chiefs of Staff (JCS), not for A&T. Civilian shaping of the "next" (and "after next") armed forces is achieved through A&T. Much of the Cold War was a competition between the acquisition-and-technology establishments of the United States and the Soviet Union. Our military technology cast a *long shadow* that had profound effects on friends and foes. Therefore, it is essential to have an organization like A&T offering good advice to the Under Secretary and the Secretary.

The forces, of course, are the result of a real world *corporate* decision among OSD, the services, and the JCS. At certain times, different parts of this corporate group will have more or less influence, depending on the political and economic environment. But it is essential to have a strong civilian-controlled organization such as A&T as a dominant player.

What Businesses Does A&T Think It Is In?

NDRI

- Civilian control
  - Perform acquisition oversight
  - Advise SecDef and DepSecDef
  - Set policy, standards
- Future orientation
  - ?
- Technology
- Consequences of the previous military
  - Chemical-weapon cleanup
  - Environmental security
  - Atomic weapons

R

4 8/7/96 10:00

Our interviews with A&T staffers and with those who interact with it were the basis for our assessment of the question, "What businesses does A&T think it is in?" A&T thinks it is in the business of oversight, advising the Secretary, addressing the consequences of the prior military, and responding to Congressional requests for information. People do not believe—in the sense that it influences what they do each day—that they are in the technology business or that there is really much of a future orientation.

Almost without exception, A&T personnel have told us that acquisition oversight is their principal business. While some areas, such as environmental security or economic security, are new, they have often been pulled out of their former organizational locations into separate offices to provide greater visibility and to reflect recent new priorities. A&T is focusing more on current on-going programs than on taking a longer-term perspective. This phenomenon is troubling, given the explosive transformation that technology is causing in the world. Almost all future-oriented work is said to be taking place in DARPA (Defense Advanced Research Projects Agency). But this does not result in A&T's activities, which concentrate on oversight, being well informed.

Also, a very important question follows from the existing definition of A&T's business. Namely, is A&T's highest value added likely to be in the area of oversight? There are other troubling aspects of the existing business definition. Although someone has to deal with consequences from the last military—chemical weapons decontamination—does housing so much of this and other activities in A&T dilute attention and fragment management's ability to focus the organization on what should be new growth businesses?

Scorecard

NDRI

- Acquisition oversight
  - Declining utility of oversight as a core business
  - SAEs and PEOs professionalize
- DoD policy setting
  - Necessary but cumbersome and slow
- Managing selected programs (e.g., DARO)
  - Solid and focused
- Technology development
  - Strategy and directions not clear to most
  - Some fields not well covered
- New areas
  - Problematic, not "taking off" as once thought

R

5 8/7/96 10:00

The utility of oversight conceived as ensuring conformity to various audit standards is declining. "Debacles"—messy high-profile problems like the A-12 aircraft development program have been a past problem in DoD, and they may return in the future. Their damage can be so great that A&T has to have a system in place to prevent them. But other major problems exist today: the introduction of new technologies, being a superordinate to the services' competing proposals, and, most important, shaping an integrated force of the future. No one else is doing these things. The payback from a big investment in an audit-like conception of oversight is declining also because the services have improved in this area.

Policy-setting by A&T is essential. But the focus has not been on the institutionalization of policies that are set. Formal action memoranda are issued on polices, with little concern for ensuring that they are implemented. This state of affairs has contributed to the image of A&T as a bureaucracy turning out rules, which, in turn, reinforces certain negative images of A&T.

Technology development is hard to assess. However, based on our interviews, we noted lack of clarity about S&T policy. To a certain extent, this is characteristic of S&T policy everywhere, the private sector included. The real issue is less one of clarity than it is a feeling that many new fields and ways of doing business are not being considered and that old S&T programs are carried forward. Fields like software engineering, biotechnology, and data-routing are important for DoD and need advocates if they are to generate useful military advances.

A&T has been involved in new security areas, such as economic and environmental security. It is not at all clear that such areas are becoming as important as was anticipated only a few years ago. These areas are likely to be controversial, and it may be wise to continue them as hedges against an uncertain future or to reevaluate them in one or two years.

A&T's Strengths and Weaknesses

NDRI

Strengths:

- Access to SecDef/DepSecDef
- An *existing* system of civilian control
- In theory, a full-service shop
- Making many good decisions
- Senior management technically well informed

Weaknesses:

- Low value added in key segments, especially oversight
- Low value added from grouping diverse activities within A&T
- Too many disparate offices
- "Full-service mentality" fragments and diverts management attention
- Inability to institutionalize change

R

6 8/7/96 10:00

This slide offers our evaluation of A&T's strengths and weaknesses in its existing businesses. It is a management judgments (ours) based on interviews and our assessment of performance.

The key question is not really whether the strengths or the weaknesses are greater, but whether A&T is investing its resources—dollars, people, management attention—in the right areas for the future.

Overall, we are concerned; that is, there are enough weaknesses, and strengths which may not be in emerging future areas, to suggest that A&T undertake strategies for change.

We now elaborate on some of these strengths and weaknesses and suggest some change strategies.

What Businesses Should A&T Be In?

NDRI

- Civilian control
  - Oversee acquisition
  - Advise SecDef and DepSecDef
  - Set policy, standards
- Future orientation
  - Shape forces
  - Integrate commercial and military
- Technology
  - Invest in science and technology
- Consequences of the previous military

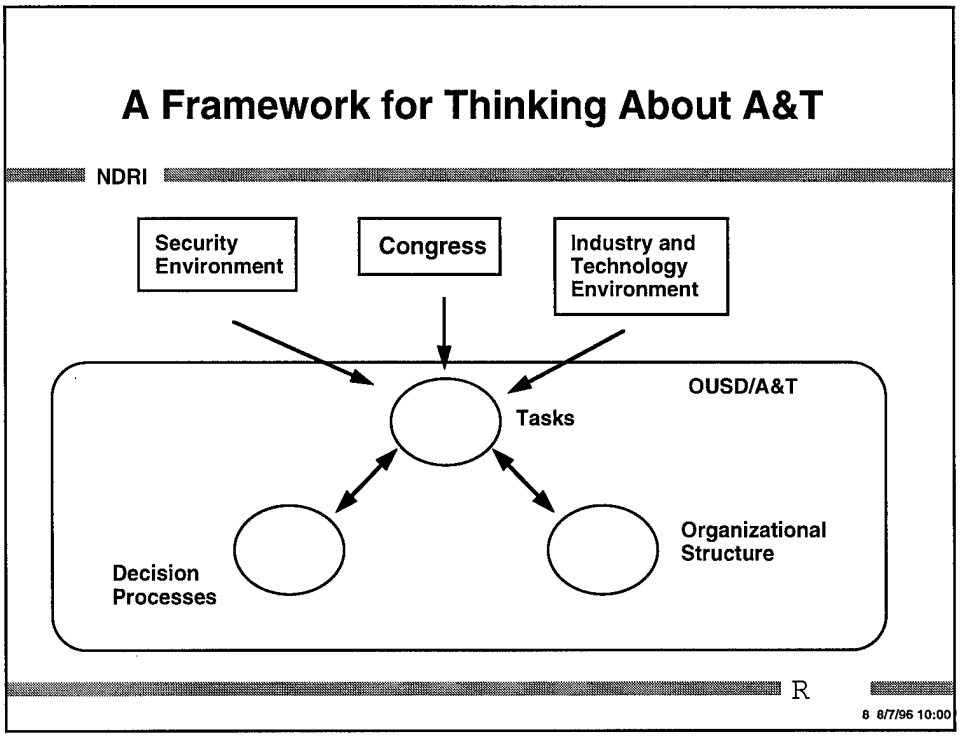
R

7 8/7/96 10:00

Oversight, providing advice to the Secretary and Deputy Secretary, and setting policy and dealing with the consequences of the previous military are essential. However, these activities consume the vast majority of the time and intellectual effort of the current A&T staff. Little time and effort appears to be devoted to longer-term thinking about the emerging roles, functions, and characteristics of the next military and the military after next.

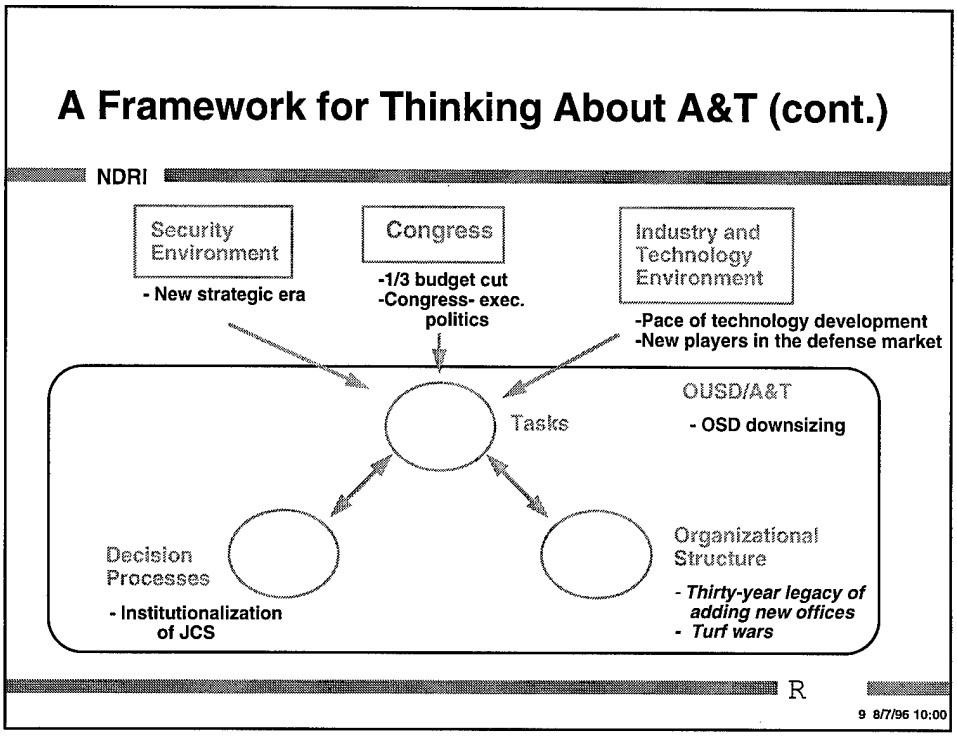
Given A&T's role in the higher organization of U.S. defense, we believe that integrating and shaping future forces should be the *primary orientation*. Because of A&T's role as the primary civilian control mechanism, it is in the best position to do things like integrate commercial and military technologies and link these to the missions of future forces.

Such overall change in direction says little about how to actually accomplish this objective. This is something that needs to be thought through carefully, for in terms of emphasis, it is unlikely that the kind of work actually performed will change as much as it might at first appear. We turn now to ways to institutionalize change.



A&T can be thought of as being defined by the tasks it performs, the decision processes it uses, and its organizational structure. This way of thinking about A&T is better than referring to its organizational chart, which says little or nothing about how the organization really works.

We considered changes in the tasks facing A&T as determined by the changing security environment and by changes in the technology and industry structure that A&T or other parts of the acquisition system source from. We also considered how private companies have changed their decision processes and structures and what these might suggest for A&T. Stated simply, tasks, decision processes, and structures are useful ways to think about change management.



Here we display key differences between the current security environment and the environment of the past. The past 50 years have seen an expansion in the size and specialization of government. We are probably entering an era in which *differentiation* has gone as far as it can go and is being replaced by a new emphasis on *integration*. That generalization is what was behind corporate restructuring of the past ten years, as firms concluded that the payoff from specialized staffs and coordinators was less than the increased cost of transactions and inflexibility.

In DoD, the institutionalization of JCS as a player in decisionmaking has increased. The military services have been important for a long time. This means that fragmentation in OSD becomes especially apparent as the focus and competence of the other two players are increasing.

What appears unchanged is the tendency to see the world in terms of conflicts of the past. The context of the buildup of the 1980s and arguments over Goldwater-Nichols still dominate discussion, even though the most recent of these is nearly ten years old.

Implications of New Environment for A&T Tasks

NDRI

- **Difficult trade-offs require more neutrality than services can provide (25% drop in budget possible)**
- **Modernization of weapons and command systems and less emphasis on new platforms**
- **Develop new technologies and operational concepts for the next military and the military after next**
- **Integrate big parallel systems beyond scope of services**

R

10 8/7/96 10:0

Changes in the security environment, industry, and technology will change the nature of the tasks that A&T manages. Our fundamental argument is that *A&T should organize around the tasks it performs, so it is important to look at how these will change in the future.* We suggest four areas of change in which A&T should actively engage.

The United States may face truly large DoD budget reductions of as much as 25 percent of the current falling levels. Current corporate decisionmaking in the Pentagon, and especially in A&T, is not prepared to undertake the difficult trade-offs involved. With large budget changes, DoD will be forced to do things differently, and it is especially in this situation that service objectivity would be stretched beyond its limit. The challenge here is to do more with less—something that corporate restructuring has proven to be possible, and that increasingly is actually an expected feature of management.

Relatively less emphasis will be placed on platform acquisition in favor of weapon and command modifications.

A&T should return to defining big concepts and the technology that institutionalizes them. The model could be like the 1960s, when its predecessor, DDR&E formulated such big concepts as first and second strike, forward-basing, and strike forces. One "model," then, is for A&T to regain its traditional ascendancy in this arena but to apply its expertise to "new" issues like information warfare, the military after next, and dealing with WMD (weapons of mass destruction).

Finally, the integration of big parallel systems will certainly increase in importance. An ability to bundle diverse technologies will create new kinds of truly joint forces. Information warfare may involve tying together national sensors with naval platforms. But such a new system will not involve the acquisition of a big weapon platform, the task for which A&T was created. In fact, existing A&T departmental structures inhibit performance in this task environment. Changing this orientation is a major objective of our proposals.

Some Areas Requiring Integration

NDRI

- Threat variance (Peer, MRC, and LIC)
- Weapon systems
  - Cost and performance
  - Commercial and military technologies
- Joint operations
  - Navy and Air Force support of land battle
  - Information warfare and services
  - Submarines and carrier battle groups
  - Sensors, C^4I, and forces (JROC Vision Force Study)
  - Dominant battlefield awareness and logistics, lift, and CAS
- Multiple agencies
  - Intelligence community and forces
  - Military intelligence and national systems

R

11 8/7/96 10:0

In this chart, we focus on the integration of big parallel systems by example. Integration tasks will become increasingly important in the future, and A&T should build competencies—in terms of people and organization—to accomplish such tasks. Expertise in this area is not something that will happen on its own. Allowing these tasks to fall to the service level—with little or no aforethought—could lead to major suboptimization and expense, and worse, could make the next military a carbon copy of the current one.

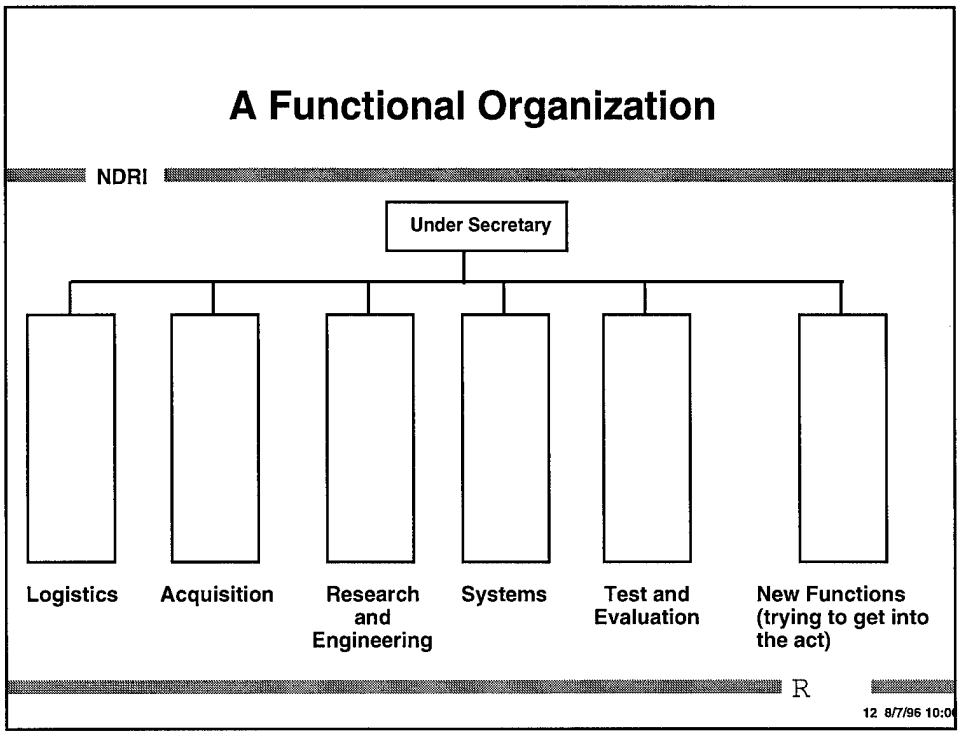
We emphasize that the examples included on this list are quite different than the efficient acquisition of a platform.

Threat variance refers to the size and complexity of the opponents we might face. How forces designed for one threat environment perform in another is a major issue. We must build our forces accordingly, for no one of these is likely to stand out through all of the uncertainties during the next 10 years.

Cost performance integration requires major efforts at using COTS products as components, more assembly of plug-in parts rather than highly integrated platforms, and promotion of outsourcing among the services.

Some areas have received little attention so far, such as the intelligence community–military integration and information warfare. Yet, these areas are almost certain to be the source of major future issues.

Dominant battlefield awareness (DBA) holds its major benefits not in better weapons per se, but in *reduced* needs for logistics and support, and in changing how we think about things like CAS. These areas are highly *cross-functional* in their impact, something that should be mirrored in future A&T organization.



In this chart, for reference purposes, we characterize the current A&T in terms of its work flow, which is divided into the notional functions shown. Other parts of the organization exist, but this functional organization diagram represents the mind set and the essence of the current A&T.

Cross-Functional Communications

NDRI

Cross-functional communications will greatly increase because of . . .

- **New technology**
- **Jointness**
- **Modular upgrades to embed weapons in networks**
- **Tying big parallel systems together**
- **Integration challenges**
- **New sources of functional complexity**

Factors forcing cross-functional communication	*Trend*
Diversity or variety	Increased
Unanticipated changes	Increased
Work interdependence	Much increased
Total quality initiatives	Increased
Time compression	Less ?

R

13 8/7/96 10:0

This chart summarizes why there will be greatly increased levels of cross-functional communications in the work of A&T, driven by the changing task environment. One result will be more lateral communication among the functional departments shown on the immediately previous chart. The logic is as follows:

1. Functional organizations like the current A&T can manage only limited levels of cross-functional communications;

2. Technology and the external environment are becoming more complex;

3. Teams, or other lateral coordinating mechanisms, can alleviate the increased communications, but only to a degree, after which . . .

4. Either organizational performance will decline, or a new organizational structure will be needed to adapt, one better suited to a more complex task environment.

The other major attempt at cross-functional communication under way in the Pentagon is represented by the JWCAs in the JROC. It is our judgment that although these represent great progress, the civilian acquisition and technology side of DoD in A&T must move in a direction to enhance its capacity to manage in a much more cross-functional environment.

Management and Organizational Structure to Accomplish New Tasks

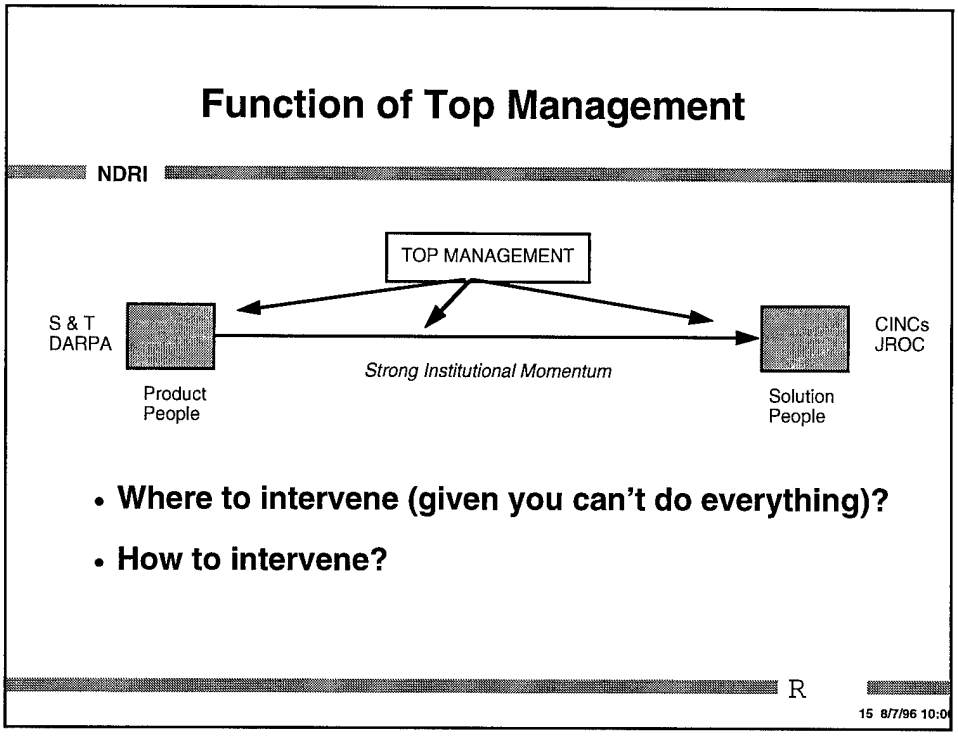
NDRI

- Management approaches
- Organizational structures

R

14 8/7/96 10:0

At this point, let us shift the focus of the briefing. For the remainder of the briefing, we will discuss management approaches and organizational structures that would allow us to accomplish the tasks we just discussed.



Top management can't do everything. Demands on its attention far exceed its availability. It not only has to decide what to do, but where and how to do it. In the past a tendency has existed to cope with these demands by adding on new departments.

In the future, more emphasis will be placed on the kinds of issues raised in this chart. That is, it will be important to decide where and how to intervene in a system with a powerful momentum carrying it forward.

Operators call for more attention to their needs. Yet, A&T has important responsibilities to the future, so that the next military and the military after next will be effective, perhaps even if it means taking away resources from the current military.

It is a mistake to become too focused on either extreme of the management spectrum. The solution people, the CINCs, do not have the responsibilities that A&T has. Neither do the product people, who tend to be focused too abstractly on the future. Rather what is needed is a skillful balance of emphasis, something that is as much an art as it is a science.

Managing Tensions as a Way to Change A&T

NDRI

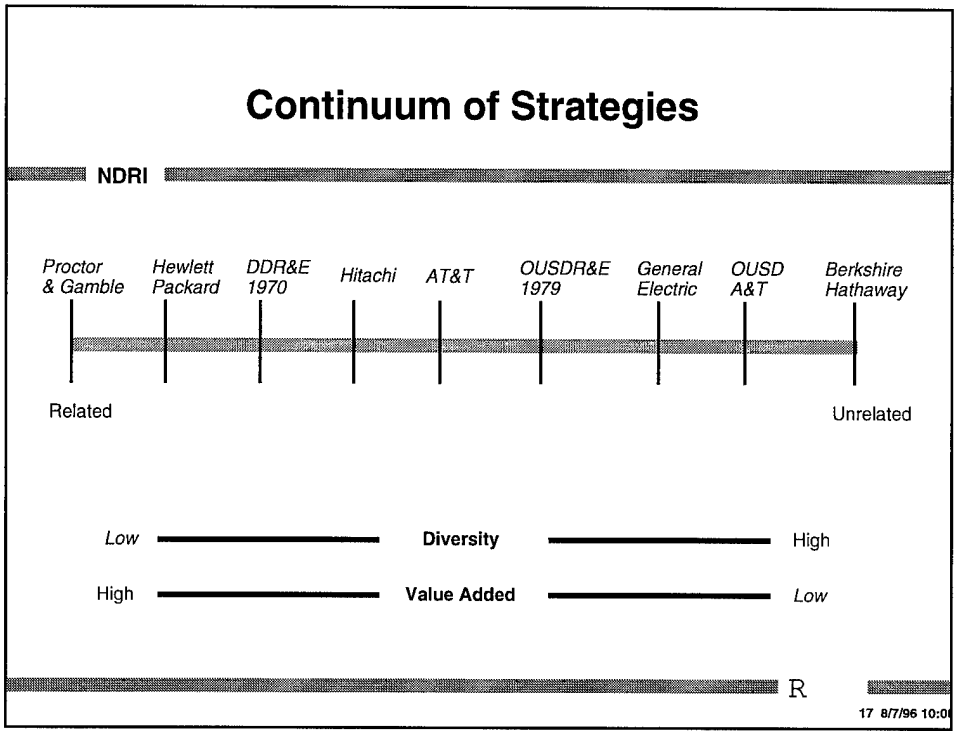
Strategy:	Planned	◄——►	Opportunistic
Style:	Managerial	◄——►	Transformational
Structure:	Simplified	◄——►	Specialized
Client:	Technologist	◄——►	CINC
Horizon:	Short-Term	◄——►	Longer-Term
Staff:	Lateral-Entry	◄——►	Career

R

16 8/7/96 10:0

The argument on the previous chart can be generalized to many different areas. Each of these areas reflects tensions that *can be leveraged to move the organization in one direction or another. It is not the job of management to alleviate these tensions, but rather* ***to use them to generate change***.

In the private sector, a growing awareness exists that "pure" answers to these competing tensions are undesirable. Managers have given up the traditional (and fundamental) precept that organizations succeed primarily through an ability to reduce diversity and ambiguity. Total consistency is actually undesirable, with tolerance for loose coupling and initiatives needed. A strong sense exists among staffers that the current A&T, for example, is too focused on "in the box" solutions as compared to, say, DDR&E in the 1960s.



One way to think about organizations that have complex work loads is as agglomerations of related and unrelated businesses. Firms like Proctor & Gamble have highly integrated businesses: The diversity of their management work load is reduced, and the contribution of the corporation to business units can be high in terms of value added.

At the other extreme, Warren Buffet's Berkshire Hathaway is a passive holding company for many firms; it only checks their financial numbers. Diversity is so high that no management structure, no matter how ingenious, can add value to the portfolio of businesses.

Most firms lie in the middle of this spectrum. Our sense is that since 1970, A&T (and its predecessors) has been moving to the right end of the spectrum. It has added many specialties and new areas, so diversity of activity is sharply up. Yet, the value added from having so many diverse pieces under one roof has declined. *If this trend continues, A&T is likely to become a holding company for businesses that can't find a home any place else.* As such, its ability to shape forces will decline.

This, of course, is an OSD issue, not purely an A&T one. Nonetheless, it is important for A&T executives to understand that *no amount of management genius or process change could keep up with the levels of task structure diversity introduced into the organization in the past 10 years.*

Trend Toward Specialization

NDRI

- Since creation of USDA&T, new offices added . . .
  - With an ever finer division of labor
  - Part of a government-wide trend
- Each change makes sense in isolation, but the cumulative legacy contributes to . . .
  - Inefficiency and high transaction costs
  - Work-arounds
  - Span-of-control problems
  - Growing distance between managers and workers
  - Overfocus on process
  - Lack of focus on big picture

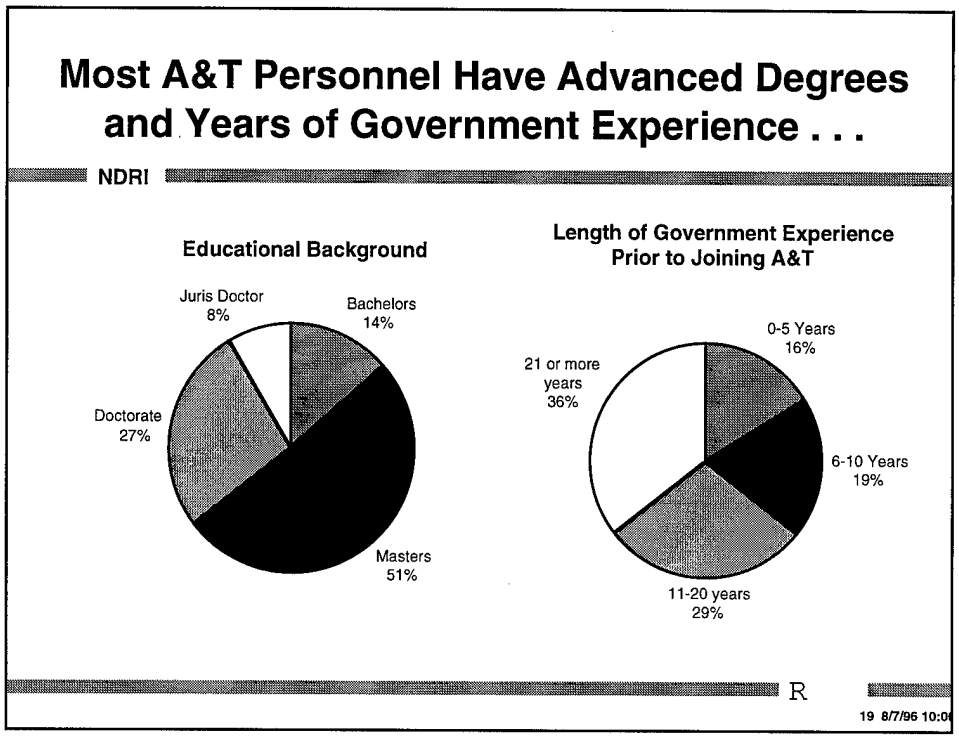
R

18 8/7/96 10:0

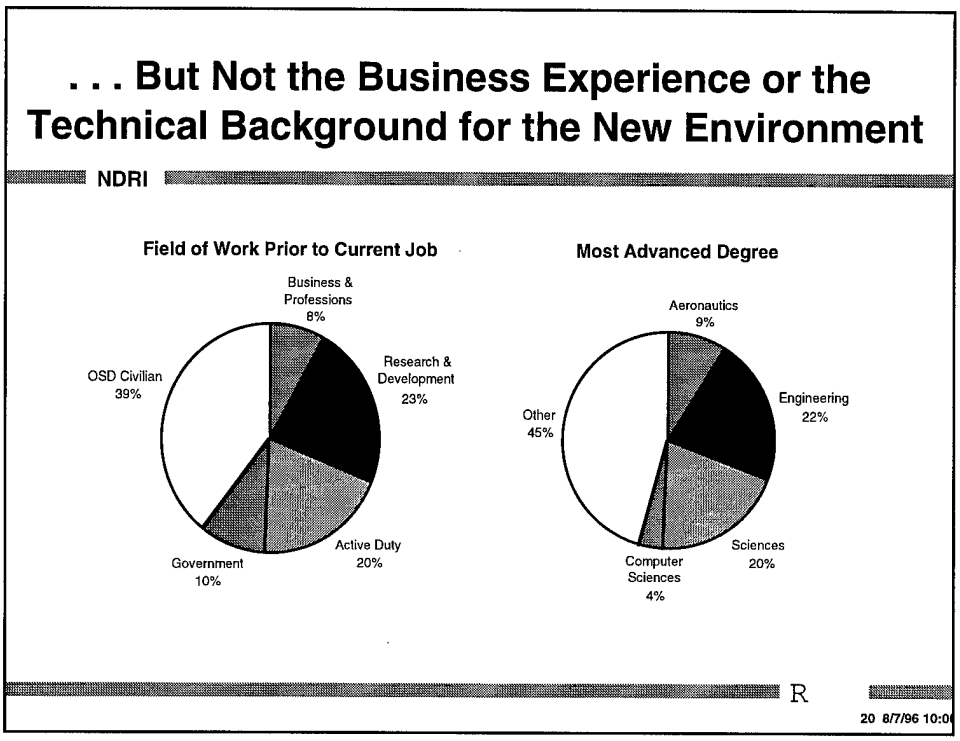
The trend toward increased specialization has led to increased departmentalization, with new offices overlaid on the old structure. As a result, coordination costs have soared. Coordination still occurs, but with the result that people spend a great deal of time trying to make the system work.

In addition, it was striking how limited is the number of people with a comprehensive overview of A&T's responsibilities. To be fair, many people mentioned how this lack of transparency is a situation to be exploited, because it gives great payoff to those who can make its subsystems perform.

The trend in the private sector is to simplify—to balance specialization with integration. It is hard to escape the conclusion that this trend should affect A&T as well.

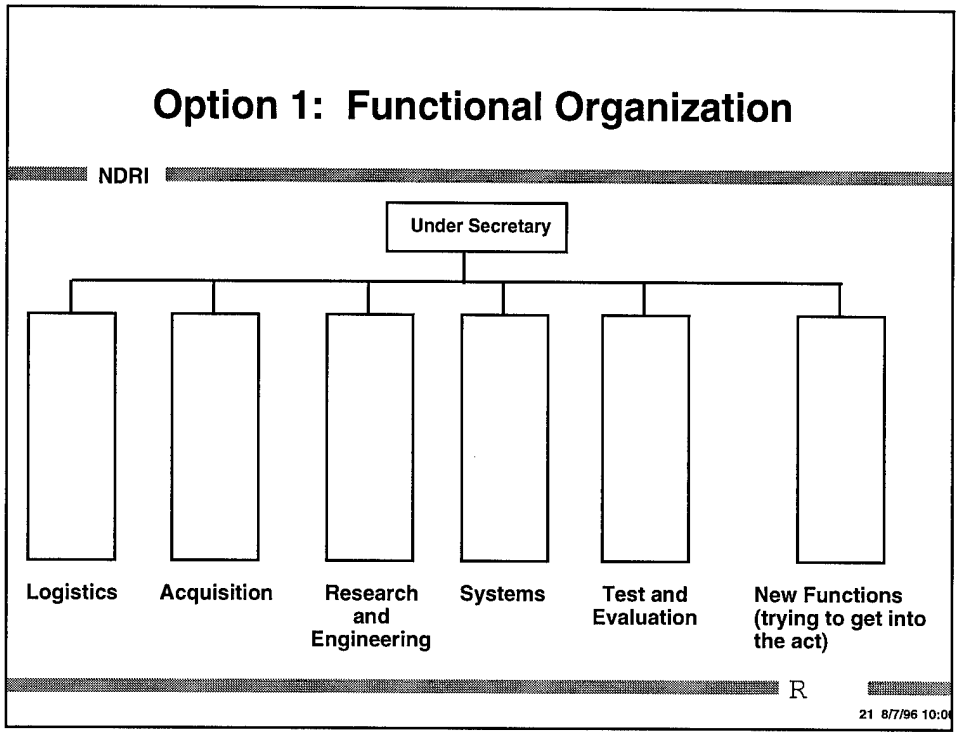


The majority of A&T personnel have advanced degrees. Most of them have also spent a considerable length of time in government service.



However, few personnel come to A&T with business and professional experience. As DoD makes increasing efforts to adopt commercial practices and to bring in suppliers that have not traditionally worked in defense markets, this lack of experience will become an increasing handicap in A&T's ability to fulfill its mission.

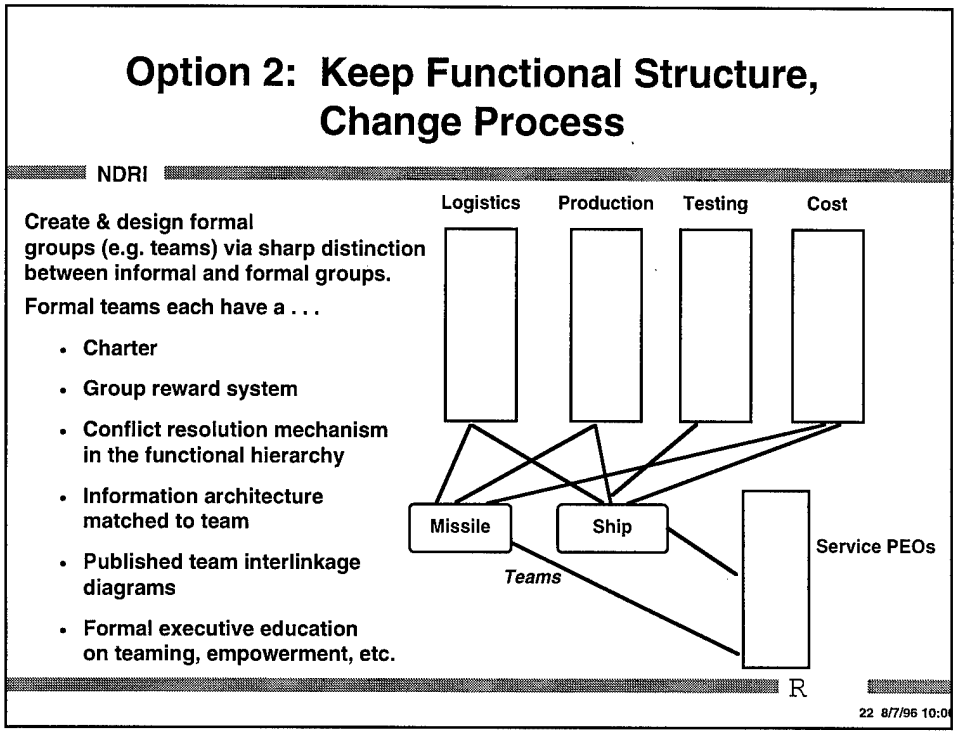
In addition, few of A&T's personnel have degrees in computer sciences or electrical engineering, the technical specialties that will be essential as DoD acquisition focuses less on platforms and more on upgrades of electronic components carried by platforms.



What possible options are open to A&T? Option 1 is like A&T prior to the introduction of integrated product teams (IPTs). (The fact that this chart does not duplicate the official A&T organization chart is immaterial. The official chart shows organizational rank and status; it does not describe how the work of A&T is performed.)

In a functional mode of organization, centers of excellence in functions like logistics are housed together. Oversight is undertaken by having program managers serially work through an array of functions. New sources of diversity are introduced as new functional offices: acquisition reform clears away purchasing and legal impediment; environment finds ways to assess the impact of programs, and so on. The point is that new offices try to get into the core flow of work; they search for ways to be relevant.

Functional organization is a baseline for comparison. With moderate levels of complexity, it performs reasonably well. But with increased complexity, it is slow to react, as changes in one functional area frequently affect those in another. Other deficiencies exsist as well, and for this reason, almost all technology-based corporations have abandoned the functional structure.



A&T has moved from option 1 in the direction shown here; it has relied on process changes to lessen the negative effects of functional organization. IPTs decentralize work and information and are an attempt to increase lateral communication across functions.

Option 2, shown here, basically argues for a more formal use of teams, achieved through the methods listed. Not much change would be required for A&T to embrace option 2. A&T would only have to move away from using teams for everything by making a sharp distinction between informal teams—business as usual, spontaneous cooperation—and formal teams. Ways to do this are shown. These incremental changes could be introduced into A&T.

Problems with a Functional Organization

NDRI

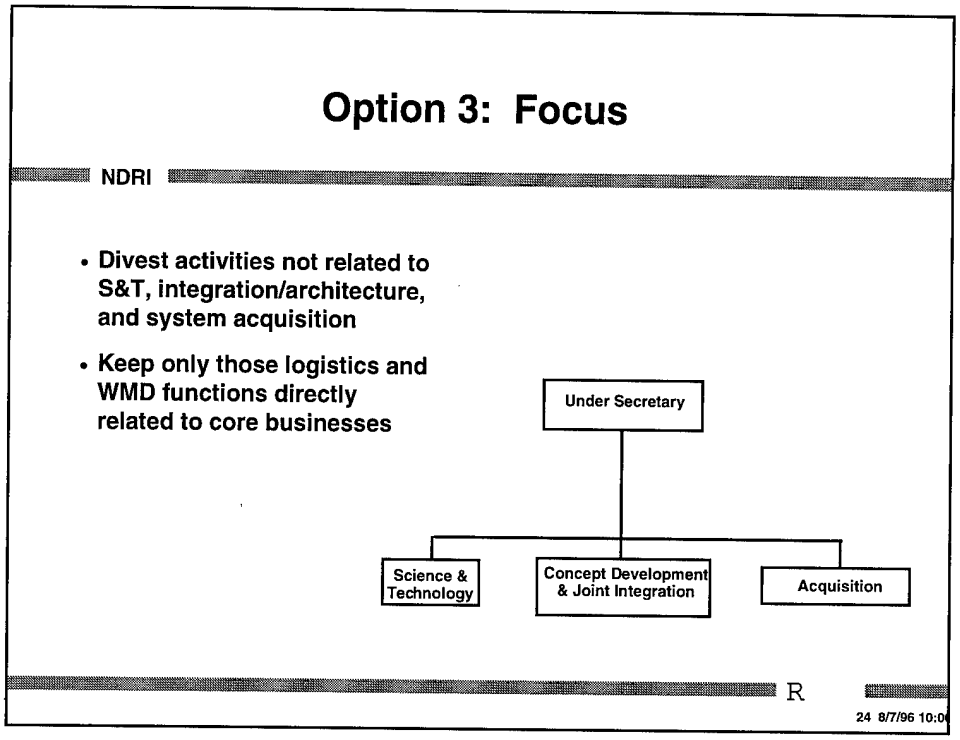
- **Opaque to top management**
  - **Not clear where to invest the marginal budget dollar**
  - **Accounting and performance measures difficult to get**
- **Diversity and complexity of tasks can overload its coordinating capacities**
  - **Teams require demanding people skills—good engineering and leadership skills required in the *same* person**
  - **Too many teams in too many areas can lead to loss of control**
  - **Hard to realign in changing environments and technologies**

R

23 8/7/96 10:0

This chart and the next raise the question of how far a functional organization can work, even if it is modified by using formal teams as proposed in option 2.

No one knows the answer to this question. However, a tendency exists to examine the question in terms of past debates ("overcentralization" in OSD, "the $300 toilet seat," and idiosyncratic interpretations of Goldwater-Nichols). Our belief is that not enough attention is being paid to external environmental conditions like the high pace of technological change, the shifting locus of technology skills to the private sector, and the need to confront the demanding problems of integrating big parallel systems.

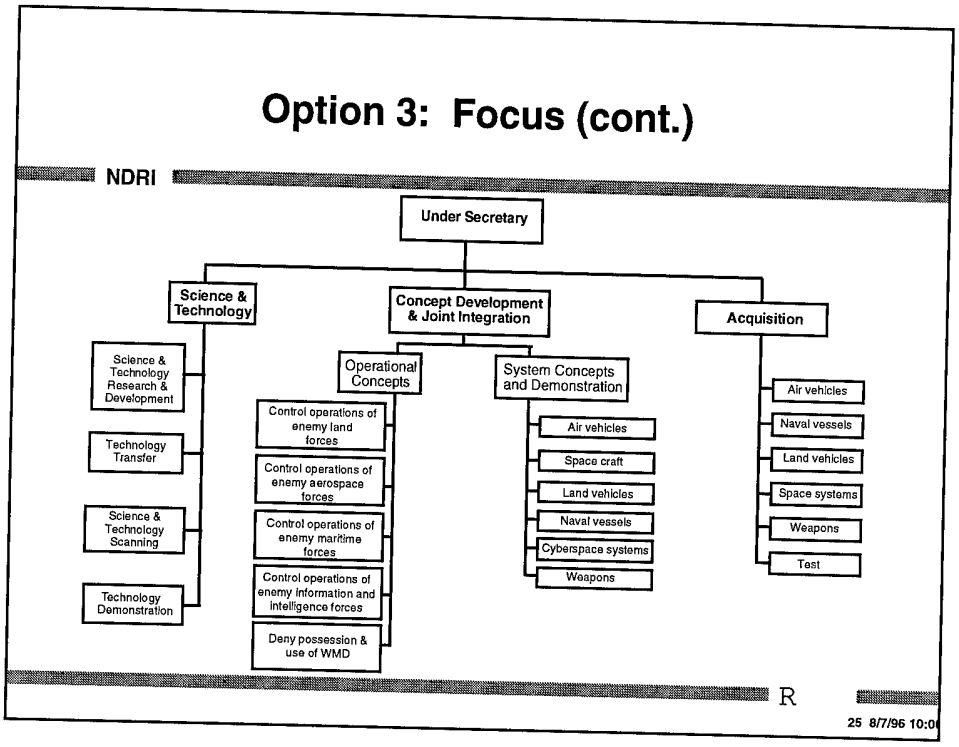


Defense planning has always been fraught with uncertainties. The current period is no different, albeit the uncertainties are. However, we believe we know enough about the future to do a competent job of defense planning. For example:

- We know the military missions and tasks that need to be accomplished to maintain supremacy on the battlefield.
- We know that we must identify new technologies and develop selected technologies.
- We know that advances in existing and emerging technologies offer opportunities to formulate new and creative concepts to accomplish relevant military missions, which will enable us and our enemies to gain new military capabilities.
- We know that the forces must be jointly integrated to provide robustness and flexibility not available from a single service and that our forces must not be optimized for a single scenario.
- We know that some systems have broad utility across multiple missions.
- We know that A&T must provide oversight to the acquisition process.
- We know that we must have an institution and a process to accomplish these things.

Option 3 is called "Focus" because it divests a large amount of current activities and offices to refocus on three core businesses—**science and technology**, **concept development and joint integration**, and **acquisition**.

Logistic activities not concerned with these core businesses are shed. This is true, likewise, for most other offices, ranging from atomic weapons to the environment. If a downsizing of A&T is necessary, these divestment candidates could take the large portion of reductions.



We believe this organizational structure will enable A&T to institutionalize processes that will meet future challenges. This option begins by reducing the mass of A&T and focuses on important future problems of formulating new concepts, identifying and developing enabling technologies, force-shaping, system integration, and acquisition. (Smaller offices in support roles are not displayed on this chart.)

The **Science and Technology Office** would have a broader charter than the current S&T office. The largest component office would be the Science and Technology Research and Development Office, which would have responsibility for identifying new technologies and seeing that selected ones mature, especially those identified in the Concept Development and Joint Integration Office. In addition to nurturing and furthering technologies, the functions of the S&T Office need to be expanded in three important ways.

- First, an Office of Technology Transfer should be established to advise the Under Secretary on relevant issues.
- A second office would focus on scanning science and commercial technology developments to understand their implications and would be tasked to think of ways these new technologies could be adapted to U.S. advantage or used against the United States by its adversaries.
- A third new office, Technology Demonstration, would support or conduct demonstrations that generate basic technical information to reduce technological risk. The aim, of course, is to provide building blocks intended to add to the general knowledge base. These demonstrations would be conducted outside of the normal weapon system program structure. No military mission need be specified.

The **Concept Development and Joint Integration Office** would have the charter to *formulate, evaluate,* and *define* concepts in each mission area. This office would be organized around operational concepts and system concepts and their demonstration. The Operational Concepts Office would be organized by mission area. Each operational concept or mission area, such as controlling operations of enemy land forces, should be organized to address major tasks within the mission, such as to delay, destroy, or disrupt lead elements of invading armies, to delay or damage enemy forces and logistics in the rear, to ensure naval support of the land battle, and so on. Each office would continually explore new ways to integrate service capabilities to be more effective and evaluate the new concepts.

The mission area offices would accomplish the concept formulation task by encouraging a consortia of operators and developers, including firms that now do not participate in defense markets, to propose new ways to gain military capability to meet the needs of the future. Each office should encourage a robust competition among concepts and consortia aimed at generating more innovative, out-of-the box approaches to gaining improved or new military capabilities. This kind of environment would be accomplished by convening what Glenn Kent and William Simon call a concept option group (COG).

The COG would be an interactive partnership between those who know what is technically possible and those who know what is operationally viable and useful. The COG should be led by operational planners. It should include operators from the user commands, development planners from acquisition commands, scientists and engineers appropriate for each functional area in the operational concept, and a "red team" to identify possible countermeasures to the concepts being defined.

In the process of formulating new concepts, we expect solutions to draw on existing, emerging, or even undeveloped technologies. For the latter two cases, the Under Secretary would task the Science and Technology (S&T) Office to plan and support R&D road maps to technological maturity. For the more technologically mature concepts, each office would conduct additional engineering studies—demonstrations to evaluate the technical feasibility, operational practicality, and robustness of the concepts. Offices would also address doctrinal and command-control-communication issues raised by these concepts.

For selected concepts offering significant improvements in capability, the operational concepts group would do the detailed end-to-end planning, estimate the numbers in more detail, and take into account problems of engineering and support, e.g., joint command and logistics support.

Recognizing that many systems have high utility in multiple missions, we suggest that a second major office, a System Concepts and Demonstration Office, be established to demonstrate new ideas. Prototypes in this category would be used to explore the usefulness of a new design or concept in performing a specific task or mission, or to demonstrate a particular application of several integrated technologies. Also included here are demonstrations of the ability to meet a specified threat and consideration of operations, support, and logistics. The System Concepts and Demonstration Office has the responsibility of integrating all the components and of providing an early and convincing demonstration of the operational concept. *Each system demonstration would have a short life*—i.e., a new project office would be formed to address each selected system concept and then disbanded when the task was completed.

After the evaluation and assessment of competing concepts, the Concept Development and Joint Integration Office would recommend to the Under Secretary and in turn to the Secretary of Defense which concepts should be implemented, which systems should be acquired, and which services should be assigned to perform particular roles and functions.

The **Acquisition Office**, the third business, would oversee platforms and systems. This office would be organized according to type of platform.

Process demands would necessitate the use of both informal and formal teams in this option. The difference between this option and the existing arrangement is that the diversity of work would be reduced, with corresponding prospects for increased value added from corporate actions and also for increased transparency as to where the whole organization is going. This approach should increase direction-setting by senior management.

Example of Concept Development and Joint Integration

Naval Support of Land Battle

NDRI

Mission:

Examine roles and missions for naval forces operating with other services in meeting requirements at sea and ashore and assess new technologies enhancing power projection from the sea.

Design the high-level architecture of command arrangements and intelligence needs for naval support of land operations.

Staffing: **12 professionals**

4 (1 Army, 1 Air Force, 2 Navy) on surveillance/C3I

3 on long-range massed/high-precision fires (missiles, guns)

2 on large-magazine ships (current DARPA/Navy project)

1 on UAV technology

1 OR type on mixes of weapons

1 on data routing (private industry)

R

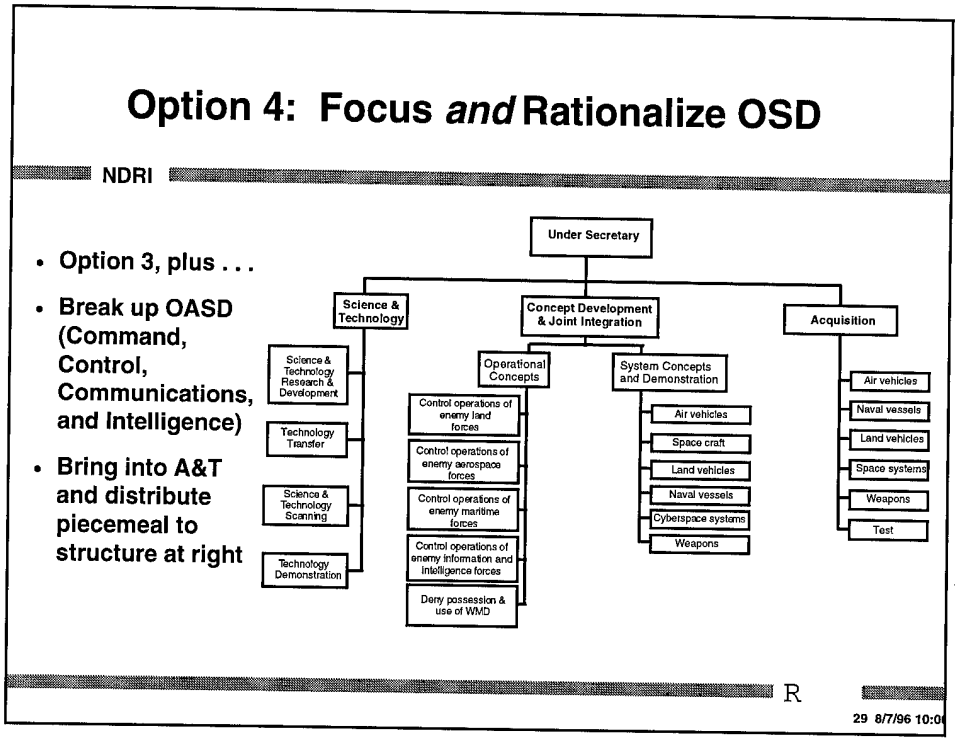
28 8/7/96 10:0

Here an example is detailed to illustrate the activities that would occur in Concept Development and Joint Integration, specifically, in controlling enemy land forces. At the left are some general characterizations of the problem.

The Commission on Roles and Missions had it right: In the future the services will be so interlinked by operational demands *and* by information interchange that it makes little sense to view the services as organizations with high levels of redundancy. To the extent that redundancies have evolved to excessive levels, this situation may reflect inadequate A&T direction-setting as much as service opportunism.

At the right is a hypothetical 12-person shop on naval support of the land battle. Functions reflect skills and knowledge, not group membership. The Air Force surveillance professional could be civilian or military. OR refers to an operation research expert on weapons mixes.

Most of this list is self-explanatory. However, included is a data-routing expert from the private sector (perhaps from the venture capital sector), as this field seems more highly developed in the commercial than in the public sector. The broader point is that the new organization should seek congressional approval for visiting technology fellows to join these teams from the private sector, with regulatory relief where it is needed.



Option 4 goes beyond option 3 by bringing command and control back into A&T. But it does this by first *breaking up OASD (C^3I) into pieces that fit the three core businesses.*

Separating C^3I organizationally in an information-intensive era is counterproductive. Such a measure would be like creating a national cabinet department of science and technology to centralize control of S&T because it is important. Yet, S&T—and, we would argue, command and control—flourish only when they are decentralized and closely tied to those working the immediate problems. Otherwise, yet another cross-functional communication problem is imposed on the system. The idea that C^3I could be done as an independent activity, without the weapons or missions, makes little sense.

A&T will have to face very big challenges of information warfare and the integration of major parts of the intelligence community into its weapons systems and into the forces. To separate out C^3I as a separate entity greatly increases the coordination costs of defense management, and more important, reduces the potential for coherent civilian design of future military forces.

Options 3 and 4: Restructuring Implications

NDRI

- **Divest departments and groups not consistent with three core businesses:**
  - **Examples: ASD for Economic Security; ODUSDs for Environmental Security, Space, and Acquisition Reform**
  - **ODUSD Logistics not directly tied to weapon acquisition or integration, and also responsibility of DLA**
- **Establish *small* management group for entire A&T**
  - **combine parts of ODUSD/AR, Defense Procurement, and API**
- **Anticipated downsizing of service T&E's should reduce oversight demand in A&T T&E**
- **Review functions of several offices, such as AE**

R

30 8/7/96 10:0

A focused grouping of A&T around three businesses would affect future staffing and organization. Recall the central argument that A&T is simply doing too many things, making coherent direction of the whole enterprise extremely difficult and, for the future, even less prepared to deal with increasingly complex tasks.

Focus can be achieved *only* by doing fewer things. Divesting activities not in the core businesses is consistent with options 3 and 4. A&T should divest itself of the offices of the ASD Economic Security, the ODUSDs for Environmental Security, Space, Acquisition Reform, and those parts of Logistics not directly related to weapon concepts, demonstration, or acquisition.

As we field fewer major new systems, the T&E oversight performed by A&T should decline and the work content should shift to subsystems and their integration.

ATSD Atomic Energy (AE) is problematic. Current strategic thinking is that the United States will reduce its reliance on nuclear weapons. Some of AE's current functions could be distributed to the Concept Development & Joint Integration office—counter proliferation, for instance. Specialty areas, such as nuclear weapons interdepartmental coordination, arms control, and threat reduction, could report to the Deputy Secretary through other means. In any event, this is one of many areas where more study is needed.

Options 3 and 4: Some Ideas on How to Handle Restructuring of Functions and Staff

NDRI

- Functions—where do they go?
  - Establish a "GSA" entity for A&T or OSD
  - Add an additional office within A&T to collect these functions
  - Give services more responsibility
  - Assign to another government agency
  - Contract to a private firm
- Staff
  - Assign select current staff to new offices
  - Use a matrix concept to fill additional future needs

R

31 8/7/96 10:0

While we recommend eliminating many of the current A&T offices, we recognize that these functions are either required by legislation or good management or are housekeeping functions. For example, with regard to the Office of Environmental Security, those activities dealing with existing environmental problems and performance of the oversight function could be assigned to any of the following: a GSA-type activity within A&T or such an organization serving all of OSD, a management office within A&T, the services (or a lead service), another government agency, or a private firm. These are just a few ideas; they are not meant to be comprehensive but to illustrate that many possible solutions exist.

A restructuring of A&T along the lines suggested would have a major effect on both the staff and functions performed. Whereas many of the current offices would go away, most of their functions would need to be performed—albeit at a lesser activity level. For example, some of the environmental and industrial-base specialists would no longer reside in the offices of Environmental and Economic Security but would be assigned to the Concept Development & Joint Integration or Acquisition offices. To provide a specific example, within the Acquisition office a group would be formed whose focus is the F-22. We envision select environmental and industrial-base staff would be assigned to that group to perform those functions in support the F-22.

Another possibility is to develop a matrix approach, in which A&T could draw from a broad skill set as needed. The next chart expands on possible actions that A&T might take to retool its skill sets.

Options 3 and 4: Human Resource (HR) Implications

NDRI

- From "attract and retain..." to *linking HR to core businesses*
- Use restructuring as opportunity to retool skill sets
  - Follow services in getting congressional relief on reducing headcount over two years, e.g., through buy-outs, adding years of service to retirement benefits
  - Follow private industry in "overdoing it" to allow new hires in needed critical skills tied to core businesses
  - Establishing Visiting Technology Fellows Program to rotate outsiders in
  - Rotate A&T staff to a *wider* range of industries, private firms, venture capital, foreign countries

R

32 8/7/96 10:0

HR policies also derive from options 3 and 4. In place of the very traditional "we strive to attract and retain the best workers," HR policies should link employee skills to the businesses of the organization. This is clearly the trend in U.S. industry.

To accomplish this objective, temporary (e.g., two-year) legislative relief may be needed to allow greater flexibility in HR. The chart shows examples of this: flexible buy-outs and adding job time for pension determination purposes.

Another private-sector trend has been to downsize with a strategy, not merely to get small, but also to bring new thinking and skills into the firm. As some areas are cutting back, others are hiring.

Rotation of people into and out of A&T is also critical. There is simply no way that the office can retain technological knowledge that is up to date in certain rapidly changing areas. To accomplish this objective will require many temporary visiting experts, something that is made difficult today by regulations on their returning to industries where they are experts. Relief from this problem should also be sought from Congress.

Recommendations

NDRI

- A&T's current organization needs to focus on core activities to meet future challenges
  - Key future tasks not being addressed
  - Current organizational structure inhibits focus
- A&T should adopt Option 4
  - Allows focus on key future tasks
  - But requires divesting some current activities and offices
  - Requires new human resource strategies

R

33 8/7/96 10:0

In the past, the United States has been able to succeed by making marginal improvements to existing concepts and systems. The future, however, will require an anticipatory approach based on formulating new concepts, incorporating emerging technologies, and adopting new business practices. To succeed in this new environment, A&T should be partly reorganized around missions, as shown in option 4. A&T also needs to update and refocus the technical and business experience of its staff. These changes would be the first steps toward creating a culture that would foster the strategic change needed.