A RAND NOTE

Survivability Issues and USAFE Policy

Bruce W. Don, Donald E. Lewis,
Robert M. Paulson, Willis H. Ware

May 1988

40 Years
1948-1988
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PREFACE

This Note reports the major findings and recommendations of a study that examined the relationship of command policy to survivability issues within the United States Air Forces in Europe (USAFE). It presents an assessment of the way in which USAFE develops staff initiatives and programs and how command policy might be changed to help insure that survivability is appropriately considered during this process.

The research was undertaken at the request of the Commander-in-Chief of United States Air Forces in Europe (CINCUSAFE) and begun in early 1985. The findings of the study were presented to the CINCUSAFE and his staff during early 1986. Because many of the study's findings are of general interest to all Air Force commands and organizations concerned with combat operations, at CINCUSAFE's direction the briefing was given to the Air Staff Board, the Air Force Council, and both the Tactical Air Forces (TAF) Commanders' Conference and the USAFE Wing Commanders' Conference. Both the USAFE staff and the Air Staff have undertaken initiatives to implement recommendations in the study. These initiatives, which focus on *process*, complement the Air Force's Air Base Operability Program, which is composed of a wide range of efforts emphasizing improvements to equipment and facilities.

This work was part of The RAND Corporation's Project AIR FORCE research effort conducted for the United States Air Force and was carried out under the National Security Strategies Program; the project is entitled "Analysis of European Theater Air Operations and Issues." This project includes a research team stationed at Hq USAFE, which was primarily responsible for the development and execution of the research described here.

SUMMARY

This Note reports the major findings and recommendations of a study that examined the relationship of command policy to survivability issues within the United States Air Forces in Europe (USAFE). It assesses how USAFE develops staff initiatives and programs and how command policy might be changed to help insure that survivability is appropriately considered during this process.[1]

Survivability considerations may be overlooked in the normal course of business and many times corrective measures take a long time to be implemented. In investigating the basis of this problem, the research staff noted that survivability grows from a choice among a range of measures from operations/communications security (OPSEC and COMSEC), to indications and warning (I&W), through offensive operations, and on to the more familiar elements of ongoing survivability programs:

Active Defense
Passive Defense
Damage Control
Robustness in System Design
Recovery of Mission Capability

A balanced mix of these measures is necessary to provide for the efficient and effective survivability of a command's combat forces. Relying on a single measure to bear the responsibility of handling an enemy attack by itself is an expensive and failure-prone approach.

Since survivability is but one aspect of military capability, it is provided for in the same manner as any other element of military capability (for example, the ability to perform air interdiction): through the day-to-day work of the staff and operational units within a command. Through this process the command seeks to provide an appropriate level of

[1]The term *survivability*, as used in this study, is based upon the definition found in Air Force Regulation 80-38. We intend to connote a broad range of actions that apply to a wide spectrum of Air Force facilities and units—air bases, cruise missile units, intelligence stations, and radar sites. With similar emphasis on a broad range of actions aimed at continuing operations despite hostile action, the Air Force has recently redesignated its *air base survivability* efforts as *air base operability efforts*. (See Air Force Regulation 360-1.)

survivability for the command's people, its aircraft (while they are on the ground), its remote sites, and other elements of the support infrastructure. For this effort to succeed, however, **survivability must be considered in every initiative the command undertakes, not just through a few major survivability initiatives.** As a result, each functional area (Logistics, Operations, Engineering) has a role to play in insuring that the command's forces can survive to perform their mission.

The problem is not that survivability is ignored; it is that survivability could be better provided for, even with the resource constraints (in manpower and money) that must be continually faced.

In examining how well this survivability process currently works, the research staff found that four problematic issues surfaced. These issues often combine to degrade the effectiveness of the substantial resources already at the command's disposal. The research established that

- Guidance on survivability is often lacking
- A functionally organized staff has trouble handling a cross-functional problem such as survivability
- Alternative and less costly ways of handling survivability problems are not adequately explored
- Clever solutions developed at the unit level were not taken advantage of across the command.

In addressing the question of how to improve this situation, the research staff recommend policy actions that the command can take in four areas. They are:

1. **Strengthen the guidance and enforce it.** Many regulations and plans make no mention of the need for survivability. Formats specified for documents describing requirements and defining new programs should include survivability considerations. For example, the U.S. Air Force draft guidance on Air Base Survivability should be broadened in scope to include the survivability of the entire air operations "system"—remote sites, communications, intelligence ground stations, airbase operability, and command and control facilities—not just air bases.

2. **Provide a cross-functional emphasis**. Because each functional area within the staff has an interest in some aspect of survivability, survivability issues are often addressed piecemeal. A single point of advocacy with authority and autonomy is needed to coordinate and define the responsibilities of the different functional areas. Standards that cut across all functional areas should be developed and used to insure survivable basing, designs, deployments, and operations. These standards must become an integral part of the guidance given to the command's staff and its operational units, and the inspection system should insure these standards are observed.

3. **Use a decision process that specifically includes survivability**. The collegiate process, which is often used to assess alternative courses of action within the Air Force, considers many different perspectives, but survivability is seldom included in the assessment. Survivability should be specifically incorporated into a command's decision process. For example, the USAFE Board structure should include an agency to review the candidates for USAFE's input to the Program Objective Memorandum (POM) for survivability considerations. The format for the packages used to evaluate these candidates should specifically consider survivability measures. Choices made by commanders about equipment and facilities siting must consider survivability, even during deployments and exercises.

4. **Capitalize on individual initiative**. Many of the good ideas developed at the unit level are not put into practice command-wide. New ideas should be encouraged through a communication system, people should be motivated through award and incentive programs, and currently budgeted resources can be made more available for survivability efforts by changing the way in which they are managed.

The policy actions that should be undertaken first should emphasize correcting the guidance: This is a high-payoff, low-cost first step.

LIST OF ABBREVIATIONS

This list contains the full spellings for the acronyms and abbreviations used in this note.

AAFCE	- Allied Air Forces Central Europe
ABS	- Air Base Survivability
AF	- Air Force
AFISC	- Air Force Inspection and Safety Center
AFM	- Air Force Manual
AFR	- Air Force Regulation
AIS	- Avionics Intermediate Shop
ATF	- Advanced Tactical Fighter
ATSO	- Ability to Survive and Operate
CAD	- Computer Aided Design
CINCUSAFE	- Commander-in-Chief, United States Air Forces, Europe
COB	- Collocated Operating Base
COMSEC	- Communications Security
CONPLAN	- Operation Plan in concept format
CP	- Command Post
DCS	- Deputy Chief of Staff
DoD	- Department of Defense
EMP	- Electromagnetic Pulse
GLCM	- Ground Launched Cruise Missile
HHQ	- Higher Headquarters
HOI	- Headquarters Operating Instruction
HQ	- Headquarters
I&W	- Indications and Warning
IG	- Inspector General
IN	- Intelligence
IOC	- Initial Operational Capability
JCS	- Joint Chiefs of Staff
JMSNS	- Joint Major System New Start

JSOR	- Joint System Operational Requirement
JSP	- Joint Support Plan
JSTARS	- Joint Surveillance and Target Attack System
LIMFAC	- Limiting Factors
MAJCOM	- Major Command
MOB	- Main Operating Base
OPLAN	- Operation Plan
OPSEC	- Operations Security
PDP	- Program Decision Package
POM	- Program Objective Memorandum
POV	- Privately Owned Vehicle
PPLAN	- Programming Plan
PSOC	- Preliminary System Operational Concept
SCPS	- Survivable Collective Protective Shelter
SHAPE	- Supreme Headquarters Allied Powers Europe
SOC	- System Operational Concept
SON	- Statement of Operational Need
STOL	- Short Takeoff and Landing
TAC	- Tactical Air Command
TAC EVAL	- Tactical Evaluation
USAFE	- United States Air Force, Europe
USAFEP	- United States Air Force, Europe Pamphlet
USAFER	- United States Air Force, Europe Regulation
WP	- Warsaw Pact
WRSK	- War Reserves Spare Kit

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FIGURES

I. INTRODUCTION

This Note reports the major findings and recommendations of a study that examined the relationship of command policy to survivability issues within the United States Air Forces in Europe (USAFE). It presents an assessment of the way in which USAFE develops staff initiatives and programs and how command policy might be changed to help insure that survivability is appropriately considered during this process.[1]

The Commander-in-Chief of the United States Air Forces in Europe (CINCUSAFE) had expressed concern about the command's response to the threat posed to his forces, both current and planned. CINCUSAFE was particularly concerned with his forces' ability to withstand offensive operations by the Warsaw Pact (WP). Noting that the many initiatives for manning, equipping, and basing his forces all required some consideration of survivability, he asked RAND's Project AIR FORCE research team at Ramstein Air Base, West Germany, to examine how well the command's day-to-day work addressed survivability issues and to report on policy measures that might be taken to improve how this is done.

GOALS AND SCOPE OF THE STUDY

The study seeks to help insure that the personnel of the command, its aircraft and missiles (while they are on the ground), its remote sites, and the other elements of the support infrastructure can be made survivable in the face of the WP's increasing offensive capabilities. To do this the research team addressed one major question: "What kind of command policies can help insure that survivability is *appropriately* addressed in *new initiatives*?" The study examined practical and near-term measures. The term "appropriately" is used to stress the need to strike a balance and make tradeoffs. Survivability is not a "be all and end all." It can be overemphasized as well as underemphasized. It must be examined in the context of all the command's other requirements. When we refer to "new initiatives" we mean such efforts as developing

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Statements of Operational Need (SON), Joint Support Plans (JSP), Military Construction Programs, and USAFE's inputs to NATO and the Air Staff. In short, "initiatives" include almost any formal actions that the USAFE staff undertake.

No attempt was made to assess or develop initiatives directly aimed at improving survivability (such as the findings and recommendations resulting from Exercise "SALTY DEMO").[2] The focus was on insuring that survivability considerations were included in the many other sorts of initiatives the command undertakes. The study was less concerned with clever new ideas that provide for the survivability of USAFE's forces than it was with *how the command can come up with those ideas and get them implemented.* This is a process-oriented view of survivability.

STUDY APPROACH

The study team examined several major command initiatives currently under way or planned, how survivability problems are identified and addressed in those initiatives, and the control and management approaches used to insure that survivability receives adequate consideration. It assessed shortfalls in the ways in which survivability was (or was not) considered in each initiative and sought to understand whether these shortfalls had any common basis. Where it found an underlying cause, it then developed recommendations, in conjunction with elements of the USAFE staff, to correct the problem. These recommendations were presented to CINCUSAFE for his consideration.

OBSERVABLE PROBLEM, LESS APPARENT CAUSE

USAFE is faced with many easily observable symptoms of the problems involved in providing an adequate level of survivability for its forces. For example:

- The Avionics Intermediate Shop (AIS) is being hardened a decade after the F-15 and F-111 have been bedded down in the theater.
- Survivability shortfalls are regularly reported as limiting factors (LIMFACs) within the command. For example, during the course of the study one USAFE Main Operating Base reported that several LIMFACs were directly related to survivability.

[2]"SALTY DEMO" was an air base survivability exercise conducted at Spangdahlem Air Base in West Germany from 29 April to 17 May 1985. It sought to demonstrate how to conduct base level operations under air and ground attack conditions. An assessment of the lessons learned from the effort produced several recommendations whose implementation the Air Force is currently considering.

- NATO is about to build some 500 new shelters over the next six years under its Infrastructure Program. These new shelters are being designed to counter a 1969 threat.
- Headquarters/base loading (creating clusters of lucrative targets for the enemy) is a chronic problem at some USAFE locations.

But none of these oversights or weaknesses in current survivability efforts are causes; they are symptomatic of the problem. The ones we have listed are simply examples, no more or less important than any number of others. The task ahead is not to patch up as many of these symptoms as possible, but rather to operate on their source. The root of the problem is really two-fold: Many survivability considerations seem to be overlooked, and implementing survivability measures takes an inordinate amount of time. Survivability is not being ignored; rather, USAFE could do better to improve it, even with the constraints that the command must face.

To better understand how to get at the root of the problem, it will be necessary to develop a common framework for discussion. Such a basis is important because "survivability" often means something different to each individual and organization.

ORGANIZATION

Section II develops this common framework and provides a context for later discussion by explaining what we mean when we use the word "survivability," how it contributes to military capability, and how USAFE provides for the survivability of its forces. The causes of concern and major findings are reported in Sec. III; it offers recommendations in four areas and provides examples of implementing those recommendations. Section IV concludes the body of the discussion with a summary of recommendations and a suggestion on where to start improving the way in which the command addresses survivability issues. The appendix offers detailed definitions of the five basic survivability measures.

II. THE CONTEXT

WHAT IS SURVIVABILITY?

A clear and direct definition of survivability that helps set the context for a fuller discussion can be found in Air Force Regulation (AFR) 80-38, which defines the Air Force Systems Survivability Program:

> *Survivability is the ability to avoid or withstand a hostile man-made environment—without abortive impairment of mission.*

To ensure that survivability is adequately provided for, however, we need an understanding of how survivability comes about. In this case, survivability is the result of the sum of many survivability measures, which we will refer to as a *depth of survivability measures*. As illustrated in Fig. 1, these measures range from Operations Security (OPSEC) and Communications Security (COMSEC) through Indications and Warning (I&W) and Offensive Operations and on to the more familiar elements of ongoing survivability efforts.[1] Each of these measures adds to the effect of the others. They might be thought of as layers of defenses protecting a critical asset.

The intensity of the arrow in Fig. 2.1 represents the intensity or severity of potential damage that enemy offensive operations could do to USAFE's aircraft on the ground or its support infrastructure. Each level or measure of defense reduces the effect of that potential damage to the point where, if things are working properly, it is possible to sustain operations over the long term. However, no one survivability measure should be relied on exclusively to handle an attack by itself; this is an expensive and failure-prone approach to providing for survivability.

Survivability is mission-centered. It is layered and multifaceted, and its goal is to maintain the capability to perform the mission. Survivability can (and should) be attained in many ways.

We must also keep in mind several other characteristics of survivability that will bear on the following discussion:

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[1]The appendix provides a more detailed definition of each of the survivability measures.

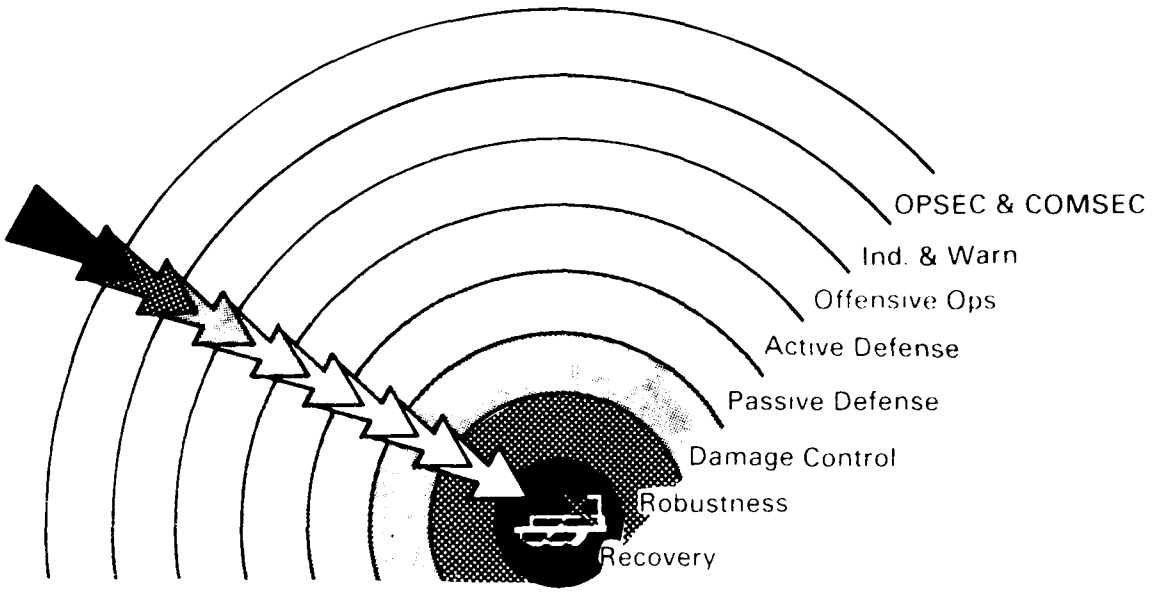

Fig. 1—Survivability Grows from the Sum of Many Measures

- Survivability is not like safety. There are few day-to-day reminders that it is important, and survivability seldom enhances a commander's peacetime record. (The terrorist threat has been changing this notion in recent years, but in general it is still true).
- Survivability measures are easy targets for trimming when funds become more limited; no one has to pay for such an oversight unless there is a war, so it can be a real "play now/pay later" situation.
- Survivability measures are sometimes considered only reluctantly. Peacetime motivations are often at cross purposes with providing adequate survivability: To address a survivability problem, a manager must commit effort and money to deal with an envisioned problem. Redundancy is an effective wartime measure; it is not an efficient peacetime policy. There is not likely to be a demonstration that this was a prudent course of action during the manager's "watch." Such actions not only take a good deal of foresight but also require a strong conviction that resources are being properly used.

- Often a weak-link mechanism is at work: If a single functional area leaves a critical aspect of the mission unprotected, good work by the rest of the staff can be undone.
- Finally, a perverse mechanism can come into play. Not really an attempt to pass the blame, it is rather the result of a very logical process. If the command does not appear to be working on a major survivability problem in one of its functional areas, the rest of the staff will believe they can better use their time in addressing other issues. Many times the problem is being addressed, but the efforts to correct it are not commonly known. (Or, more realistically, it is a difficult problem to solve, and the measures being taken to handle it are not commonly understood.) The perception that it is not being addressed in one area colors the efforts of the rest of the staff.

THE IMPORTANCE OF SURVIVABILITY

Survivability contributes directly to military capability. As shown in Fig. 2, military capability requires *people, equipment and facilities*, and *consumables* in the right *numbers* and of the right *kinds*, organized into military *units available* at the right time in an *enduring* way throughout the conflict. Figure 2 also provides examples of the kinds of things we mean when we say that military capability requires the right kinds of people (they must be *qualified*) or that equipment must be available (it must be *in place*) in-theater to be able to conduct operations. As shown by the shading in the figure, survivability is a distinct element of military capability. It makes people and things available for battle. It determines whether the military capability we have deters the enemy or presents him with an incentive for preemptive attack.

Military capability is composed of several elements (such as survivability, reliability, and sustainability). Each of the different elements is interrelated, sometimes in a complementary manner. For example, things that enhance Reliability and Maintainability (things that are *tough* and *easy to fix*) also enhance survivability, because the more the Air Force can divorce itself from heavy reliance on maintenance, the less vulnerable it is; this is a form of passive defense. Also, the easier it is for the maintenance organization to fix a piece of equipment, the more that organization can concentrate on repairing battle damage- a form of recovery. Similarly, things that are easily deployable (able to be *in place* in the theater) generally occupy a less vulnerable area; are more durable; are easier to hide, camouflage, or fit into existing shelters; and seldom rely on unique power sources.

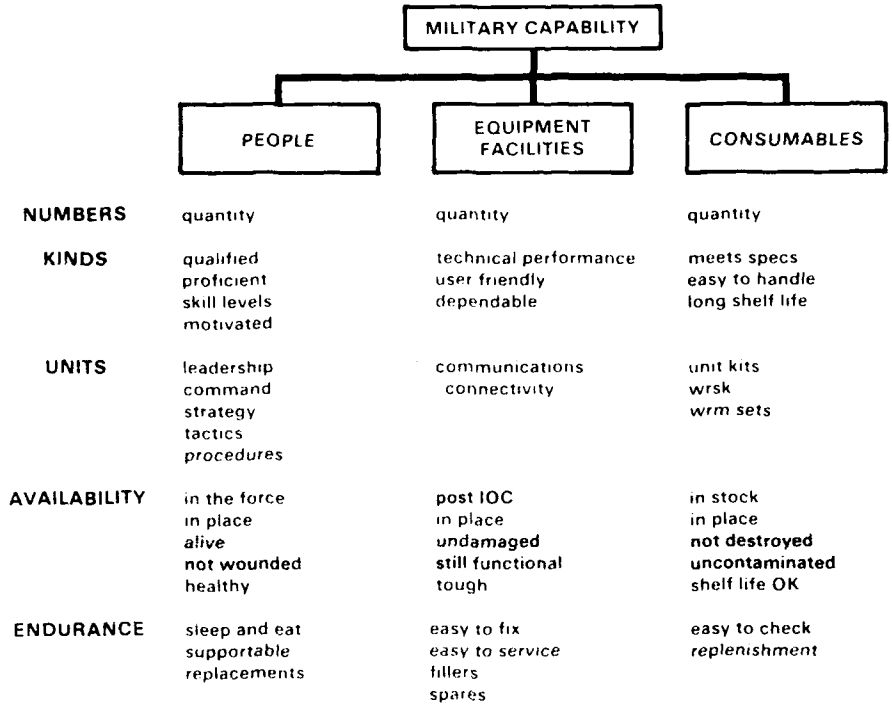

Fig. 2--Requirements of Military Capability and How Survivability Contributes

Often, however, survivability interacts with the other elements of military capability in an antagonistic way. This interaction is perhaps most apparent when the Air Force considers buying equipment or facilities. Survivability can adversely affect not only the total cost of the system, but also the production schedule (past Initial Operational Capability or *post IOC* in Fig. 2) and such things as capability (*technical performance* in Fig. 2).

We want to stress two points about the contribution of survivability to military capability. First, survivability is a critical component of military capability: Dead men can't fight; destroyed aircraft can't fly. Second, because survivability is but one element of military capability, there are tradeoffs between it and the other elements of military capability. We can pay for survivability in terms of performance, operability, or schedule as well as in dollars. Therefore, it is important to understand the nature of these tradeoffs—for example, the cost of survivability in terms of operability--so the appropriate level of survivability can be provided in any particular situation.

HOW USAFE PROVIDES FOR SURVIVABILITY

As illustrated in Fig. 3, USAFE provides for survivability by using peacetime resources to prepare for its wartime functions—*providing logistics support and operational support*, and conducting combat *operations* themselves.

The ability to survive must be created during *peacetime preparation* if it is to have an effect while the command is performing *wartime functions*, such as those listed on the right of the Fig. 3. This peacetime preparation is nothing more than the Services' mission to *organize, train, and equip* that the Air Force (and USAFE) carries out on a daily basis. In order to carry out this mission, the command undertakes a whole series of initiatives, such as those listed in the left column of the figure.

USAFE has a great deal of leverage over some of these initiatives (denoted by the largest bullets), while with others (the smallest bullets) its influence is minimal. Those initiatives over which it has substantial leverage could be viewed as the "pressure points"

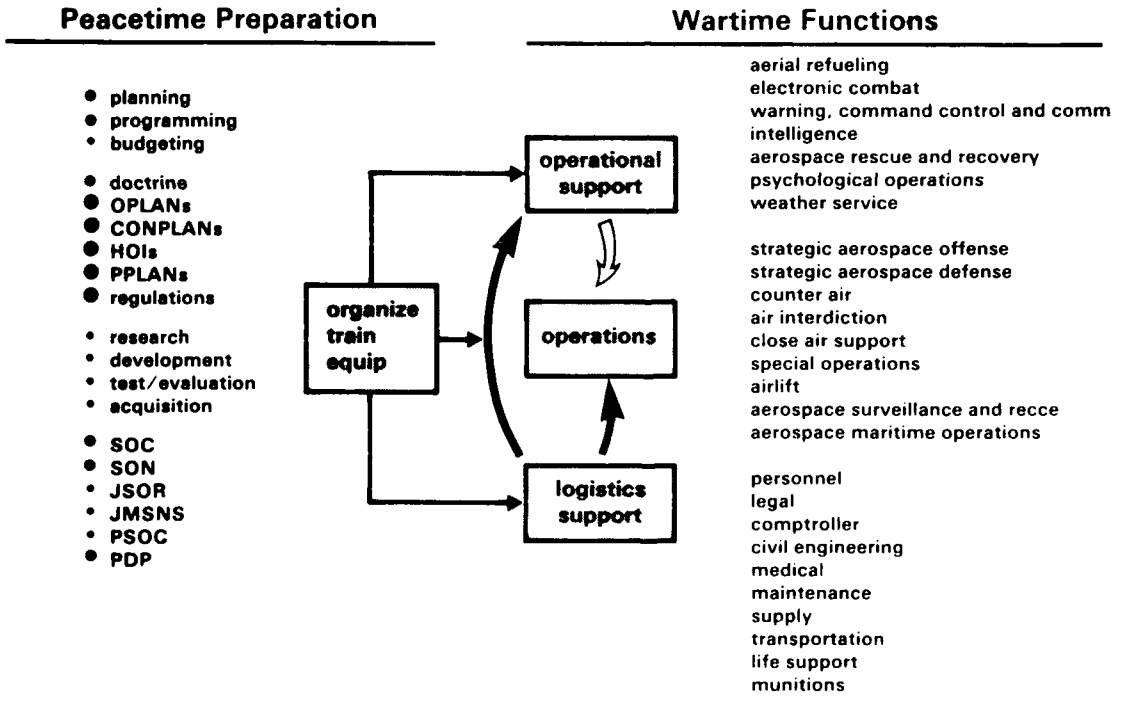

Fig. 3—How USAFE Provides for Survivability

through which USAFE can influence the process of providing for the survivability of its forces. This approach argues for considering "survivability in every initiative" rather than considering a few "survivability initiatives."

Since this process of transforming peacetime resources into a wartime capability is already in place and functioning as the normal course of business, why does it not place more appropriate emphasis on survivability? The next section discusses why this is the case and recommends how to improve the situation.

III. FINDINGS AND RECOMMENDATIONS

Often the low emphasis that survivability issues receive is blamed on a scarcity of resources (manpower and money), but it could be argued that in many cases it is not budget, people, and technology that constrain provisions for survivability. RAND researchers found that, although resources do play a role, other factors come into play as well, and they grow out of the basic characteristics of survivability discussed earlier.

The analysis conducted in this study reveals four major reasons why survivability is not considered as fully as it could be:

- Guidance is often lacking or inadequate.
- A functionally organized staff has trouble handling a cross-functional problem like improving survivability.
- Not enough emphasis is placed on finding alternative and less costly ways of doing things.
- A lot of innovative and useful solutions at the unit level are not encouraged or effectively promulgated.

Each of these four factors influences the others in some way, compounding the problem.

These four problem areas also identify the kinds of solutions or remedies that should be applied at the "pressure points" discussed in the previous section and define the major areas in which we make our policy recommendations for improving survivability. We recommend that USAFE:

- Strengthen the guidance, and enforce it
- Provide a cross-functional emphasis
- Use a decision process that includes survivability
- Capitalize on individual initiative.

These four areas for policy recommendations are selective and include only the important and practical (from USAFE's perspective). Although they are interrelated, each area can be addressed individually to improve current levels of survivability.

STRENGTHEN THE GUIDANCE, AND ENFORCE IT

Our first group of recommendations deals with the guidance provided to the staff and operational units. The problem can be traced to the most fundamental levels: It is almost as if there were a pervasive assumption that USAFE will operate from sanctuary bases, and there does not appear to be any central focus for providing guidance on survivability. Moreover, many regulations and plans make no mention of the need for survivability.

USAFE has the latitude to improve the guidance currently provided on survivability and has done so in several important instances (for example, USAFE Regulation 28-5 now includes a survivability annex), but more needs to be done. There are shortfalls in Air Force, JCS, and DoD guidance, and NATO is in need of assistance. USAFE can affect the nature and strength of the guidance provided to its staff and operational units in three spheres, each less directly under USAFE's influence:

- USAFE itself
- U.S. higher headquarters
- The NATO commands.

Strengthening Guidance for Survivability Within USAFE

Within its own command, USAFE should

- Require a survivability annex for Programming Plans (PPLANS)
- Include survivability measures in Joint Support Plans (JSPs)
- Develop a Headquarters Operating Instruction (HOI) for survivability points of contact
- Include applicable NATO survivability documents in USAFER 0-3.

Require Survivability Guidance in an Annex for Programming Plans. Researchers observed that plans to introduce new systems into a theater often present one of the best opportunities for insuring that adequate provisions are made for the survivability of the system. Many factors affecting a system's capability (for example, strategic location, headquarters, and air base loading) can be addressed in a practical manner only during the early stages of planning. Currently, USAFER 27-1, *Programming Plans*, contains little guidance to insure that survivability is adequately considered early in the beddown process.

We recommend that USAFER 27-1 be revised to include an annex on survivability. Such an annex might be patterned after the survivability annex suggested for Operations Plans in current USAFE guidance (USAFER 28-5). In addition to specifying details, this annex should stress what might be termed the "survivability strategy" for the system: the overall game plan outlining which of the many survivability measures are appropriate for protecting the system in question.

Include Survivability Measures as an Annex in JSPs. Some 70 Joint Support Plans (JSPs) detail agreements between the United States and each host nation concerning the facilities and support that will be provided at each of the Collocated Operating Bases (COBs). There are no in-place U.S. forces at these bases in peacetime, but nearly two thirds of U.S. fighter aircraft will operate from COBs if NATO is fully augmented during a conflict. The survivability of U.S. forces operating from COBs is a shared responsibility, with a considerable share falling on the host nation. The format for JSPs is outlined in USAFER 28-2, which provides command guidance for writing JSPs. During the course of this study, an update to this publication was under consideration; it would have specifically included an annex on survivability in the suggested plan format. The current suite of JSPs do not include survivability considerations for COBs and make no demands on our allies to comply with NATO standards. The U.S. Congress has expressed reservations about the protection afforded augmenting U.S. aircraft at these bases.

Our recommendation is that USAFE carry through on the effort to include a specific annex on survivability in the JSP format.

Develop an HOI for Survivability Points of Contact. HOIs provide guidance for efficient staff action. There is no USAFE HOI identifying points of contact or offices with the primary responsibility for particular aspects of survivability issues within the functional areas on the staff (operations, logistics, etc.); new staff members must rely on informal means to determine this information.

We suggest that a new USAFE HOI should be written to identify not only USAFE's new single coordinator for survivability issues, but also each office within the functional areas which are expert in particular areas (such as tactical deception, hardening, casualty treatment, and explosive ordnance disposal).

USAFE HOIs relating to survivability are numbered according to their functional area; this makes it difficult to appreciate the balance (or lack thereof) of guidance provided to the staff in the survivability arena.

The Air Force has created a specific 360- series for survivability publications. We therefore recommend that USAFE reissue USAFE HOI 20-3 (chemical warfare) and USAFE HOI 355-1 (disaster preparedness) as 360- series publications and develop additional staff guidance for the other survivability sub-areas as required.

Include Applicable NATO Survivability Documents in USAFER 0-3. National forces do not usually use NATO directives directly. NATO relies on the member nations' military staffs to incorporate its directives into national publications when appropriate. This approach requires that USAFE staff officers be familiar with NATO directives and use them in drafting USAFE guidance. To aid the staff with this task, USAFE publishes a list of key NATO documents (USAFER 0-3). This regulation almost completely ignores the rather sizable number of NATO documents dealing with survivability.

To improve the administrative tools applicable to survivability, USAFER 0-3 should be revised to incorporate the key NATO documents dealing with survivability. Some consideration should be given to developing a bibliography of all NATO survivability documents.

Strengthening Guidance Within National HHQ for Survivability

USAFE can exert a substantial degree of influence on higher headquarters (e.g. U.S. European Command, HQ USAF); recognizing this, the command should try to insure that upper echelons provide appropriate guidance on survivability. Some specific actions that should be taken in this regard are:

- Include survivability in Air Force Manual (AFM) 1-1, the manual that defines Air Force doctrine
- Improve SON/SOC standards to include more substantial treatment of survivability
- Revise the OPLAN format to specifically address survivability.
- Encourage the Joint Staff to revise the definition of "military capability" in JCS Pub 1
- Include in JCS Pub 1 a definition of survivability
- Revise AF 360- series regulations to address operations under attack conditions for the entire Air Force mission, not just air bases

- Improve critical aspects of current Air Force regulations
- Develop a 3- series manual on tactics and procedures for air base combat operations

Specifically Treat Survivability in Air Force Doctrine. Air Force doctrine has largely failed to address survivability in published form. The research team reviewed several previous versions of the Air Force basic doctrine manual (AFM 1-1)[1] in addition to the current (March 1984) version. Throughout this history of the thinking on how and why to employ airpower we found little or no consideration given to protecting the force to enable it to operate in a hostile environment. For example, the current version of AFM 1-1 outlines specialized tasks that are necessary to insure mission success:

Aerial Refueling
Electronic Combat
Warning, Command, Control and Communications
Intelligence
Aerospace Rescue and Recovery
Psychological Operations
Weather Service.

Many of these specialized tasks have been incorporated into Air Force basic doctrine for several years. At least four other tasks fall into this category:

Active Air Defense
Active Ground Defense
Passive Defense
Damage Control/Reconstitution/Recovery.

These, too, are necessary for successful war fighting and all are directly related to survivability, but are virtually unmentioned in the current version of AFM 1-1. Perhaps more important, the Air Force has committed funds to major programs in pursuit of these tasks. There is a realization that these tasks are critical, and that realization has been acted upon, but there is no doctrinal basis for this action.

[1]These include manuscripts dated from 1953 to 1984 and an in-progress draft dated October 1985.

USAFE can and should help correct this failing at the most fundamental level of guidance. As a result of an initiative undertaken by USAFE's Deputy Chief of Staff for Plans and Programs and direction given by the Air Force Board, work is underway address such tasks more appropriately in the next revision of the basic doctrine manual.

Improve Uneven Treatment of Survivability in SONs/SOCs. System Operational Concepts and Statements of Operational Need are basic source documents that influence the development of Air Force systems. At the time the RAND study team reviewed the draft Air Force guidance (AFM 55-XX) on developing SOCs, its treatment of survivability varied greatly among the various agencies responsible for developing SOCs. This treatment ranged from entirely adequate to nonexistent. Guidance for SONs (AFR 57-1) was even more sparse, leaving largely up to the writer the way in which the SON addressed survivability. Athough this practice can allow a great deal of flexibility in tailoring the issue to the subject, it often results in the matter's being overlooked entirely.

These shortfalls in guidance should be corrected. Each agency should include an adequately detailed description of the survivability aspects of the system's operational concept in that part of the SOC for which the agency is responsible. Each SON format specified in AFR 57-1 should require that the "survivability strategy" for the system be included explicitly in the SON.

Revise OPLAN Format to Specifically Address Survivability. AFM 28-3 suggests a format for OPLANS, which are routinely written using this format. Aside from a brief mention of chemical warfare, this format makes little specific provision for survivability considerations.

To correct this situation, the format in AFM 28-3 should be revised to include an annex specifically addressing the survivability of the forces to be used under the plan. USAFER 28-5, which governs OPLAN development within USAFE, contains a suitable example of such a format.

Revise Definition of Military Capability in JCS Pub 1. The current definition of military capability (as specified in JCS Pub 1) does not include many of the characteristics that are required of capable military forces. Because of this shortcoming, the relationship between survivability and military capability is not clearly defined.

In order to illustrate this relationship, the definition of military capability in JCS Pub 1 should be revised to provide an inclusive definition. The definition of military capability outlined in Sec. II above, explaining "The Importance of Survivability," can serve as the basis for this revision.

Include a Definition of Survivability in JCS Pub 1. There is no definition of survivability in formal guidance above the Air Force level. We recommend using the definition in AFR 80-38, which is clear and to the point:

> *Survivability is the ability to avoid or withstand a hostile, man-made environment—without abortive impairment of mission.*

Broaden the Scope of AF 360- Series Regulations. Air Force 360- series regulations address air base survivability. However, the problem of insuring that airpower can survive to fight is wider than just insuring that air bases are able to operate under wartime conditions; it requires that we also have survivable intelligence ground stations, command and control facilities, communications stations, and air defense sites. As it stands, the series strongly emphasizes flying operations from an air base. This is unquestionably important, but all Air Force units and installations must be able to withstand or avoid hostile acts in time of conflict. Survivability in the overall sense, not just air base survivability, should be the focus of these regulations. Ground Launch Cruise Missile (GLCM) units in the field, communications sites, command posts, and intelligence ground stations all need the kind of guidance the draft regulation provides. While many of these are located on air bases, many are not.[2]

The scope of the 360- series regulations and manuals should be broadened to include these other critical locations. A regulation or manual to address the unique aspects of each type of facility should be developed.

Improve Two Aspects of Current Air Base Operability Guidance. Current Air Force guidance on air base survivability is found in the new Air Force Regulation AFO 360-1 (dated 31 December 1986), titled *Air Base Operability*. This landmark regulation is the first one in which the Air Force has formally documented the organizational and functional aspects of operating an air base under attack conditions. However, as with any new effort, some improvement could be made. Two important areas in this regard deal with the functional definition of air base survivability and how the Air Force plans to organize itself to address the problem.

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[2]This problem promises to grow in the future. The Air Force is currently planning several unique, highly capable intelligence ground stations to complement several of the Air Force advanced sensor platforms. If the survivability of the operations at these facilities is not adequately provided for they will become the weak link in sensor systems that have a considerable capability against the enemy.

The functional definition of air base survivability overlooks damage control. This function is part of air base recovery, but there is a difference between time-critical actions, which may have to be undertaken during an attack to control the level of destruction, and simply putting things back together after the fires have gone out. Because they are not addressed as separate functions, such time-critical actions are largely overlooked. Fire fighting is alluded to only once in the document (Chapter 7, p. 17). Personnel rescue is never mentioned. In contrast, repair of critical facilities and resources is discussed appropriately throughout the document.

The document adequately addresses a wing level organization, but it does not address a sub-wing level unit operating on its own. The Tactical Air Forces (TAF) typically deploy to combat theaters in squadron-sized units. These units will be faced with problems similar to those confronting a wing at a MOB. Under the organizational precepts outlined in the document, such a unit will have neither the organization nor the resources to properly address survivability problems. The adequacy of the program is questionable for three circumstances: a remote site cut off from its MOB, squadrons deployed to austere locations, and units operating from COBs.

Develop a 3- Series Manual for Air Base Combat Operations. The 3- series of Air Force Manuals provides tactics and procedures for the combat employment of Air Force assets. There are no such manuals for air base operations under combat conditions.

A series of manuals (similar to the 3-1 series for tactical fighters) should be developed to explain and illustrate tactics and procedures applicable to the various aspects of operations on air bases under wartime conditions.

Strengthening the Guidance Within NATO

The USAFE command should

- Argue for updated NATO air base design criteria
- Specify protection for key civilian personnel (both U.S. and foreign).

Update NATO Standards. Current NATO air base design criteria are based on a threat analysis that has not been updated for many years. Although much of the threat data remain valid, important aspects are outdated (particularly the assessment of Warsaw Pact precision-guided munitions).

We highly recommend that the NATO design criteria be reviewed for completeness and currency, particularly with respect to their threat assessment. The U.S. Air Force should take the lead in this effort because of its growing expertise in air base survivability and intelligence assessment capabilities.

Researchers also noted that NATO has been hesitant to develop a standard design for facilities in order to allow national construction and design techniques to execute the NATO design criteria in an individual manner. The strength of this approach is that it allows for differences in, and the ongoing evolution of, design and building technology; but it can result in an expensive redesign phase for each new building program. Often, previous designs are entirely adequate. (Programs intended to increase the number of hardened squadron operations facilities, for example, may not need to redesign the structure.)

Two approaches can be used to alleviate this problem; both deal with changes to the NATO criteria. In the first, a standardized facility design could be provided along with the NATO criteria. Contractors should be asked to outline what advantages a redesign would offer. If warranted, it could be undertaken; otherwise the standard design would be executed. In the second, computer aided design (CAD) technology could be used to translate the NATO criteria into an executable design. In that case, the NATO criteria for each facility would be published as inputs to (or part of) a commercially available CAD package.

Require Protection for Key Civilian Personnel. Many U.S. bases in the European theater rely on host nation personnel for critical wartime tasks; often protection for these personnel (chemical warfare gear or personnel shelters) is not addressed within the host nation agreement. At times, this lack of specific consideration results in the inability of personnel to carry out their tasks under wartime conditions; at one USAFE base the only personnel trained to change the chemical filters used to chemically harden a major repair facility were host nation civilians who were not provided any chemical warfare protective gear.

Support agreements with host nations should specifically address the resources necessary to operate in a hostile environment. This consideration should detail what type of equipment and facilities are required, the numbers or size required, and who will provide them.

Enforcing the Guidance

Insure Existing Guidance Is Enforced. It is not enough merely to write new guidance or correct shortfalls in existing regulations—the guidance must also be enforced. Standards need to be developed, and units and systems need to be evaluated according to these standards. The involvement of USAFE Inspector General (IG) and the NATO Tactical Evaluation (TAC EVAL) team is critical, as is following up on their findings.

Currently, HQ Air Force Inspection and Safety Center is instituting a program to standardize the inspection criteria for evaluating the Ability to Survive and Operate (ATSO) programs of the USAF's Major Commands (MAJCOMs). The MAJCOMs began actively participating in the program during the latter half of 1986. Although this effort is just starting and its success remains to be seen, it provides the kind of inspection and evaluation emphasis necessary to insure that appropriate survivability guidance is developed, observed, and enforced.

PROVIDE A CROSS-FUNCTIONAL EMPHASIS

The next set of recommendations deals with the cross-functional nature of survivability and of efforts to improve it. It is difficult for a functionally organized staff to address and solve such cross-functional problems as improving survivability. Because each functional area within the staff has an interest in some aspect of survivability, survivability issues are often addressed in a piecemeal manner. Yet improved survivability demands that different functional elements focus on the same issue. Two improvements or changes must be made to provide this necessary cross-functional emphasis to the problem:

- Changing organizational responsibilities in order to improve the way that elements at the staff address survivability issues
- Using survivability goals or standards to help the command develop the skills, techniques, and expertise necessary to address survivability problems.

Changing Organizational Responsibilities

To improve the way the USAFE staff address survivability issues, organizational responsibilities must be changed. We recommend that organizational responsibilities be changed by expanding the charter of the Air Base Survivability (ABS) Task Group to include a broader area of concern, providing a single point of contact for the rest of the staff and outside agencies, and creating a principal to set and enforce standards.

Such changes in responsibilities do not fit well into a functionally organized staff; it will be no easy task for the command to make such a transition and insure its longevity.[3] However, for survivability issues to be addressed in an appropriate manner within the command, some element of the USAFE staff must be charged with the responsibility for the broad spectrum encompassed by survivability and be given the *autonomy* and *authority* to carry out such a charge.

Expand the ABS Task Group Charter. As pointed out in Sec. II, USAFE exercises substantial leverage over some Air Force initiatives. We have termed these the "pressure points" that can be used to help insure that survivability is adequately provided for the command's assets. The cross-functional USAFE ABS Task Group is charged with bringing together the expertise of the various functional areas to address survivability problems. It is composed of representatives from across the staff. Although the group is specifically charged with working actions that are viewed as "survivability" initiatives (developing shelter programs, providing chemical protective gear), its charter is unclear on many of the functions we have identified as "pressure points" (reviewing SOCs and SONs, drafting regulations or OPLANS, making inputs to the USAFE POM and beddown planning process).

We recommend that a review be conducted and specific provisions be made in the ABS Task Group charter to insure that the Task Group take an active role in developing and assessing those initiatives aligned with USAFE's "pressure points." This involvement should take place early enough in the staff process that survivability issues can be addressed and changes and can be accommodated with ease.

Using Survivability Standards or Goals

In order to provide a cross-functional emphasis for survivability issues, the members of the command must learn the proper skills and techniques for addressing survivability problems. Helping a large, complex organization such as USAFE to learn the proper skills is no easy task, especially when these techniques encompass a wide range of functional area expertise. Goals and standards help to keep this effort practical and down to earth. They direct the learning experience and provide something to strive for. Thus we recommend that USAFE define a unified set of survivability goals or standards. More specifically, we suggest that USAFE define this set of goals, standards, or criteria across

[3]During the course of the study USAFE undertook several actions aimed at providing the staff with a cross-functional perspective. For example, a new office (USAFE/DES) has been selected as the command's single point of contact for survivability matters.

- weapons systems
- air bases and other facilities
- units within the command.

One way to do this is to publish a set of survivability standards.

Publish a Set of Survivability Standards. As we discuss below, simple, straightforward analysis can be used to develop implementable standards that can help insure the survivability of USAFE's forces. It is also possible to develop standards in such a way that they have reasonable effects on mission performance or cost. The research staff has observed that there are currently few such standards.

We recommend that each functional area (DCS) within the USAFE headquarters develop a set of such standards, paying particular attention to both the effect on survivability and the "cost" that must be incurred to attain this aspect of military capability. These costs may affect a unit's operability, its budget, its maintainability, or any number of other aspects of the unit's mission. Thus, it is critical that the functional area responsible for the mission (rather than some outside agency) assess the effect of the actions required to attain these survivability standards. These standards must be dynamic; as the threat changes and intelligence assessments are revised, these standards must be re-examined.[4]

USAFE should publish the standards that have been developed by each functional area in directive form. These standards should be put into practice during exercises, deployments, and inspections, as well as serving as guidelines for systems' development and beddown.

An Example of Criteria and Standards: A Tent City. To illustrate the kinds of criteria or standards we mean, we show how to assess the vulnerability of the men and women in a tactical unit operating from an austere location and to use this assessment to set a survivability standard. Figure 4 illustrates the effects of a typical attack on a "tent city" such as those set up to house the people in a tactical unit deployed to a COB. On the vertical axis we have plotted the number of casualties that result from attacks by two different types of Pact ordnance (labeled Type 1 and Type 2) and on the horizontal axis the distance between the tents.

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[4]See the discussion on "Strengthening the Guidance within NATO" and "Assessing the Threat and Vulnerabilities" for a related discussion.

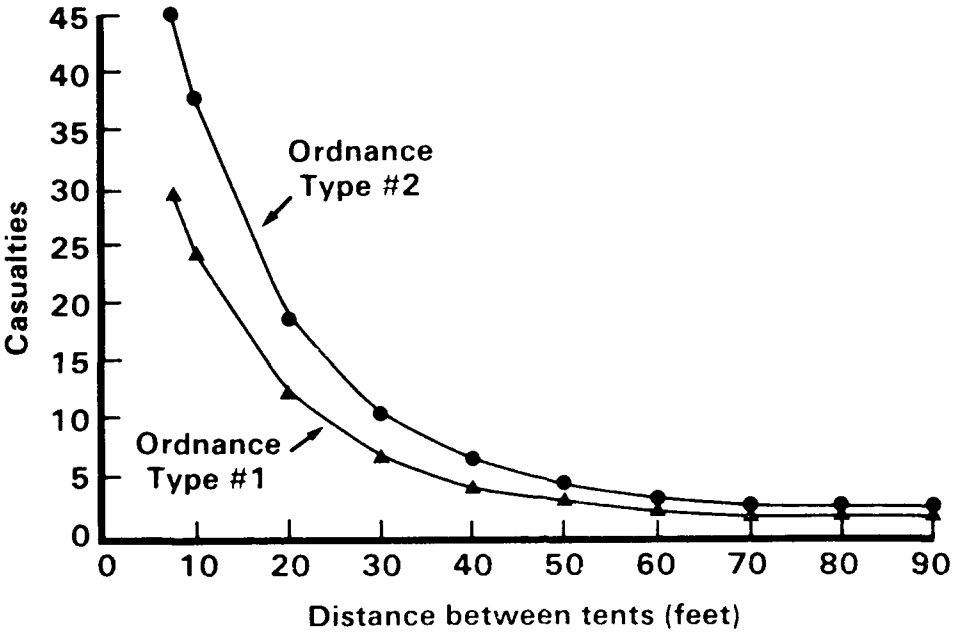

Fig. 4—Criteria and Standards for a Tent City

The number of casualties provides a measure of how survivable a tent city is. The spacing between the tents represents the price of varying levels of survivability; it represents an effect on the unit's operability. The further the tents are spread out, the more time has to be allowed for people to eat or to get a shift assembled and be transported to jobs on the flightline.

If the tent cities are set up in usual fashion, clustered together with minimum spacing between tents (about 10 ft), up to 45 people could be killed in a single attack.[5] If the tents are spread farther apart, the potential casualties fall off. That dispersal lowers the number of casualties is common knowledge; the critical information is knowing how much they fall off—the shape of the two curves. With such information it is possible to determine the payoffs and costs of dispersing the tent city—in short, whether it is worth the effort.

[5]Clustering tents closely together is the practice in many elements of the U.S. Armed Forces, not just USAFE. See, for example, the photograph of the 1983 "Bright Star" exercise in "NATO and 'Out-of-Area' Contingencies," *International Defense Review*, No 5, 1987.

In order to set a standard, the criterion must first be decided upon. To demonstrate the point, suppose that no more than five casualties in any given attack has been chosen as an appropriate level of risk. This criterion results in a spacing between tents of about 50 feet, which would then be the number that needs to be advertised and, more important, used during deployments, exercises, and inspections.

This kind of straightforward analysis can be done by the staff on a regular basis to develop and apply a whole family of standards.

A few points are in order before we leave this example. First, the illustration is a real-world problem—these results could be used right now to set a "tent city standard." Next, this type of tradeoff analysis can be done by either USAFE headquarters or by a wing. Such analysis does not require a large scale, complex simulation. Third, the approach taken did not require more money; the cost incurred is in terms of operability, not dollars. Further, the standard should not be limited to addressing only spacing. Earlier in our discussion of how survivability should be attained, we pointed out that no single survivability measure should bear the responsibility for handling an enemy attack by itself. Such a standard should also require such other measures as using camouflage and digging trenches that could be used if there were adequate warning. Finally, this "what you get and what you pay" approach represents a general methodology that can be applied to other problems, as the next example illustrates.

An Example of Criteria and Standards: Communications Van Siting. As a second illustration of how to define standards, we show how to analyze the criteria for communications van siting. In Fig. 5 we have plotted the probability of a communications van's survival at a deployment base (vertical axis) as a function of its distance from the squadron operations center (horizontal axis). (Here we are dealing with collateral damage. The squadron "ops center" is the primary target.)

There is a region of ambiguity in this assessment (shaded portion on figure) that depends on whether the communications van falls along the axis of attack (the lower curve) or perpendicular to it (the upper curve). Again, the benefit is the probability of survival, and the cost is the distance from the squadron operation center to the communications van.

Deploying units usually set up communications vans near the squadrons operations center (about 10 to 20 feet away). Suppose, however, a criterion is chosen requiring a 90 percent chance that the communications van will not be included in the collateral damage resulting from an attack on the squadron operations center. In this case, the van must be located about 600 feet from the squadron operations center.

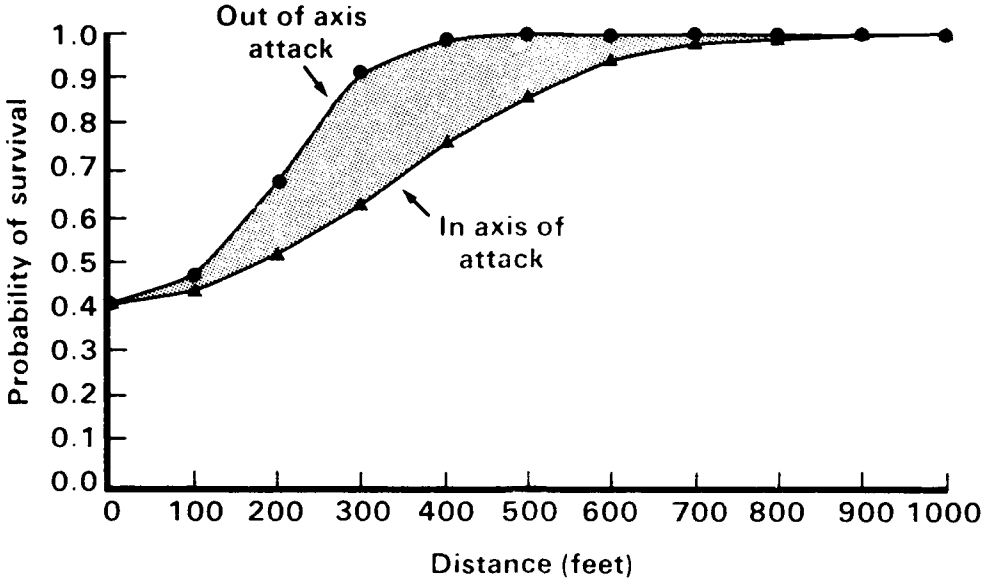

Fig. 5—Criteria and Standards for Communications Van Siting

USAFE is currently using this information to develop a communications van siting standard for deployment bases. The point of the example is that even such a simple analysis can result in a standard that can be put into practice.

Other Ways to Provide a Cross-Functional Emphasis

USAFE could also improve the cross-functional emphasis of different staff elements on survivability issues by:

- Writing a USAFE HOI defining points of contact for survivability issues
- Using videotape to communicate good ideas among functional areas
- Insuring that all functional areas are familiar with the NATO funding process.

The first of these was discussed as a way of strengthening guidance.

Use Videotape to Communicate Good Ideas. During visits to various USAFE bases, the study team was introduced to several innovative and constructive approaches to survivability problems. Often these approaches could have been used to handle problems at other bases.

Although there is a great deal of communications among USAFE's bases, and the command has established a survivability officer at each base, exchange on survivability is lacking: Those faced with solving problems related to survivability are not made aware of solutions that have already been implemented. One simple way to pass such information would be to encourage base and wing commanders to videotape approaches they have found useful in providing for survivability; USAFE headquarters could compile and distribute such programs back to all the bases, providing an outline of the approach taken, where it was implemented, and who should be contacted for further details.

Insure all Functional Areas are Familiar with the NATO Funding Process. Many of the approaches to passive defense entail building hardened or fragment-protected structures. Such projects may be eligible for funding under NATO's infrastructure program. Because of the expertise gained by staff members about the U.S. funding process as a result of previous assignments, funding for such construction is often sought through the U.S. funding process. The Congress has repeatedly declined to fund military construction that NATO could pay for, thus delaying program initiation.

Researchers recommend that an early determination of NATO funding eligibility is needed to avoid this problem. Including such considerations in the Program Decision Package (PDP) questionnaire, as suggested below (see end of Sec. III), will help insure appropriate funding sources are considered.

USE A DECISION PROCESS THAT INCLUDES SURVIVABILITY

The next set of recommendations deals with the decision process—the deliberations that "turn on" any new initiative, for example, evaluating a PDP or choosing between operational concepts for a SOC and relating these initiatives to other command actions such as the Military Construction Program (MCP) or the NATO Infrastructure Program. Typically, these decisions are made at what have been termed the "pressure points" earlier in this discussion.

To insure that the decision process includes survivability, we recommend

- Incorporating the necessary elements of survivability during the decision process
- Assessing both the threat and the vulnerabilities
- Allocating resources appropriately.

Incorporating the Necessary Elements

Insure that Decisions Include the Critical Elements. To improve the consideration of survivability issues during the decision process, we recommend that:

1. A depth of survivability measures be considered with a view to choosing several (not just one) to protect the system. Each must be assessed as to
   — costs, or what you must pay
   — benefits, or what you get for each.
2. A range of threats be addressed
   — defining the types of hostile forces that are applicable
   — specifying pertinent details of their attack
   — emphasizing countering critical actions common to all attacks.
3. Deliberations take a "systems approach" that
   — considers all elements of the system or facility
   — identifies the unique vulnerable elements.

An Example: Using Scorecards to Aid in the Decision Process. Figures 6 and 7 illustrate one approach that can embody these three elements. Although some might call this a decision methodology, it is actually little more than a combination of a checklist and a scorecard. It is straightforward and often used in analysis to present widely differing information to a decisionmaker. The first figure shows a way scorecards could be designed to help insure that survivability is appropriately considered in the decision process (during the approval of a beddown plan, for example). The three recommended elements of the analysis are all present:

- A range of *survivability measures* (from *active defense* to *recovery*) can be considered; the scorecards are used to present both the benefits and costs of each (the *payoffs against those hostile force actions* that are critical for an enemy to make good his attack, and the *effect on the system element* in terms of the different kinds of costs that might be incurred).[6]

[6]See the appendix for a more detailed description of each survivability measure.

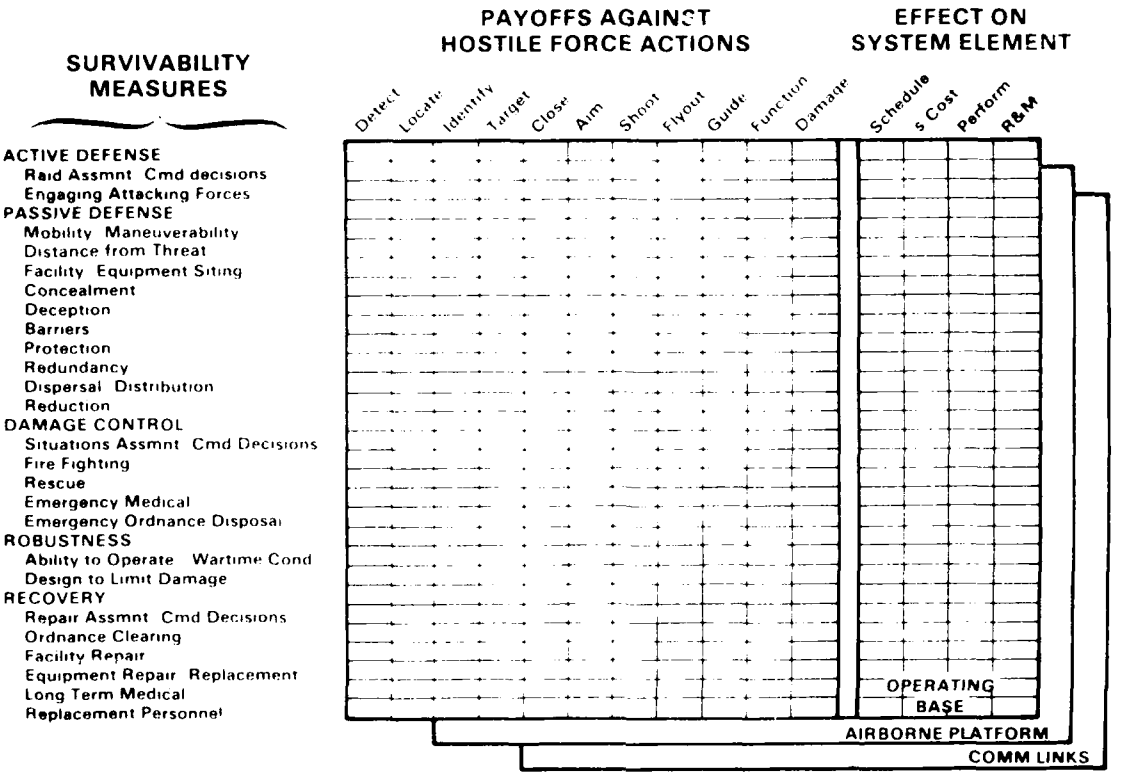

Fig. 6—A Scorecard to Aid in the Decision Process

- The scorecard design allows the assessment of a wide range of hostile forces by examing a chain of critical actions (*detect to damage*) common to all.[7]
- The method is flexible enough to allow an assessment of each of the elements of the system under consideration (for example, the *operating base*, the *airborne platform* while on the ground, or the *communications links*) that may be vulnerable.

[7]Figure 8 provides some examples of the critical actions associated with the manned aircraft and terrorist threats.

Such a scorecard presents the information to the decisionmaker in a consistent and concise manner, but it is not designed to present conclusions. The decision is still a judgmental one for which the scorecard is only an aid. The decisionmaker himself draws the conclusions.

This scorecard approach has been used to help the USAFE operations staff assess alternative operating concepts for the Joint Surveillance and Target Attack System (JSTARS).

Figure 7 is an example of the way scorecards were used for the JSTARS assessment. In this example the system element considered is the operating base; survivability measures are being assessed for their effectiveness in protecting against an air attack on the base.

The portion of Fig. 7 with shading shows the kinds of payoffs from the various survivability measures against hostile force actions. Dark shading is used if a measure shows great promise in providing for survivability, lighter shading if it shows less promise, and none if a measure would have little effect.

It is not practical to counter some enemy actions. The "shoot" column has no shadings because not much can be done to keep an enemy from actually pulling the trigger if he has already closed within firing range and aimed at his target. Although active defenses could conceivably bring the attacking aircraft down, the time available between aiming and firing is so short it is not really practical to try.

This payoffs section of the scorecard identifies measures that will become part of the survivability strategy for the system. For example, *damage control, robustness*, and *recovery* provide a last line of defense (but a strong one); other measures (*active* and *passive defense*) break the enemy's critical chain of events earlier in the process. Such a mix would offer a good depth of measures for survivability.

The right portion of the scorecard is used to show the effect of each of the survivability measures. Only those measures that will have a major effect on the system have been assessed. A minus sign indicates a measure would have a negative effect (increasing the cost or decreasing the performance of the base), and a plus indicates a measure would have a positive effect. Although the effect of some survivability measures is largely negative (*mobility/maneuverability*), others (*distance from threat*) are largely positive.[8]

[8]A mobile basing scheme envisions a completely transportable intelligence and logistics (primarily avionics maintenance) support contingent supporting JSTARS aircraft flying from randomly chosen airfields across Europe. There are indications that a rearward basing scheme, a stateside MOB supporting several operating locations within the theater, is most cost effective.

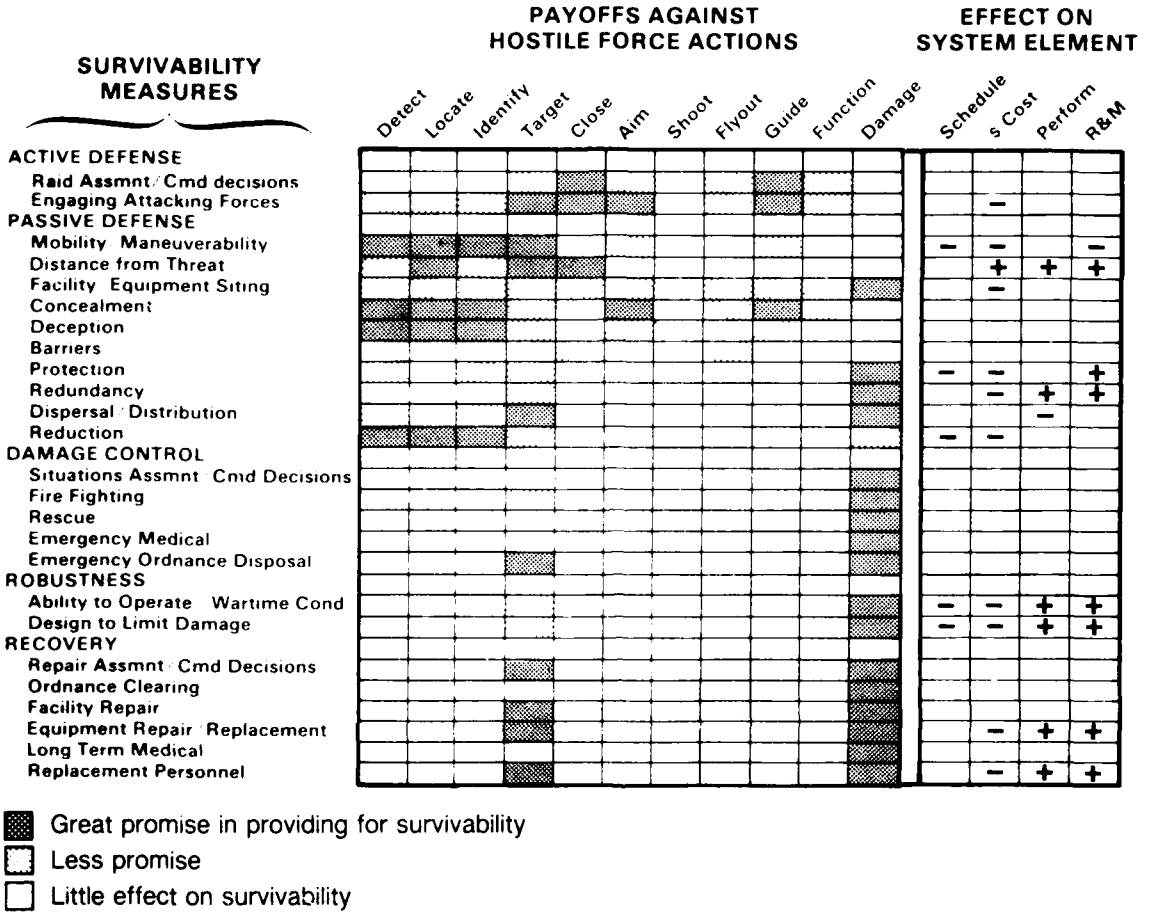

Fig. 7—A Scorecard Used to Define USAFE Command's Input to the European Concept of Operation for the JSTARS

As an illustration, we will consider *redundancy*, a form of passive defense. Our assessment is that redundancy will increase the cost of the system because of the additional equipment needed, but this approach also has positive aspects: It could influence the enemy's ability or willingness to *target* the operating base, reduce his ability to *damage* the mission capability of the base if he does attack, and increase the ability of the operating base to produce sorties (*performance* and *reliability/maintainability*) to fill the JSTARS orbits. This assessment by means of the scorecards brings to light the "whole story" for the decisionmaker. This approach easily describes the complete picture.

Assessing the Threat and Vulnerabilities

Rank Facilities and Installations According to Survivability Needs. Currently the command undertakes survivability initiatives after a case-by-case assessment of each base or facility. Such an approach can be effective, but another approach could be more effective: The threats to each installation and the criticality of the mission performed there can be assessed within a common framework. This approach has the potential to provide a more efficient allocation of both staff effort and resources, and it ranks programming improvements.

The researchers recommend the following steps:

- Intelligence should assess and categorize bases by severity of threat
- Operations should assess and categorize bases by the value of the units located there
- The command should set standards for levels of survivability based on class of threat.

First, intelligence should assess the different threat levels faced by each of USAFE's installations. This assessment should rate each type of threat facing the installation (Fig. 8 illustrates one possible categorization of the types of threats)[9] according to a rough measure of its intensity (high, medium, and low). Simple, quantitative parameters (such as the number of third generation ground attack aircraft that can reach the base) should be used as the criteria for rating the intensity of the threat. Next, an operations assessment should be made for each installation. It should attempt to rate the criticality or value of the assets at each site. Again, a simple categorization (e.g., no more than three levels) based on straightforward quantitative measures should be the goal (for example, the number of F-15s at the location). For practical reasons, these assessments by the staff will have to be made on the basis of subjective military judgment for all but a few selected cases. With these two assessments, it is possible to rank each location by the order in which survivability initiatives should be implemented. Such a rating could help define survivability standards for the installations. For example, bases subjected to a high threat and having the highest level of criticality might warrant hardening, whereas those with lesser ratings may need to use dispersal or splinter protection instead.

[9]The figure also gives examples of the critical actions that must be taken by a particular type of threat for it to conduct an effective attack. Such critical actions should be considered during the intelligence assessment.

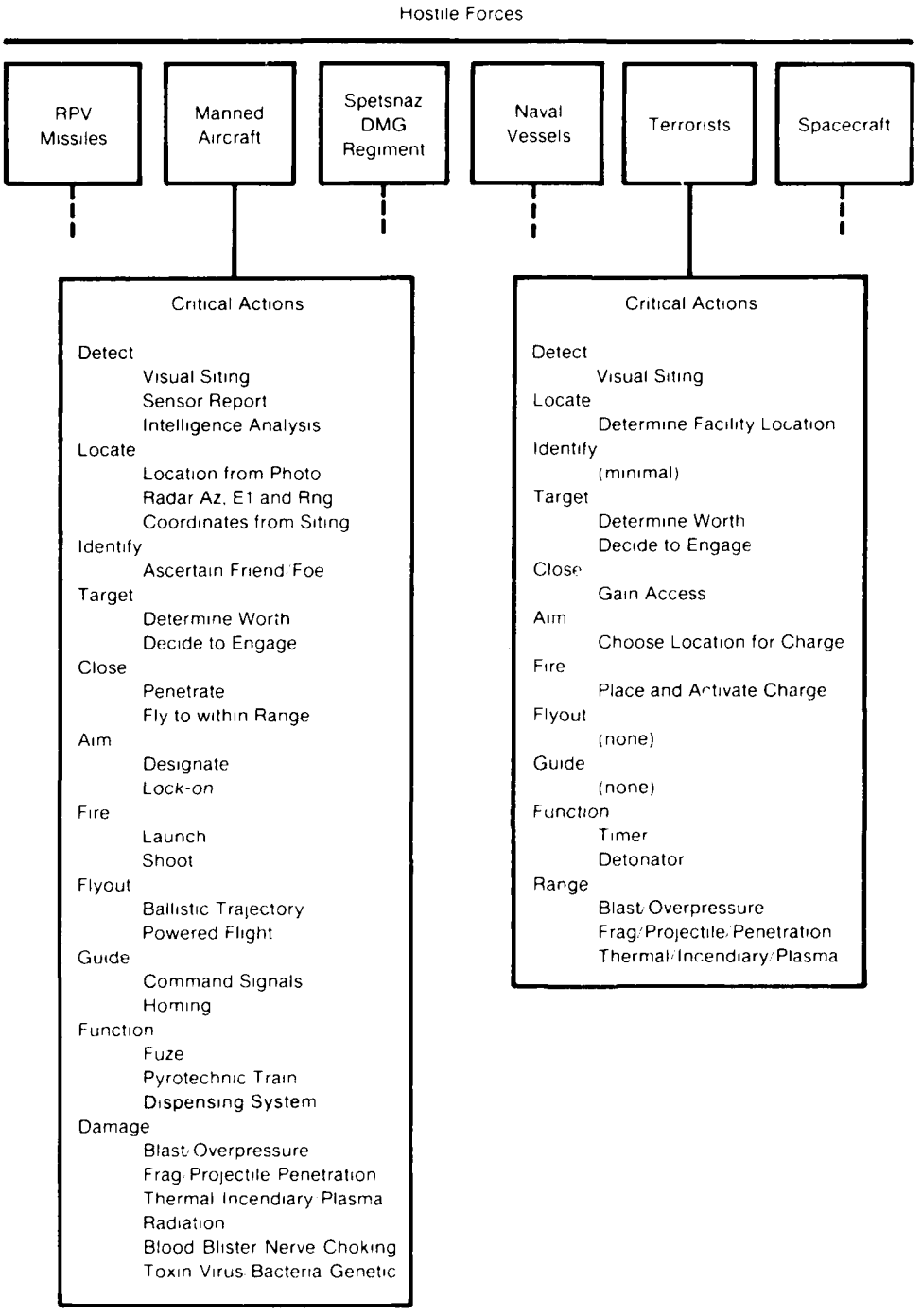

Fig. 8—Examples of Critical Actions Within a Range of Threats

Allocating Resources Appropriately

While the recommendations on ranking facilities and installations according to survivability needs can contribute markedly to insuring that USAFE's resources are concentrated in high leverage areas, two other actions can help insure that resources are allocated appropriately:

- Insuring that survivability is actively considered during USAFE's POM deliberations
- Adding a survivability question to the PDP questionnaire.

Insure Survivability Is Considered During POM Deliberations. USAFE HOI 20-1 defines the organizational structure of the various boards, panels, and committees that take part in evaluating proposals to be included in the POM submitted to USAFE. None of these organizations review each decision package from a survivability perspective. In the past, USAFE's Vice Commander sought increased consideration of survivability during this process.

RAND staff recommend that USAFE HOI 20-1 be revised to include a panel or committee responsible for reviewing decision packages from the survivability perspective.

Add Survivability to PDP Questionnaire in USAFE POM Handbook. The USAFE POM Handbook provides a single set of instructions on how to submit and monitor a USAFE POM initiative. In it is a questionnaire used to build the PDPs that, if approved, become part of the USAFE POM. Currently this questionnaire does not address any survivability measures that will be necessary for the program. As a result, POM decisions are often made with little direct consideration of survivability.

We suggest that the following question be added to the PDP questionnaire:

> If the objective sought in this PDP is a wartime capability, what scheme will be used to avoid or withstand an abortive impairment of that capability should it be subjected to enemy attack?
>
> Describe the range of threats (nuclear, conventional, chemical/biological) expected for each major program element (equipment, facilities, personnel, and consumables). Specify the approaches that will be used to counter each threat (e.g., siting, active defenses, concealment, deception, barriers/protection, redundancy, dispersal/distribution, reduction in size or number of critical components, robustness, warning, damage control, recovery actions). Often more than one approach will be required for each element. If the approach includes building hardened structures, assess the eligibility of this

construction for funding under the NATO infrastructure program. Outline the "costs" that these survivability measures incur in terms of funding, operability/performance, availability (schedule, deployability, reliability/maintainability), and sustainability. Address each element both while it is performing its mission (flying, carrying out maintenance) and while it is not (between flights, sleeping/eating).

Additional Measures that USAFE Might Take

Other measures, some of them previously discussed, can also aid in making sure the decision process appropriately considers survivability issues. Among them:

- Determine NATO Infrastructure funding eligibility before including a proposed initiative in the USAFE POM
- Utilize aircrew expertise in seeking out vulnerabilities during installation design, exercise, and beddown planning
- Specifically consider base/headquarters loading during beddown planning.

CAPITALIZE ON INDIVIDUAL INITIATIVE

The fourth and final area of recommendations examines ways to exploit individual initiative. Many innovative and constructive ideas for improving survivability are put into practice at the unit level, often by individuals, but are not encouraged or promulgated. This major resource could be used more effectively. To capitalize on individual initiative, we make three recommendations:

- Encourage new ideas by
  - — communicating and advertising (e.g., videotapes)
  - — demonstrating innovative approaches to survivability problems
  - — instituting a survivability suggestion program
- Develop individual motivation by
  - — recognizing and rewarding good programs and ideas
  - — making managers understand that survivability is important business, not just "playing war"
- Make resources more available by
  - — taking advantage of minor construction/minor works programs
  - — making proven modular systems easily available.

Such efforts should be aimed not only at coming up with the right equipment and facilities, but also at providing effective organization and training.

Encouraging New Ideas

Communicate and Advertise Ideas. We have already discussed instituting a videotape program to communicate ideas between units. Another way to communicate methods used to handle survivability problems and demonstrate innovative approaches might be to take reconnaissance photos of deployment exercises. This practice would not only enable units to see alternative approaches to dispersed operations, but could also broaden the scope of assessing deployment exercises.

The way in which a unit deploys and employs its equipment and personnel can greatly influence both its survivability and sortie generation capability. Aircraft parked wingtip-to-wingtip are easy to maintain and service, but they are not survivable; storing WRSK in a single central location makes them easy to manage but very vulnerable. Many times the only measure of a unit's deployment performance is the percentage of its scheduled sorties it has been able to fly; little or nothing is acknowledged about the posture from which it was able to do this. Reconnaissance photos of a unit's operations at a time when it was operating from its wartime posture can illustrate vulnerabilities.[10] Such photos could be included in the briefing typically given to the USAFE Director of Operations to report on the deployment, as well as shown to other USAFE units.

Institute a Survivability Suggestion Program. Although this study emphasized the *process* through which the command provides for the survivability of its forces, during the course of this analysis the researchers were provided with many suggestions on how to enhance survivability within the command. Some examples include: undertaking reforestation programs in conjunction with interior ministries (allowing them to harvest timber in return for seedlings) to decrease costs; making more use of space inside existing aircraft shelters by installing a shock mounted mezzanine; providing security police with ground-to-air gunnery training and possibly man-portable surface-to-air missiles; beginning a pilot program to investigate the operational and logistic consequences of dispersed and distributed (composite wing) basing. Many of these ideas warrant further consideration but there is no program to collect and assess such suggestions within the command.

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[10]Deployments often have multiple goals; operating from a wartime posture is often only one of these and may be inconsistent with other goals, such as producing a large number of sorties for gunnery training.

A suggestion program should solicit and evaluate ideas from individuals. As we explain below, appropriate recognition and rewards should be accorded those who make practical contributions. This program should be separate from the existing Air Force suggestion program.

Developing Individual Motivation by Recognition and Reward

Institute a Combat Operability Awards Program. Throughout USAFE, individuals and units have developed and implemented several creative and practical approaches to survivability problems. These approaches range from local design and construction of facilities to effective training programs. Such efforts have gone largely unrecognized above the local level.

We recommend that USAFE institute a combat operability award program, recognizing and rewarding both individuals and units for these efforts. Such recognition is warranted not only because of the value of contributions themselves, but also because of the increased survivability awareness such programs can help develop. These programs should encourage ideas and contributions at the level where individuals and small units can make important contributions to combat efforts. Self-help programs and efforts to identify and utilize overlooked local resources provide two examples. Similarly, another area in which individual initiative can pay high dividends is in developing imaginative plans for the use of facilities and equipment that remain serviceable after an attack.

Making Resources More Available

Take Better Advantage of Minor Works Funding. A portion of the NATO common funding program for infrastructure is available for small, unit level projects. Many survivability efforts involve infrastructure construction. Currently, unit level managers seeking to use such funds must gain approval of service commanders and then joint headquarters before they are able to apply to SHAPE. Many units do not know such funding is available.

We recommend that units be made aware of this program. Application procedures should be streamlined so that units can, in essence, apply directly to SHAPE. Applications should be allowed to stand on their own merits without service or joint headquarters additions, since they usually will involve projects peculiar to a specific location or condition on a base.

Develop and Supply a Catalog of Survivability Products to Units. Several products have been developed to address survivability problems. Besides those tailored to a specific purpose (e.g., chemical warfare protection devices or Stinger missiles), many others are flexible enough to allow them to be used at the local level for various problems (e.g., the modular concrete revetment sections currently being used at COBs in the Northern Region and rapid runway repair slabs). Additionally,

many commercially available products can be used to enhance survivability (sewer pipe sections with manhole covers can be buried in the ground vertically and used as individual personnel shelters, as was done in Hanoi during the Vietnam conflict). To use such products, base level planners must go to a good deal of effort to determine what is available and how to acquire it. In many cases this information is already available in some part of the command.

We believe that the command should assemble a catalog illustrating what products are available and providing stock numbers or other information on acquisition. If the demand for particular items proves to be great enough, central purchasing can be used to lower unit price.

IV. SUMMARY OF RECOMMENDATIONS AND WHERE TO START

Our recommendations fall into four general categories. They deal with the direction given by the command, the way the staff address survivability problems, the role of decisionmakers, and the means of motivating the right people. To describe these recommendations and explain what each means, we have provided examples of the kinds of things we believe are necessary. In the following list of the four major categories of recommendations, we present these suggestions in the form of a checklist that USAFE staff might find useful.

- **STRENGTHEN THE GUIDANCE AND ENFORCE IT**
  - ☐ Require Survivability Guidance in an Annex for PPLANS.
  - ☐ Include Survivability Measures as an Annex in JSPs.
  - ☐ Develop an HOI for Survivability Points of Contact.
  - ☐ Include Applicable NATO Survivability Documents in USAFER 0-3.
  - ☐ Specifically Treat Survivability in Air Force Doctrine.
  - ☐ Improve Uneven Treatment of Survivability in SONs/SOCs.
  - ☐ Revise OPLAN Format to Specifically Address Survivability.
  - ☐ Revise Definition of Military Capability in JCS Pub 1.
  - ☐ Include a Definition of Survivability in JCS Pub 1.
  - ☐ Broaden the Scope of AF 360- Series Regulations.
  - ☐ Improve Two Aspects of Current Air Base Operability Guidance.
  - ☐ Develop a 3- Series Manual for Air Base Combat Operations.
  - ☐ Update NATO Standards.
  - ☐ Require Protection for Key Civilian Personnel.
  - ☐ Insure Existing Guidance is Enforced.
- **PROVIDE A CROSS-FUNCTIONAL EMPHASIS**
  - ☐ Expand the ABS Task Group Charter.
  - ☐ Publish a Set of Survivability Standards.
  - ☐ Use Videotape to Communicate Good Ideas.
  - ☐ Insure all Functional Areas are Familiar with NATO Funding Process.

- **USE A DECISION PROCESS THAT INCLUDES SURVIVABILITY**
  - ☐ Insure Decisions Include the Critical Elements.
  - ☐ Rank Facilities and Installations According to Survivability Needs.
  - ☐ Insure Survivability is Considered During POM Deliberations.
  - ☐ Add Survivability to the PDP Questionnaire in USAFE POM Handbook.
- **CAPITALIZE ON INDIVIDUAL INITIATIVE**
  - ☐ Communicate and Advertise Ideas.
  - ☐ Institute a Survivability Suggestion Program.
  - ☐ Institute a Combat Operability Awards Program.
  - ☐ Take Better Advantage of Minor Works Funding.
  - ☐ Develop and Supply a Catalog of Survivability Products to Units.

The list is long, so there is an obvious question about where USAFE's efforts should begin. In the study team's opinion, the most direct and effective initial effort would be to strengthen guidance and enforce it. Suggestions in this area offer the highest, earliest payoffs at low cost.

Most of the recommendations discussed above do not cost a lot of money nor do they require grand new survivability programs: The critical ingredient is broadening the focus of current efforts.

Appendix

DEFINITION AND EXAMPLES OF SURVIVABILITY MEASURES

The following categorization of survivability measures, along with examples of each, defines each of the five major categories of survivability measures used in this Note: Active Defense, Passive Defense, Damage Control, Robustness, and Recovery.

ACTIVE DEFENSE: ENGAGING THE ENEMY

Definition: Measures that have an effect shortly before the attack. Engaging the attacking enemy forces to limit their ability.

situation assessment
resource allocation
active electronic/infrared countermeasures
ground force response
fighter aircraft response
use of anti-aircraft artillery

PASSIVE DEFENSE: AVOIDING OR WITHSTANDING DAMAGE

Definition: Measures that have effect during the attack. Actions taken beforehand resulting in the ability to avoid or withstand the effects of hostile action.

mobile operations
camouflage/decoys
flush aircraft to avoid attacks
distance from threat: range/payload and attrition
siting away from flightline and other target areas
terrain masking
smoke
cave basing/hardening
filtering and pressurizing facilities
spare communications antennas

off-base billeting and messing
redundancy

DAMAGE CONTROL: LIMITING THE EFFECTS OF ATTACK

Definition: Measures that have an effect while the effects of the attack are still developing. Active, time-critical action that must be taken to limit the effect of the enemy's damage mechanisms.

base fire department
base water supply
fire fighting augmentations
rescue teams
survivor recovery
critical ordnance sweeping
damage assessment

ROBUSTNESS: INSENSITIVITY TO ATTACK

Definition: Measures that have effect immediately after the attack. An ability to operate (although at reduced capacity) despite the damage.

arresting gear
flotation
STOL
manual input of navigation/intelligence tapes
backup power systems
manual procedures to back up automated systems
compartmentalization

RECOVERY: REGAINING THE DAMAGED MISSION CAPABILITY

Definition: Measures that take effect after the effects of the attack are complete. The ability to regain mission capability.

repair the damage or redeploy to alternative location

runway/taxiway repair

communications restoration

pipeline repair

battle damage repair of aircraft and ground equipment

filler aircraft

replacement personnel

utility repair

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This Note reports on the relationship between command policy and survivability within the United States Air Forces in Europe (USAFE). The study examined major initiatives that the USAFE command is currently implementing or planning to implement and found that survivability must be considered in each one. A balanced mix of the following measures is necessary: active defense, passive defense, damage control, robustness in system design, and recovery of mission capability. The authors recommend several policy actions: strengthen the guidance and enforce it; provide a cross-functional emphasis; use a decision process that specifically includes survivability; and capitalize on individual initiative.