RAND

Analysis of Special Operations Forces in Decision Aids

Recommendations

Bruce Pirnie

National Defense Research Institute

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Preface

This report records work accomplished during Phase Two of the project "Analysis of Special Operations Forces in Decision Aids" in support of U.S. Special Operations Command (USSOCOM). The objective of this project is to recommend ways in which the capabilities and contributions of special operations forces (SOF) can be better represented in decision aids that support the defense planning, programming, and budgeting process. In this context, *decision aids* refers to computer-supported models. The project was carried out in two phases.

Phase One included two tasks: Task 1 required RAND to discern the issues central to SOF analysis. The results of Task 1 were briefed to USSOCOM staff in October 1991. Task 2 required RAND to identify current analytic shortfalls. This effort was supported by a survey of the Office of the Secretary of Defense, the Joint Staff, analytic agencies supporting the service staffs, and military educational institutions. These organizations were chosen for their official involvement in resource-allocation decisions. The results of Task 2 were briefed to USSOCOM staff in April 1992. The results of Phase One were subsequently reported in *Analysis of Special Operations Forces in Decision Aids: Current Shortfalls*, RAND, N-3536-SOCOM (1994), by Bruce Pirnie. Section 2 of this document summarizes the results of Phase One.

Phase Two included two tasks: Task 3 required RAND to develop a construct for SOF analysis that would cover the doctrinal missions (not including psychological operations and civil affairs) and all contexts for the employment of SOF. Results were briefed to USSOCOM staff in October 1992. Section 3 of this document is based on this briefing. Task 4 required RAND to present recommendations for modifications to existing models and creation of entirely new models to better represent SOF in the planning, programming, and budgeting process. The results were briefed to USSOCOM staff at the second meeting of the Special Operations Forces Simulations Working Group in December 1992, at Headquarters USSOCOM, MacDill Air Force Base, Florida. Section 4 of this document is based on this briefing.

This report should be of interest to persons concerned with special operations forces and military modeling.

This work was performed within the International Security and Defense Strategy Program of RAND's National Defense Research Institute (NDRI), a federally funded research and development center sponsored by the Office of the Secretary of Defense and the Joint Staff. Comments should be directed to the authors or to Charles Kelley, Director of the International Security and Defense Strategy Program.

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Summary

The U.S. Special Operations Command (USSOCOM) is concerned that certain decision aids do not adequately support analysis of contributions by special operations forces (SOF). Of special concern are the computer-based models, currently in use by the Joint Staff, staffs of unified and specified commanders, and service staffs to support the Joint Strategic Planning System (JSPS) and the Planning, Programming, and Budgeting System (PPBS), i.e., those models used to support resource-allocation decisions. Accordingly, RAND was tasked to evaluate current coverage of SOF by computer-based models, develop a construct for analysis of SOF contributions, and make recommendations for further development of models.

What Is "Special" About SOF?

The sobriquet "special" is traceable to British usage during World War II. The qualities that make SOF "special" can be discerned by contrasting their *typical employment* and *force characteristics* with those of general-purpose forces. SOF exercise leverage, employ indirection, or destroy an opponent's key capabilities, in contrast to general-purpose forces that try to attain decisive success.

Typical Employment

Special operations forces are employed differently than general-purpose forces in maneuver, combat, acceptable risks, and the usual intent of the commander. These differences are summarized in Figure S.1.

	Special Operations Forces	*General-Purpose Forces*
Maneuver	**Break contact with friendly forces.**	**Maintain contact with friendly forces.**
Combat	**Plan for brief, selective combat.**	**Plan for protracted, inclusive combat.**
Risk	**Accept high risk of failure, loss to force.**	**Hedge, circumvent, reinforce.**
Intent	**Exert leverage, use indirection, attack opponent's key capabilities.**	**Attain decisive success.**

Figure S.1—Typical Employment: SOF and General-Purpose Forces

Maneuver. SOF typically break contact with friendly forces. They are often inserted into neutral, politically denied, or enemy-held territory and are subsequently recovered. During raids, they are inserted and recovered quickly, but some tasks may require them to operate for extended periods behind enemy lines. By contrast, even large formations of general-purpose ground forces maintain continuous contact with other friendly forces. This contact is required to secure flanks and to ensure an uninterrupted logistics flow. Envelopment by opposing forces is undesirable, and encirclement is usually fatal.

Combat. Commanders of SOF may plan to avoid combat entirely, or they may plan to engage in brief combat (minutes to hours). SOF must disengage before their resources are exhausted or the opponent can subject them to the greater combat power of general-purpose forces. Combat for SOF is often highly selective with respect to times, places, and targets. In contrast, general-purpose forces may have to engage in protracted combat (days to weeks) with large portions of an opponent's array. This is not to say that general-purpose forces necessarily fight attrition campaigns. On the contrary, commanders will often plan to defeat the entire opposing force while engaging only portions of it. But unless one side has an overwhelming advantage, protracted combat must be expected and may be unavoidable.

Risk. Commanders of SOF accept large risks of failure and loss to their forces. Special operations are notoriously hazardous, and have little margin for error. When SOF fail to accomplish a task, there may be no second chance. There was no second chance to recover U.S. prisoners from North Vietnam (Son Tay Raid on 21 November 1970) or to recover U.S. hostages from Tehran (Eagle Claw on 24–25 April 1980). When SOF enter hostile territory, they often risk destruction. Commanders of SOF try to reduce risk through stealth, surprise, and quick action, thus avoiding or limiting contact with opposing general-purpose forces. In contrast, commanders of general-purpose forces do not normally accept the risk that an entire force could be destroyed. The fortunes of war are such that entire armies and fleets may be lost anyway, but commanders of general-purpose forces typically plan their operations to hedge against risk.

Intent. The intent of special operations may focus on exercising leverage, creating indirection, or gaining or destroying an opponent's key capabilities. *Leverage* implies the tactical use of force to gain an operational advantage. SOF typically exert leverage in military operations when they seize assets crucial to the further conduct of operations, such as the Salines Airport during Urgent Fury or the Torrijos/Tocumen and Rio Hato airfields during Just Cause. *Indirection* implies diverting an opponent's combat power or weakening its sources. Anglo-American support for the Resistance in France and the Partisans in Yugoslavia

struck indirectly at Germany's power during World War II (WWII). *Key capabilities* might be command and control, communications, or weapons of mass destruction. In contrast, commanders of large general-purpose forces plan to attain decisive success or victory through their operations. Of course, they may use the stratagems cited for SOF, but their fundamental intent is to compel a decision, normally through defeat of the opposing force.

Force Characteristics

Reflecting the contrasts in typical employment, SOF also differ from general-purpose forces in personnel, equipment, training, and size, as summarized in Figure S.2.

Personnel. From their inception to the current time, U.S. SOF have been a rigorously selected elite. For example, the Basic Underwater Demolition/Sea-Air-Land (SEAL) (BUD/S) training course is so difficult that only a minority of students in a given class will graduate at the same time. BUD/S includes a "Hell Week" that pushes them to their absolute limits while constantly offering them the opportunity to resign. For the most part, general-purpose forces try to attract and retain personnel who reflect a national average. General-purpose forces include elite elements, such as fighter pilots, but these are exceptions.

Equipment. SOF use highly modified versions of standard equipment and items that are uniquely procured. For particular operations, SOF may also procure nonstandard items through civilian suppliers. By contrast, most equipment used by general-purpose forces is type-classified and standardized to facilitate maintenance, resupply, and training on a large scale.

Training. SOF training is usually joint and often combined with that of foreign forces. The organization of USSOCOM as a unified command with service components reflects the need for joint operations. SOF often train together with foreign forces in the areas where they may have to operate. Of course, general-

	Special Operations Forces	*General-Purpose Forces*
Personnel	Exceptional motivation and ability	National average
Equipment	Highly modified, uniquely procured	Standardized
Training	Joint; often with foreign forces	Service; usually with national forces
Size	Groups, regiments, wings	Armies, numbered air forces, fleets

Figure S.2—Force Characteristics: SOF and General-Purpose Forces

purpose forces also conduct joint training and undertake large-scale exercises with allied forces, but most training is service-specific and conducted within a national force.

Size. Relative size is the most obvious difference between SOF and general-purpose forces. The typical operations and character of SOF dictate a small force. Even if desirable, it would be impractical to create large SOF. It is inherently simpler to raise and equip general-purpose forces because they are composed of average personnel and standardized equipment. Moreover, general-purpose forces must be large if they are to sustain losses against comparably armed opponents and still accomplish their missions.

Inadequate Coverage

Currently used models are inadequate to analyze SOF contributions. With few exceptions, they cover only aspects of reconnaissance and combat in the context of larger operations by general-purpose forces. The theater-level models tend to focus on attrition and movement of the forward line of own troops (FLOT) as the outputs of large-scale battles. They offer little assessment of the extended effects characteristic of special operations. *Extended effects* occur when SOF act at the tactical level but influence the operational level and even the strategic level.

At the *tactical level,* units accomplish tasks directly related to engagements and battles. At the *operational level,* formations achieve campaign and operational objectives, e.g., achieve air supremacy or sea control. At the *strategic level,* national forces accomplish national security objectives, e.g., secure a free and independent nation.

The statements about currently used models are not intended to be pejorative. Most of the operational-level and theater-level models were designed to analyze entire campaigns against the Warsaw Pact or to support command-post exercises at division, corps, and joint task force levels. In most cases, special operations appear as enhancements to the original model, if they are handled at all. Moreover, some SOF tasks are not amenable to modeling in the current state of the art. Figure S.3 summarizes coverage of SOF tasks by models currently in use.

Trends in computer-based modeling may be more hospitable to special operations. During the Cold War, U.S. defense planning was dominated by the NATO Central Front, characterized by very large conventional battles and likely use of nuclear weapons on a large scale. In the security environment after the end of the Cold War, planning centers on major regional contingencies (MRC) and lesser regional contingencies (LRC) that are likely to require rapid

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National-Level Tasking		Large-Force Operations						Guerrilla Warfare	
Model	Counter-terrorism	Beach reconn	Strike reconn	Conven forces reconn	Destroy key assets	Occupy key facilities	Recover personnel, materiel	Support insurgency	Suppress insurgency
CBS			explicit	explicit	explicit	explicit			
CEM									
CFAW				explicit	explicit				
CTLS									
Eagle									
ENWGS		scripted							
ITEM									
Janus					explicit	explicit			
JCM				explicit	explicit	explicit			
JTLS			explicit	explicit	explicit	explicit			
Panther									explicit
RDSS									implicit
RSAS-ITM					explicit	explicit			
SEES					explicit	explicit			
TAC RAM									
TAC THUNDER									
TACWAR									
TWSEAS-M		scripted	explicit	explicit					
TAM									

NOTE: See "Contexts for Employment of SOF" for definitions of the headings "National-Level Tasking," "Large-Force Operations," and "Guerrilla Warfare." Subheadings are defined as follows: "reconn": "beach reconn" = hydrographic reconnaissance in support of amphibious operations; "strike reconn" = strike reconnaissance including target designation; "conven forces reconn" = reconnaissance directed against opposing general-purpose forces.

Figure S.3—Coverage of Tasks

commitment of U.S. forces in operations that complement the efforts of regional allies. Analysis of regional contingencies raises modeling issues, such as intelligence, command and control, deep battle, maneuver, and forced entry,[1] that were slighted when the Central Front dominated planning but that are of strong interest to planners of special operations.

Framework for Analysis of SOF Contributions

This report documents work on Phase Two of the project "Analysis of Special Operations Forces in Decision Aids." Phase Two comprises two tasks, Tasks 3 and 4. Task 3 required RAND to develop a construct for analysis of SOF contributions. This framework postulates a *hierarchy of objectives* that provides

[1] *Forced entry* means deploying military forces into enemy-held territory under combat conditions. The usual means are airborne, heliborne, and amphibious assault, often in combination.

the rationale for SOF employment and criteria to evaluate SOF contributions. It identifies four *contexts* for SOF employment that imply different applications of the hierarchy to analysis.

Hierarchy of Objectives

Military operations are conducted to accomplish objectives in a hierarchy that extends from national goals to employment concepts. This hierarchy is presented in Figure S.4.

National goals are rooted in the historical experience of the nation and find expression in fundamental documents such as the *Declaration of Independence*. *National security objectives* are contained in broad statements of American strategy that integrate political, economic, and military objectives. SOF may contribute directly to attainment of national security objectives when they receive national-level tasking. *National military objectives* are expressed in the president's annual statement of national security strategy and in *Defense Guidance* issued by the secretary of defense. *Campaign objectives* are framed by the commander of a joint task force or the commander in chief (CINC) of a unified command. They express his intentions developed from an overall campaign strategy. *Operational objectives* are developed within the headquarters of the combatant command, usually by component commanders. *Operational tasks* are general descriptions of actions taken by military forces.

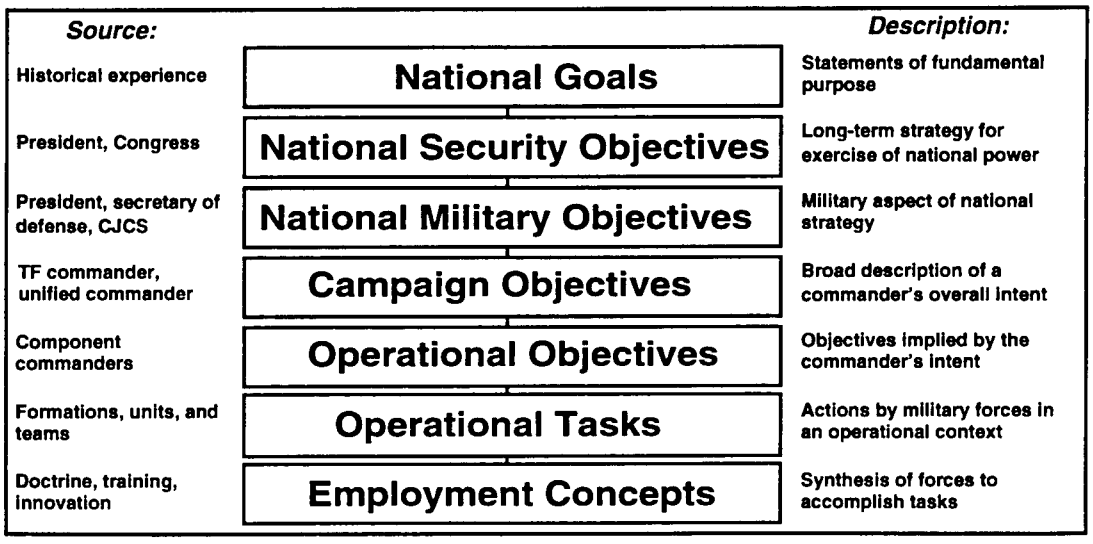

Figure S.4—Hierarchy of Objectives

An *employment concept* has five elements: (1) *surveillance*—the process of acquiring raw intelligence data; (2) *assessment*—refinement, correlation, and analysis of raw intelligence to produce usable intelligence; (3) *control and coordination*—overall planning and direction, including the real-time control of forces; (4) *mission preparation*—specialized training, rehearsal, and positioning of forces to execute the task; and (5) *mission execution*—insertion, combat action, and recovery. SOF employment concepts can be extremely complex, as shown by the Son Tay Raid, outlined in Figure S.5.

Contexts for Employment of SOF

Special operations forces should be analyzed and modeled within four contexts that differ in the level of objectives within the hierarchy, command and control arrangements, and the missions or tasks typically performed. These differences imply different demands on analysis and modeling. The first three contexts can be reasonably well bounded; the fourth captures a miscellany of collateral activities. Figure S.6 summarizes these contexts.

A *national-level tasking* implies that the National Command Authority (NCA) directs the Commander in Chief, U.S. Special Operations Command (USCINCSOC), who may designate an operational command, such as Joint Special Operations Command (JSOC). The objectives will often be political or psychological, rather than military. SOF typically perform counterterrorism in this context, but might perform any task.

In *large-force operations*, special operations are integrated into campaigns and operations conducted primarily by general-purpose forces. SOF help to attain

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Surveillance	**National collection means, SR-71, Buffalo Hunter drones, prisoners' mail, human agents**
Assessment	**Radar coverage, opposing air activity, weather conditions, guards, reaction forces, configuration of compound, condition of prisoners**
Control	**JCS (Special Assistant for Counterinsurgency and Special Activities) → mission commander (Monkey Mountain) → raid commander**
Preparation	**Assault group rehearsal on full-scale mock-up at Eglin AFB; full flight profiles rehearsed over continental United States**
Execution	**Insertion by HC-130 (refueling), MC-130 (navigational assistance), A-1 (fire support), HH-53, HH-3 aircraft; controlled crash of HH-3; diversion flown by carrier-based aircraft; SF assault force equipped with specially procured small arms, special goggles, and night-vision devices**

Figure S.5—Employment Concept: Son Tay Raid

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Context	Objectives	Command and Control	Missions or Activities
National-Level Tasking	Set by NCA; may be political, military, economic, or psychological objectives.	NCA directs USCINCSOC, who designates an operational commander.	Often counterterrorism, but may be any mission.
Large-Force Operations	Set by JTF or theater commander; primarily military objectives.	NCA → JTF or theater commander → SOC commander → tactical-level commanders.	Usually reconnaissance and combat actions integrated into larger operations by general-purpose forces.
Guerrilla Warfare	Set by interagency authority or regional military commander; political, military, economic, and psychological objectives.	Example of Vietnam conflict: NCA → CINCPAC → Military Assistance Command, Vietnam (MACV).	Usually insurgency or counterinsurgency assisting indigenous forces.
Other Use	Set by various authorities; may be political, military, economic, psychological, or humanitarian objectives.	Wide range of possible relationships involving NCA, JTF or theater commander, interagency task force, alliance, or international organization.	Collateral activities: security assistance; humanitarian aid; antiterrorism; counterdrug operations; search and rescue; civic action; noncombatant evacuation; peacekeeping; show of force.

Figure S.6—Contexts for Employment of SOF

the military objectives set by the commander in chief of a unified command or a joint task force (JTF) commander. In this context, SOF typically perform reconnaissance and combat.

When *guerrilla warfare* is involved, objectives are typically set through an interagency effort, although there may be an exclusively military chain of command. In this context, SOF make a basically military contribution toward objectives that are likely to be more political, economic, social, and psychological than military. SOF can assist insurgents or contribute to counterinsurgency, depending on U.S. strategy.

Other use captures miscellaneous collateral activities that SOF perform because of their special capabilities. Objectives are set by a variety of authorities, including international organizations supported by the United States. These objectives may be political, military, economic, psychological, or humanitarian.

Categorizing Tasks

To what extent can models in the current state of the art support analysis required for resource-allocation decisions? Currently and in the foreseeable future, some SOF tasks cannot be usefully modeled for resource-allocation decisions because they are dominated by uncertainty or are too poorly understood. They are *dominated by uncertainty* when the range of plausible inputs is so large that the outputs will not be useful. *Poor understanding* implies an

inability to devise or justify algorithms, to define variables, or to discover values for those variables that can be defined.

National-Level Tasking and Large-Force Operations

Figure S.7 categorizes those tasks typically associated with national-level tasking and large-force operations. It distinguishes detailed modeling at the tactical level from aggregated modeling at the operational level. *Detailed modeling* means that actual forces, e.g., an individual SEAL team, are represented realistically. *Aggregated modeling* means that the effects of special operations, e.g., advantages obtained through hydrographic reconnaissance, are represented by parameters or simple algorithms.

The tasks associated with counterterrorism cannot be usefully modeled to support resource-allocation decisions. Rescue and recovery are dominated by uncertainty of time and place, national objectives, personnel or materiel to be recovered, threats posed by terrorists and governments that support terrorism, support from friendly governments, and employment concepts. Attack on terrorist infrastructure is not amenable to modeling because the character and extent of terrorist infrastructures are poorly understood or cannot be anticipated, especially those for future threats. It is also unclear what SOF actions would be politically acceptable and how these actions would affect terrorism.

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Description of Task	Can Be Usefully Modeled		Cannot Be Usefully Modeled	
	Detailed, tactical level	Aggregated, operational level	Dominated by uncertainty	Too poorly understood
Rescue hostages and recover sensitive materiel			X	
Attack terrorist infrastructure				X
Conduct geo- and hydrographic reconnaissance		X		
Conduct target acquisition	X	X		
Conduct post-strike reconnaissance		X		
Conduct conventional-force reconnaissance		X		
Destroy key assets	X	X		
Occupy key facilities	X	X		
Capture or recover personnel and materiel			X	

Usually national-level tasking

Usually integrated into large-force operations

Figure S.7—Categorizing Whether SOF Tasks Can Be Modeled for Resource-Allocation Decisions: National-Level Tasking and Large-Force Operations

Some of the tasks associated with reconnaissance and combat can be usefully, although not exhaustively, modeled at the tactical (task) level. However, tactical-level modeling will not reveal the leverage SOF exerts at the operational (theater) level. Nor is there any prospect that the outputs of tactical-level modeling can be applied to the operational level without the exercise of expert human judgment outside the model.

Guerrilla Warfare

Figure S.8 categorizes tasks typically associated with guerrilla warfare. These tasks are less amenable to modeling of any character than those associated with reconnaissance and combat, because guerrilla warfare is less well understood.

All tasks characteristic of insurgency are dominated by uncertainty or are poorly understood. It is impossible to forecast the conditions under which these tasks might be performed, especially specifics of the training, equipment, military aptitude, and morale of the indigenous forces that would play the major role. Since World War II, U.S. forces have seldom fought on the insurgent side, with a consequent lack of data to support analysis of insurgency. Intelligence collection, especially the accuracy, comprehensiveness, and timeliness of all-sources intelligence, is too poorly understood to permit modeling.

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Description of Task	Can Be Usefully Modeled		Cannot Be Usefully Modeled	
	Detailed, tactical level	Aggregated, operational level	Dominated by uncertainty	Too poorly understood
Collect intelligence against a government				X
Perform escape and evasion			X	
Conduct subversion				X
Accomplish sabotage			X	
Engage government forces using guerrilla tactics			X	
Collect intelligence against an insurgency				X
Perform civic action to support a government			X	
Train friendly government forces			X	
Interdict insurgent routes		X		
Destroy insurgent bases and forces		X		

☐ Usually integrated into large-force operations or guerrilla warfare ☐ Usually guerrilla warfare

Figure S.8—Categorizing Whether SOF Tasks Can Be Modeled to Support Resource-Allocation Decisions: Guerrilla Warfare

Modeling Priorities for SOF

Considering the poor coverage of SOF contributions by current models and the inherent limitations of modeling, it is important to establish priorities for modeling efforts (Task 4). Large-force operations should have priority for modeling because this context:

- Reflects the focus of overall U.S. planning.
- Tends to drive force requirements.
- Demonstrates leverage inherent in special operations.
- Is more amenable to modeling than the other contexts.

Within this context, priority should go to critical objectives and their related tasks, to which SOF can make important contributions. Examples might include:

- Destroy and suppress mobile weapon systems:
  — Destroy ground mobile ballistic missile launchers.
  — Destroy ground mobile cruise missile launchers.

- Prevent proliferation of weapons of mass destruction:
  —Interdict shipment of associated technology and materials.
  —Conduct preemptive strikes on related facilities.

- Neutralize existing weapons of mass destruction:
  —Destroy research facilities and kill or recover expert personnel.
  —Destroy factories and storage sites.
  —Locate and destroy fixed and mobile delivery systems.
  —Degrade associated command and control.

- Destroy and degrade opposing command and control of general-purpose forces.
- Conduct reconnaissance and combat to support forced entry.
- Conduct reconnaissance against targets not well covered by national assets.
- Destroy and suppress opposing air defense.

These priorities encompass tasks that will be critical to regional contingencies for the foreseeable future. It is unlikely that the United States can completely solve the problems in target acquisition posed by mobile launchers without recourse to special operations. And potential adversaries will probably field cruise missiles to circumvent tactical ballistic missile defenses. Weapons of mass destruction are

likely to pose an increasingly severe threat to deployed U.S. forces. Under some circumstances, threat alone might have a decisive influence by intimidating a regional ally. SOF has traditionally played an especially large role in forced entry, including reconnaissance and combat actions against opposing forces in the objective area.

Rationale for SOF

Military modeling, often adduced to support resource-allocation decisions for general-purpose forces, fails to support analysis of SOF contributions because SOF and general-purpose forces are fundamentally different. General-purpose forces generate sustained combat power to defeat opposing forces and thus gain control of aerospace, sea, and land. In contrast, SOF cannot gain control because they cannot defeat general-purpose forces, except in brief, localized engagements. Why, therefore, should the United States develop expensive elite forces that generate little sustained combat power? The rationale includes leverage, unique capabilities, audacity, flexibility, low visibility, and guerrilla warfare.

Leverage

SOF offer good return on investment when they exert leverage, i.e., when they avert losses to general-purpose forces by eliminating an opponent's capability or seizing a key objective.

Unique Capabilities

Sometimes a target is so inaccessible or elusive that only SOF can attack it or even identify it. For example, during Desert Storm, the Iraqi Scud missiles proved so elusive that only SOF could identify them consistently.

Audacity

U.S. forces may have just one opportunity to accomplish an intricate, risky operation in which even a small mistake can cause failure. Eagle Claw and Pacific Wind were operations of this type. To accomplish such risky operations, the United States requires not only SOF but also a command structure that ensures special operations are well planned, rehearsed, and controlled.

Flexibility

Flexibility enables a commander to confront the opponent with disparate threats, to recover from setbacks, and to make optimal allocations of force. During Desert Storm, USCINCCENT had the option of employing MH-53J Pave Low and AH-64 Apache against radars on the border of Iraq. SOF were an optimal choice for performing this task because they could report with high certainty and in real time that those early-warning radars were destroyed.

Low Visibility

Because SOF are less visible than general-purpose forces, they entail less risk of escalation and may be more acceptable to friendly governments.

Guerrilla Warfare

Guerrilla forces employ the tactics of special operations, including stealth, surprise, and highly selective combat, although they usually lack the specialized equipment and training that distinguish SOF. General-purpose forces are too ponderous to respond effectively without causing extensive collateral damage, i.e., damage to persons and things other than the intended targets. In any situation that involves unconventional tactics, SOF are the force of choice.

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Acronyms, Abbreviations, and Code Names

ACES	Air Force Command Exercise System: hexagon-based, theater-level wargame developed at Air University
AFSAA	Air Force Studies and Analysis Agency
ASD (SO/LIC)	Assistant Secretary of Defense (Special Operations and Low-Intensity Conflict)
ATCAL	Attrition Model Using Calibrated Parameters
ATGM	Anti-tank guided missile
AWACS	Airborne Warning and Control System
BUD/S	Basic Underwater Demolition/SEAL
CA	Civil affairs
CAA	U.S. Army Concepts Analysis Agency
CADEM	Calibrated Differential Equation Methodology
CAP	Combat air patrol
CBS	Corps Battle Simulation: highly interactive hexagon-based exercise driver sponsored by NSC
CEM	Concepts Evaluation Model: autonomous, piston-style theater-level model sponsored by CAA
CFAW	Contingency Force Analysis Wargaming: highly interactive, hexagon-based operational-level combat model sponsored by CAA
C^3I	Command, control, communications, and intelligence
CINC	Commander in chief
CJCS	Chairman, Joint Chiefs of Staff
CONAF	Conceptual Design for the Army in the Field (now CEM I)
CONUS	Continental United States
CORDS	Civil Operations and Revolutionary Development Support, established under MACV in 1967

CPX	Command-post exercise
CT	Counterterrorism
CTLS	Current Theater-Level Simulation
DA	Direct action
Desert Storm	Code name for Coalition operations against Iraq, 17 January through 28 February 1991
DoD	Department of Defense
DPRK	Democratic People's Republic of Korea
DSP	Defense Support Program
Eagle	An object-oriented, operational-level combat model under development by TRADOC Analysis Command
Eagle Claw	Code name for the special operation that attempted to free American hostages in Iran, 24–25 April 1980
Eastern Exit	Code name for the evacuation of U.S. citizens from Somalia of 1991
ENWGS	Enhanced Naval War Gaming System: interactive, operational-level model of naval warfare sponsored by Space and Naval Warfare Systems Command
EW	Early warning
FID	Foreign internal defense
FLOT	Forward line of own troops
FTX	Field training exercise
GCI	Ground-controlled intercept
GPS	Global Positioning System
HARM	High Speed Anti-Radiation Missile
HUMINT	Human intelligence
INS	Inertial navigation system
ITEM	Integrated Theater Engagement Model: object-oriented theater-level model under development by SAIC under sponsorship of Defense Nuclear Agency

Janus	A tactical-level combat model developed by Lawrence Livermore and named after the Roman god
JCM	Joint Conflict Model: a further development of Janus sponsored by the Joint Warfare Center
JDAM	Joint Direct Attack Missile
Jedburgh	Code name for uniformed SOE teams operating in occupied France; derived from their radio sets
JSOC	Joint Special Operations Command
JSOW	Joint Standoff Weapon: a program to develop an unpowered glide vehicle with INS/GPS guidance
JSPS	Joint Strategic Planning System
JSTARS	Joint Surveillance and Target Attack Radar System
JTF	Joint task force
JTLS	Joint Theater Level Simulation: highly interactive, hexagon-based exercise driver used by JWC
Just Cause	Code name for the U.S. intervention in Panama, December 1989
JWC	Joint Warfare Center
KTO	Kuwait Theater of Operations
LIC	Low-intensity conflict
LRC	Lesser regional contingency
MACV	Military Assistance Command, Vietnam
MARCENT	Marine component of Central Command
MEF	Marine Expeditionary Force: a task force built around divisions and air wings
MEU(SOC)	Marine Expeditionary Unit (Special Operations Capable): a task force built around a battalion landing team and an aviation squadron
MFP	Major Force Program
MLRS	Multiple-launch rocket system
MRC	Major regional contingency

NATO	North Atlantic Treaty Organization
NAVCENT	Naval component of Central Command
NCA	National Command Authority
NG	National Guard
NSC	National Simulations Center
NTC	National Training Center
ODS	Operation Desert Storm
OSS	Office of Strategic Services: formed in WWII
Pacific Wind	Code name for operation to recover embassy personnel from Kuwait City prior to Desert Storm
Panther	Hybrid exercise driver for guerrilla warfare sponsored by NSC and USSOUTHCOM; replaced by Victors
Pascal	A general-purpose programming language named for the seventeenth-century French mathematician Blaise Pascal
PLO	Palestine Liberation Organization
PPBS	Planning, Programming, and Budgeting System
Provide Comfort	Code name for U.S. operation to offer humanitarian assistance in Turkey and Iraq, 1991
PSYOP	Psychological operations
RDSS	Regional Development Simulation System: simulation of political, economic, social, and military affairs in a single country under development by Booz-Allen & Hamilton for the Joint Staff
ROK	Republic of Korea
RSAS-ITM	RAND Strategy Assessment System—Integrated Theater Model: semi-autonomous model of global nuclear and conventional war used primarily by war colleges and universities. In February 1994, RSAS-ITM was renamed the Joint Integrated Contingencies Model
SAIC	Science Applications International Corporation
SAM	Surface-to-air missile
SAS	Special Air Service: branch of British SOF

SATCOM	Satellite communications
SBS	Special Boat Service: branch of British SOF
SBU	Special Boat Unit: a unit operating small craft in support of SEAL Teams
Scud	NATO code name for a Soviet tactical ballistic missile
SEAL	Sea-Air-Land: acronym designating U.S. Navy SOF
SEES	Security Exercise Evaluation Simulator
SF	Special Forces
SFOD-A	Special Forces Operational Detachment—Alpha
SHF	Super high frequency
SIGINT	Signals intelligence
SO	Special operations
SOCCE	Special Operations Command and Control Element
SOCCENT	Special Operations Command, Central Command
SOE	Special Operations Executive: British organization formed in WWII
SOF	Special operations forces
SOFPARS	Special Operations Forces Planning and Rehearsal System
SOW	Special Operations Wing
SR	Special reconnaissance
TAC RAM	TAC Resource Allocation Model: a highly aggregated theater-level simulation developed within AFSAA with assistance from Booz-Allen & Hamilton
TAC THUNDER	An operational-level model of air-land warfare developed by CACI Products Company for AFSAA
TACWAR	Tactical Warfare: autonomous, piston-style theater-level model originally developed by Institute for Defense Analysis and sponsored by the Joint Staff

TAM	Theater Analysis Model: highly aggregated theater-level model developed by Booz-Allen & Hamilton and sponsored by the Joint Staff
TCM	Theater Combat Force Requirements Model
TF	Task force
TLC/NLC	Theater Level Campaign/Non-Linear Combat
TRADOC	Training and Doctrine Command (U.S. Army)
TWSEAS-M	Tactical Warfare Simulation, Evaluation, and Analysis System—Modified: a highly interactive exercise driver used by the U.S. Marine Corps
UAV	Unmanned aerial vehicle
UCCATS	Urban Combat Computer Assisted Training System
UN	United Nations
Urgent Fury	Code name for U.S. intervention in Grenada, 25–27 October 1983
USCENTCOM	U.S. Central Command
USCINCCENT	U.S. Commander in Chief, Central Command
USCINCLANT	U.S. Commander in Chief, Atlantic Command
USCINCSOC	U.S. Commander in Chief, Special Operations Command
USSOCOM	U.S. Special Operations Command
USSOUTHCOM	U.S. Southern Command
UW	Unconventional warfare
Victors	Hybrid exercise driver for guerrilla warfare; sponsored by NSC and USSOUTHCOM
Wild Weasel	U.S. Air Force terminology: an aircraft type dedicated to air defense suppression (currently F-4G)
WWII	World War II

1. Introduction

Project Objective

The U.S. Special Operations Command (USSOCOM) is concerned that certain decision aids, especially computer-based models, do not adequately support analysis of special operations forces (SOF) contributions. Of special concern are models currently in use by the Joint Staff, staffs of unified and specified commanders, and service staffs to support the Joint Strategic Planning System (JSPS) and the Planning, Programming, and Budgeting System (PPBS), i.e., to support resource-allocation decisions. The objective of RAND's "Analysis of Special Operations Forces in Decision Aids" project is to recommend ways to better represent SOF capabilities and contributions in such decision aids.

Decision aids include intuition, formulas, simulations, models, and games, but this project focuses on computer-based models. In this context, *model* implies the simulation of military actions, especially combat, that are reasonably well understood but are so complex that analysis will normally consider ranges of outcomes.

Phases of the Project

Work on this project was accomplished in two phases, each containing two tasks. Figure 1.1 depicts the phases of the project and their respective tasks.

Phase One required RAND to identify SOF missions and conduct a survey of currently used decision aids. In Task 1, we characterized SOF missions across the

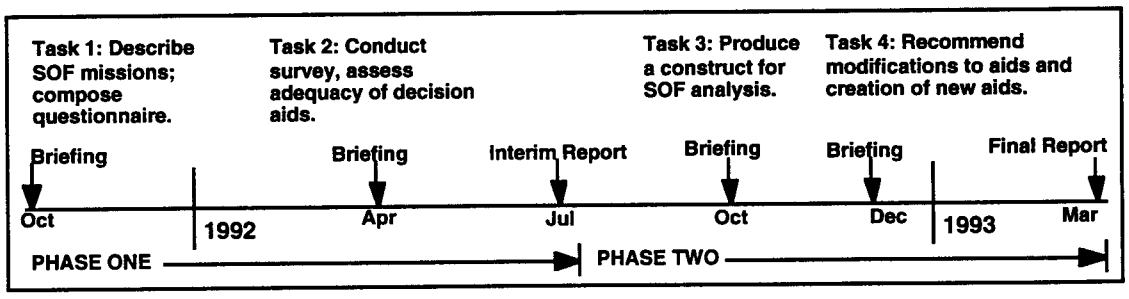

Figure 1.1—Project Timeline

full continuum of conflict, defined the character of each mission, and identified the critical variables for success. With those missions in mind, we composed a questionnaire to support a survey of currently used decision aids. That questionnaire addressed SOF issues within the charter of the organization being surveyed and the available decision aids. For each decision aid, the questionnaire asked for description, documentation (usually contained in user's manuals for mature models), range and frequency of use, data sources, planned upgrades or enhancements, and connectivity to other decision aids. In Task 2, we used the questionnaire to survey organizations concerned with resource-allocation decisions. For each such organization, we conducted the survey on-site, interviewing key personnel, assembling documents, and observing demonstrations. On the basis of the survey answers, we identified current analytic shortfalls for the SOF missions identified in Task 1. We considered not only the representation of SOF in models, but also the inherent ability of models to support analysis of issues important to special operations, such as the command and control of forces.

Phase Two required RAND to develop a framework for SOF analysis and to make recommendations to USSOCOM. In Task 3, we developed a framework for SOF analysis that defined four contexts for employment of SOF. Within each context, we specified a hierarchy of objectives extending from national goals to operational tasks. The hierarchy enables an analyst to identify opportunities for employment of SOF and to evaluate SOF contributions to attaining objectives. Also in Task 3, we sorted tasks into those that can be usefully modeled to support resource-allocation decisions and those that cannot be usefully modeled because they are dominated by uncertainty or are too poorly understood. Within the first category, tasks were further identified as appropriate for detailed modeling at the tactical level and appropriate for aggregated modeling at the operational level. *Detailed modeling* means that actual forces, e.g., an individual SEAL team, are represented realistically. *Aggregated modeling* means that the effects of special operations, e.g., advantages obtained through hydrographic reconnaissance, are represented by parameters or simple algorithms. In Task 4, we reviewed the requirements for modeling that could support analysis on three levels: tactical, operational, and resourcing. Within this framework, encompassing four contexts and three levels of analysis, we recommend a prudent strategy to improve the representation of special operations forces in models.

We accomplished Task 1 during summer 1991 and briefed the results to USSOCOM staff in October. USSOCOM staff subsequently reviewed the briefing for conformity to current U.S. doctrine in special operations and provided

comments. From November 1991 to March 1992, we conducted an on-site survey of decision aids in current use by organizations directly contributing to the PPBS. That survey included the RAND Strategy Assessment System (RSAS) and the Regional Development Simulation System (RDSS), a model under development by Booz-Allen & Hamilton with advice and guidance from RAND. We briefed the results of Task 2 to USSOCOM staff in April 1992. The results of Phase One were reported in *Analysis of Special Operations Forces in Decision Aids: Current Shortfalls*, N-3536-SOCOM (1994), by Bruce Pirnie. In October 1992, we briefed USSOCOM staff on the results of Task 3. During the second meeting of the Special Operations Forces Simulations Working Group at USSOCOM Headquarters at MacDill Air Force Base, Florida, in December 1992, we presented a briefing on Task 4. This report summarizes the results of Phase One and presents the results of Phase Two.

Organization of This Report

Section 2 summarizes the results of Phase One. It includes definitions of SOF and of missions performed by SOF; coverage of these missions by decision aids in current use; and evaluation of models, especially their relevance to SOF issues, their suitability for iterative analysis, and their current use in the resource-allocation process.

Section 3 reports the results of Task 3. It presents a framework for SOF analysis and applies that framework in illustrative examples drawn from each of the four broad contexts for special operations. It categorizes SOF tasks according to amenability to modeling that could support resource-allocation decisions.

Section 4 reports the results of Task 4. It outlines an approach to analyzing SOF contributions, specifies modeling priorities, gives an overview of current modeling, and recommends a strategy to improve modeling support for special operations.

Section 5 presents conclusions reached in the course of this project. It describes the exceptional challenges to analysis of SOF contributions, including difficulties at the tactical level, discontinuity between levels, and poorly defined contexts for special operations. It specifies those areas where USSOCOM should expect modeling to provide increasingly useful support. It concludes with a rationale for maintaining elite special operations forces.

2. Previous Research

This section summarizes the results of Phase One. It begins with current doctrine for SOF. It examines why SOF is "special" and offers a new taxonomy for analyzing SOF missions. It then describes coverage of SOF tasks by models in current use and evaluates those models. Our survey revealed that currently used models are inadequate to support analysis of SOF contributions. Shortfalls exist in all areas but are especially acute in counterterrorism and all aspects of guerrilla warfare.

Current Doctrine for SOF

The doctrinal SOF missions, as set forth in official publications, formed a starting point for our inquiry into a framework for analyzing SOF contributions. With the exception of counterterrorism, the doctrinal SOF missions are broad areas of employment, not missions,[1] and they do not provide a useful framework to analyze the contributions of SOF.

Missions

According to official publications, SOF have seven doctrinal or traditional missions: counterterrorism (CT), special reconnaissance (SR), direct action (DA), unconventional warfare (UW), foreign internal defense (FID), psychological operations (PSYOP),[2] and civil affairs (CA).[3] The first five missions inherently or potentially imply some degree of combat; the last two do not.

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[1]In military usage, *mission* has two meanings: (1) a specific combat action assigned to a unit or formation, and (2) the broadly defined purpose of a force or a military service. This discussion assumes the second meaning of the word. For example, a mission of the U.S. Air Force is to gain air supremacy in a theater of operations.

[2]The association of PSYOP with SOF dates to 1952, when the Army concealed the newly created 10th Special Forces Group (Airborne) in the already-existing Psychological Warfare Center at Fort Bragg, South Carolina. The 10th SF Group had the secret mission to encourage resistance in Eastern Europe in the event of a Soviet attack. Charles M. Simpson III, *Inside the Green Berets*, Berkley Books, New York, 1984, pp. 20–21, 35.

[3]They are described as "seven traditional mission areas" in James R. Locher III, Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict (ASD [SO/LIC]) and General Carl W. Stiner, Commander in Chief, U.S. Special Operations Command (USCINCSOC), *United States Special Operations Forces Posture Statement 1993*, U.S. Government Printing Office, Washington, D.C., 1993, pp. 7–8. U.S. Army Special Forces (SF), the largest SOF component, consider the first five to be their primary missions; however, CT is a primary mission only for specially designated SF units. See *Doctrine for Special Forces Operations*, Department of the Army, Field Manual 31-20, April 1990, pp. 3-1–3-5.

Of the five combat missions, only *counterterrorism* actually constitutes a mission. The remaining four are not missions but rather activities or broad areas of employment. Reconnaissance is a basic activity performed by *all* combatant forces. Adding the adjective *special* creates a tautology: *special* reconnaissance is performed by *special* operations forces. Direct action is a very vaguely described activity that could be ascribed to any combatant force. In practice, the distinction between *special reconnaissance* and *direct action* is often trivial. For example, when members of the British Special Boat Service (SBS) destroyed a segment of buried communications cable during Desert Storm, they also recovered a sample for analysis. In this instance, they simultaneously performed *special reconnaissance* (by recovering a sample) and *direct action* (by destroying a segment).

Taken literally, unconventional warfare is not a mission specific to SOF but a context that typically involves a wide range of forces. Not only SOF but also general-purpose forces,[4] militias, paramilitary forces, police, and irregular forces are typically involved. All these forces will usually attempt to adapt to the conditions of such conflict. Foreign internal defense is unconventional warfare seen from the perspective of an established government trying to cope with lawlessness and insurgency. From an operational perspective, the distinction between *unconventional warfare* and *foreign internal defense* is merely formal when SOF defend an established government by using guerrilla tactics, as U.S. Army Special Forces (SF) did during the Vietnam conflict.

Collateral Activities

SOF contribute their special capabilities to other areas, variously described as "collateral activities" or "missions" in their own right.[5] Some of these areas are closely related to traditional missions, but others are not. Examples include:

- Security assistance
- Humanitarian aid and disaster relief
- Antiterrorism

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[4]*General-purpose forces* is used in preference to *conventional forces* because the latter is ambiguous in U.S. usage. *Conventional forces* can mean both non-nuclear forces and forces equipped and trained to fight conventional wars. *General-purpose forces* refers to non-nuclear forces of all services that are not designated as SOF, i.e., subordinated to USSOCOM. Thus, a Marine Expeditionary Unit (Special Operations Capable) [MEU(SOC)] is a general-purpose force.

[5]The 1993 *Posture Statement* (Locher and Stiner, pp. 7 and 32–33) lists six "collateral activities": security assistance, humanitarian assistance/disaster relief, counterdrug, personnel recovery, counterproliferation, and peacekeeping. It also offers seven "missions for the 1990s": humanitarian assistance and disaster relief, peacekeeping, counterproliferation, combatting drugs, combatting terrorism, security assistance, and personnel recovery. These lists of "activities" and "missions" appear to be identical, except that "combatting terrorism" does not appear as an "activity."

- Counterdrug operations
- Search and rescue
- Civic action
- Noncombatant evacuation
- Counterproliferation efforts
- Peacekeeping
- Show of force.

This list may not be exhaustive; in some novel situation, the United States may find a new employment for SOF. Moreover, some of these areas, such as counterproliferation and peacekeeping, are not well defined. Counterproliferation might involve verification measures as well as interception of shipments, and actions ranging from reconnaissance to combat. With the partial exception of counterdrug operations, none of the collateral activities was covered by any model encountered during our survey.

What Is "Special" About SOF?

The sobriquet "special" is traceable to British usage during World War II. Early in the war, the British formed a Special Operations Executive (SOE) to handle teams conducting intelligence collection and sabotage. The U.S. counterpart became the Office of Strategic Services (OSS). Colonel Aaron Bank, who founded U.S. Special Forces, had taken part in combined SOE/OSS operations in Europe and OSS operations in Indochina.[6] In September 1950, a Special Activities Group was formed within the United Nations Command to prepare certain units for employment in Korea. These units eventually included seven Ranger companies attached to infantry divisions that saw service until August 1951, when all were inactivated. The qualities that make SOF "special" can be discerned by contrasting their *typical employment* and *force characteristics* with those of general-purpose forces.

[6]Bank parachuted into occupied France as part of a Jedburgh team. (Jedburgh teams were formed to assist the resistance in occupied Europe and were named after the type of radio the teams employed.) He later parachuted into Indochina, where he contacted the resistance to the French, including Ho Chi Minh, whom he found friendly to Americans. On 19 June 1952, Bank was ordered to activate and command 10th Special Forces Group (Airborne), the first such unit in the U.S. Army. He recruited former OSS operatives and Rangers. The Rangers were an elite light infantry recruited and trained during World War II along the pattern of British Commandos. E. M. Flanagan, Jr., "SF's Father—Truly Something Special," *Army*, June 1993; Simpson, *Inside the Green Berets*, 1984, pp. 18–50.

Typical Employment

With respect to maneuver, combat, acceptable risks, and the usual intent of the commander, special operations forces are employed differently than general-purpose forces. These differences are summarized in Figure 2.1.

Maneuver. SOF typically break contact with friendly forces. They are often inserted into neutral, politically denied, or enemy-held territory and are subsequently recovered. The planning for Eagle Claw was a spectacular example, with forces launching from Masirah Island and the USS *Nimitz* to cross the Iranian desert and hide southeast of Tehran. During raids, they are inserted and recovered quickly, but some tasks may require them to operate for extended periods behind enemy lines. For example, the British Chindits and later the U.S. 5307th Composite Unit operated for months in Japanese-occupied Burma, sustained by airlift.[7]

Even large formations of general-purpose ground forces maintain continuous contact with other friendly forces. Such contact is required to secure flanks and to ensure an uninterrupted logistics flow. Envelopment by opposing forces is undesirable; encirclement is usually fatal, as it was for the German Sixth Army in February 1942 and for Iraqi forces in the Kuwait Theater of Operations (KTO) during Desert Storm. Only under exceptional conditions, such as Khe Sanh in Vietnam during 1968, will commanders voluntarily accept an encirclement.

	Special Operations Forces	***General-Purpose Forces***
Maneuver	**Break contact with friendly forces.**	**Maintain contact with friendly forces.**
Combat	**Plan for brief, selective combat.**	**Plan for protracted, inclusive combat.**
Risk	**Accept high risk of failure, loss to force.**	**Hedge, circumvent, reinforce.**
Intent	**Exert leverage, use indirection, attack opponent's key capabilities.**	**Attain decisive success.**

Figure 2.1—Typical Employment: SOF and General-Purpose Forces

[7] A *Chindit* is a fanciful statue of a lionlike figure placed by the Burmese outside their pagodas. This name was given to the Long Range Penetration Group formed and led by Major General Orde Wingate, a highly controversial figure. The Chindits operated in unusually large numbers, at one point some 20,000 men organized into six brigades. In the opinion of the overall commander, Field Marshal William Slim, Wingate's operations diverted too much strength from conventional operations. The 5307th Composite Unit is better known as "Merrill's Marauders," after the commander Brigadier General Frank Merrill. It operated closely with the Kachin Rangers, formed by OSS from Burmese tribesmen. The Marauders and the Rangers were initially successful in harassing regular Japanese troops and forcing them on the defensive. But by the time the siege of Myitkyina in northern Burma was successfully concluded, the Marauders had been rendered almost completely ineffective by malaria, dysentery, and skin diseases contracted in the jungle.

Combat. Commanders of SOF may plan to avoid combat entirely, or they may plan to engage in brief combat (minutes to hours). SOF must disengage before either their resources are exhausted or the opponent can subject them to the greater combat power of general-purpose forces. Combat for SOF is often highly selective with respect to times, places, and targets. For example, during Desert Storm, British Special Air Service (SAS) and U.S. SOF searched areas of western and southern Iraq over extended periods for just one kind of target: extended-range Scud missiles.

General-purpose forces may have to engage in protracted combat (days to weeks) with most or all of an opponent's array. This is not to say that general-purpose forces necessarily fight attrition campaigns. On the contrary, commanders will often plan to defeat the entire opposing force while engaging only portions of it. But, unless one side has an overwhelming advantage, protracted combat must be expected and may be unavoidable. Even during the extremely one-sided Desert Storm, some Coalition general-purpose forces engaged in at least sporadic combat over four days, a longer period than is normally acceptable for a special operation.

Risk. Commanders of SOF accept large risks of failure and loss to their forces. Special operations are notoriously hazardous and have small margin for error. When SOF fail to accomplish a task, there may be no second chance. There was no second chance to recover U.S. prisoners from North Vietnam (Son Tay Raid) or to recover U.S. hostages from Tehran (Eagle Claw). When SOF enter hostile territory, they often risk destruction because they cannot match the sustained combat power of general-purpose forces. On 30–31 January 1944, Ranger Force was almost completely destroyed in a single action at Cisterna in Italy.[8] During Desert Storm, an eight-man SAS patrol was "bounced"[9] in Iraq and, initially, all eight men were missing.[10] On 3 October 1993, approximately 100 Rangers were surrounded in Mogadishu by Somali infantry and suffered over 50 percent

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[8]Rangers were organized into the three-battalion Ranger Force commanded by the legendary Colonel William O. Darby. Two Ranger battalions seized the crossroads town of Cisterna northeast of the Anzio beachhead to spearhead a corps-sized attack. But the attack stalled and never reached Cisterna. The two spearhead battalions were lost, and the third battalion suffered 60 percent casualties trying to reach the encircled Rangers. This catastrophic loss ended Ranger operations in the Mediterranean theater of operations.

[9]A force is said to be "bounced" when it is surprised by a comparable or potentially superior opponent.

[10]One SAS trooper died of hypothermia, two were killed in a firefight, and four were taken prisoner. The remaining man walked some 300 kilometers in seven days, almost without food or water, before reaching Saudi Arabia. During this forced march, he consumed some 40 pounds of body weight. General Sir Peter de la Billière, *Storm Command: A Personal Account of the Gulf War*, Harper-Collins, London, 1992, pp. 235–249.

casualties before mechanized forces reached their position.[11] In operations that promise high gain, commanders accept a high level of risk to SOF. If they did not accept it, they would forfeit many of their opportunities. They try to reduce risk through stealth, surprise, and quick action, thus avoiding or limiting contact with opposing general-purpose forces.

Because general-purpose forces operate on a larger scale, commanders of such forces have ways to overcome tactical reverses, such as the loss of a force element or local failures to accomplish a task. In the planning stage, they normally hedge by providing redundant means, achieving superiority at crucial times and places, maintaining reserve forces, and developing alternative courses of action. When tactical failure occurs, they can often circumvent it by shifting their attacks, or they can reinforce to obtain better results. In contrast to commanders of SOF, commanders of general-purpose forces do not normally accept the risk that an entire force could be destroyed. The fortunes of war are such that entire armies and fleets may be lost anyway, but commanders typically plan their operations to hedge against risk.[12] Identification of extraordinary risk usually implies that the concept of operations needs revision.

Intent. The focus of special operations may be on exercising leverage, creating indirection, or striking at an opponent's key capabilities. *Leverage* implies the tactical use of force to gain an operational advantage. SOF typically exert leverage in military operations when they seize assets crucial to the further conduct of operations, such as the Salines Airport during Urgent Fury (Grenada) or the Torrijos/Tocumen and Rio Hato airfields during Just Cause (Panama). *Indirection* implies diverting an opponent's combat power or weakening its

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[11]On the afternoon of 3 October 1993, Rangers conducted a heliborne assault using fast rope to capture supporters of Mohamed Farah Aidid in the Olympic Hotel in southern Mogadishu. (*Fast rope* is a rappelling technique that resembles a controlled fall.) Two MH-60 helicopters were shot down by ground fire. The Rangers secured one crash site, but were surrounded by Somali militia using light weapons. The Rangers held their position until relieved by 10th Mountain Division soldiers mounted in Soviet-made armored scout cars operated by Malaysian troops. By that time, the United States had lost 102 men—18 killed and 84 wounded. Somali leaders subsequently announced that 312 Somalis were killed and 514 wounded. This action led to a cease-fire followed by a unilateral U.S. decision to remove all troops from Somalia by 31 March 1994. *Washington Post*, 7 October 1993, pp. A1, A42–A43; Dennis Steele, "Mogadishu, Somalia: The Price Paid," *Army*, November 1993, pp. 25–26; and Rick Atkinson, "Night of a Thousand Casualties," *Washington Post*, 31 January 1994, pp. 1, 10–11.

[12]Catastrophic losses do not imply that the concept of operations was intentionally risky. On the contrary, they may ensue while plans intended to minimize risk are being implemented, as happened to the Germans during the latter phases of World War II. Adverse to risk and suspicious of his commanders, Hitler insisted that they conduct fanatic defense on all fronts. This highly unimaginative strategy of defending everywhere did not prevent catastrophic losses and may even have hastened them, especially in Belorussia and the Ukraine. There are exceptions to the rule that commanders of general-purpose forces try to avoid incurring large risks. Erwin Rommel's handling of the *Afrikakorps* was an exception, but Africa was a minor theater. More pertinent examples can be drawn from Israeli operations in the Six Day War (1967) and the Yom Kippur War (1973). In these wars, Israel had to conduct daring operations to break a circle of less skillful opponents before Israeli resources could be exhausted.

sources. Anglo-American support for the Resistance in France and the Partisans in Yugoslavia struck indirectly at Germany's power during World War II. *Key capabilities* might be command and control, communications, or weapons of mass destruction. On 23 January 1991, members of the British Special Boat Service flew in MH-47E helicopters to a site some 60 miles south of Baghdad, where they removed a sample of communications cable for analysis and used charges to destroy a large segment of the cable.[13] This action affected landline communications from Baghdad to Iraqi forces in the KTO. In each case, the intent is to realize an important gain through the action of a relatively small force while avoiding combat against the opponent's main force. The intent seldom is to achieve decisive success.[14]

Commanders of large general-purpose forces plan to attain decisive success or victory through their operations. Of course, they may use the stratagems cited for SOF, but their underlying intent is to compel a decision, normally through defeat of the opposing force. From their perspective, SOF appear as one means among others to this end.

Force Characteristics

Reflecting the contrasts in typical employment, SOF also differ from general-purpose forces in personnel, equipment, training, and size, as summarized in Figure 2.2.

Personnel. From their inception to the current time, U.S. SOF have been a rigorously selected elite. During World War II, the Ranger battalions were raised by encouraging men to volunteer from line outfits, selecting the most promising

	Special Operations Forces	*General-Purpose Forces*
Personnel	**Exceptional motivation and ability**	**National average**
Equipment	**Highly modified, uniquely procured**	**Standardized**
Training	**Joint; often with foreign forces**	**Service; usually with national forces**
Size	**Groups, regiments, wings**	**Armies, numbered air forces, fleets**

Figure 2.2—Force Characteristics: SOF and General-Purpose Forces

[13]De la Billière, *Storm Command*, pp. 222–223.

[14]As an exception, SOF might expect decisive success against opponents with very small or primitive forces. But even in such instances, it is prudent to back SOF with general-purpose forces, as Urgent Fury and recent operations in Somalia suggest. U.S. armored or mechanized forces could have responded promptly and effectively when Rangers became too heavily engaged in Mogadishu on 3 October 1993.

volunteers, then reducing their numbers through very arduous training. The Basic Underwater Demolition/Sea-Air-Land (SEAL) (BUD/S) training course is so difficult that only a minority of students in any given class will graduate at the same time. BUD/S includes a "Hell Week" that pushes them to their absolute limit while constantly offering them the opportunity to resign. In imitation of SAS, Colonel Charlie A. Beckwith capped his selection process with a 74-kilometer land navigation problem, done individually over rugged terrain in 20 hours. The point was to see if a candidate had enough determination to keep the pace when alone and utterly exhausted.[15]

General-purpose forces include some elite elements, such as fighter pilots, but they are exceptions. Some large groups, such as Army airborne soldiers or Marine infantry, consider themselves elite relative to comparable groups elsewhere, but their selection processes are less exclusive than those employed for SOF. For the most part, general-purpose forces try to attract and retain personnel who reflect the national average. A person is expected to succeed through average determination and talent as enhanced by training.

Equipment. SOF use highly modified versions of standard equipment and items that are uniquely procured. Modified equipment includes SOF versions of H-6, H-60, H-53, and C-130 aircraft. Uniquely procured items include communications equipment, laser markers, and intelligence support systems found only in SOF. For particular operations, SOF may also procure nonstandard items through civilian suppliers. In preparation for the Son Tay Raid, the raiders bought heavy knives, oxygen–acetylene torches, bolt cutters, chain saws, head lamps, goggles, shotguns, and night sights from civilian companies.[16] By contrast, most equipment used by general-purpose forces is type-classified and standardized to facilitate maintenance, resupply, and training on a large scale. Of course, if the situation demands, general-purpose forces may also rush developmental equipment into the field, for example, the Joint Surveillance and Target Attack Radar System (JSTARS) during Desert Storm.

Training. SOF training is usually joint and is often combined with foreign forces. To prepare for insertion and recovery, Rangers and Special Forces groups train extensively with supporting aviation. SEALs train not only for seaborne insertion, but also for airdrop using advanced parachuting techniques. To compensate for their lack of sustained combat power, SOF are especially well trained in all aspects of target designation and close air support. The

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[15]Charlie A. Beckwith and Donald Knox, *Delta Force*, Harcourt Brace Jovanovich, New York, 1983, pp. 131–132.

[16]Benjamin F. Schemmer, *The Raid*, Harper & Row, New York, 1976, pp. 117–126.

organization of USSOCOM as a unified command with service components reflects this need for joint operations. When appropriate, SOF train together with foreign forces in the areas where they may have to operate. Of course, general-purpose forces also conduct joint training and undertake large-scale exercises with allied forces, but most training is service-specific and conducted within a national force. U.S. Army general-purpose forces, for example, are concerned primarily with combined-arms (integrated employment of infantry, armor, and artillery) training at local garrisons and the National Training Center (NTC).

Size. Size is the most obvious difference between SOF and general-purpose forces. The typical operations and character of SOF dictate a small force. Even if desirable, it would be impractical to create large SOF.[17] Although U.S. SOF are now larger and more capable than at any previous time, they remain small in comparison with general-purpose forces. In 1992, U.S. SOF had an authorized active-duty strength of 27,397 personnel. Of these personnel, 14,582 were in the Army, 7,530 were in the Air Force, and 4,093 were in the Navy.[18] Army SOF, the largest service component, were small relative to the entire Army, which numbered over 600,000 personnel during the same period. The largest SOF units are Special Forces Groups, 75th Ranger Regiment, 1st Special Operations Wing (SOW), and Naval Special Warfare Groups. However, SOF are normally committed in much smaller increments than their parent organizations. For example, in recent years the Rangers have operated as battalion task forces, not as a regiment, although they were employed as a multibattalion Ranger Force in Italy during WWII.

In contrast to SOF, general-purpose forces are much larger. It is inherently simpler to raise and equip general-purpose forces because they are composed of average personnel and standardized equipment. (Some standard items of equipment, such as stealthy aircraft, nuclear attack submarines, and aircraft carriers, exceed the means of most states.) Moreover, general-purpose forces must be large if they are to sustain losses against comparably armed opponents and still fulfill their missions. The oft-stated U.S. strategy to apply overwhelming force presupposes large, general-purpose forces.

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[17]As an apparent exception, the Democratic People's Republic of Korea (DPRK) is believed to have almost 60,000 personnel assigned to 22 brigades and 7 independent battalions, often referred to as "special operations" or "special purpose" forces. Most of these troops are light infantry designated for unconventional warfare, such as the DPRK conducted in the South prior to 1950. Employment as partisans does not imply that these forces are SOF, any more than Tito's Partisans or the Viet Cong were SOF. But even if the DPRK forces are considered SOF, they are still relatively small compared with an active Army of over 1 million personnel. See Defense Intelligence Agency, *North Korea: The Foundations for Military Strength*, Washington, D.C., October 1991, pp. 4–6 and 51–55.

[18]Locher and Stiner, 1993, p. B-1.

A New Taxonomy

The underlying problem in defining SOF missions is simply that (with the exception of counterterrorism) SOF do not have distinct purposes as do services or branches of a service. *SOF* are military forces that sacrifice sustained combat power for the ability to operate stealthily in neutral, politically denied, or enemy-held territory. They can accomplish any task consistent with their *modus operandi*. In the course of research, we developed a new taxonomy for SOF employment that is logically consistent and useful for analysis. This taxonomy takes into account the doctrinal or traditional missions, but it redefines them consistent with four contexts for the employment of SOF:

National-Level Tasking

SOF perform a task directed by the National Command Authority (NCA). The NCA may direct SOF to perform any task, but in this context they *typically* perform tasks associated with counterterrorism, i.e., rescue hostages, recover materiel, and preempt terrorists by attacking their infrastructure.

Large-Force Operations

SOF help attain objectives set by the commanders of large, general-purpose forces. They perform primarily reconnaissance and combat actions (tasks associated with the traditional missions of special reconnaissance and direct action). In particular, they conduct geographic and hydrographic reconnaissance, strike reconnaissance, post-strike reconnaissance, and reconnaissance directed against opposing general-purpose forces. They destroy key assets, occupy key facilities, and capture or recover personnel and materiel. When SOF occupy key facilities, they are usually relieved by general-purpose forces that generate sustained combat power.

Guerrilla Warfare

SOF assist insurgents (*unconventional warfare*) or help to suppress insurgency (*foreign internal defense*). When they assist insurgents, SOF collect intelligence against an established government, conduct escape and evasion, help to subvert the government, perform sabotage, and directly attack government forces using hit-and-run tactics. When they try to suppress an insurgency, SOF collect intelligence against the insurgents, perform civic and humanitarian actions, train host forces, interdict insurgent routes, destroy insurgent bases, and directly

attack insurgent forces, often using tactics that closely resemble those used by insurgents.[19]

Other Use

SOF perform various collateral activities that make use of their special capabilities. These activities include security assistance, humanitarian aid and disaster relief, antiterrorism, counterdrug operations, search and rescue, civic action, noncombatant evacuation, counterproliferation efforts, peacekeeping, and show of force, but this list may not be exhaustive.

Coverage of Tasks

Our survey provided data to evaluate coverage of tasks by 20 candidate models. Each candidate satisfied at least one of the following criteria:

- Currently supports analysis of alternative force structures
- Simulates theater-level or joint-task-force-level operations
- Explicitly simulates one or more tasks performed by SOF.

The first criterion reflects the project's focus on resource-allocation decisions. The second criterion follows from the insight that SOF effects must be analyzed at operational levels, usually in conjunction with the operations of larger,

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[19]*Guerrilla* means "little war" in Spanish, derived from *guerra* for war. But in English usage, *guerrilla* is used as a modifier, e.g., guerrilla warfare, guerrilla forces, guerrilla tactics. *Guerrilla warfare* implies irregular forces that carry out military and paramilitary actions while avoiding protracted, decisive combat. Guerrilla warfare can occur within a conventional war, as in occupied France, Yugoslavia, Belorussia, Ukraine, and Burma during WWII. Current U.S. terminology supplants *guerrilla warfare* with *low-intensity conflict* (LIC), which is meant to apply to every condition falling between normal peacetime and conventional war. However, the expression *low-intensity conflict* is undesirable for several reasons: First, it is not helpful to say that a conflict exhibits low-intensity when it is extremely intense for the forces and noncombatants affected. Second, the official definition of *low-intensity conflict* includes both terrorism and guerrilla warfare. Of course, terrorism can shade imperceptibly into guerrilla warfare or even into conventional war, as it did during the emergence of modern Israel or during some phases of the struggle between Israel and the Palestine Liberation Organization (PLO). But in many instances, e.g., the infamous Baader-Meinhof group in West Germany, terrorism alone is the problem and it should not be dignified by a term such as low-intensity conflict. In this connection, it is noteworthy that the Baader-Meinhof group tried to present itself as a "guerrilla" organization, although it was almost universally regarded as "terrorist." Third, conventional war can be characterized as low intensity or high intensity, depending on the exigencies and strategies of the participants. The important distinction is not related to the degrees of intensity but to the type of forces involved and the character of combat. The distinction is between regular forces fighting protracted battles that are meant to be decisive (*conventional war*) and irregular forces fighting brief engagements that cannot be decisive (*guerrilla warfare*). Current U.S. Army doctrine for SF defines *guerrilla warfare* as "the overt military aspect of an insurgency" (Field Manual 31-20, *Doctrine for Special Forces Operations*, p. 3-1), but this definition seems overly restrictive. Historically, subversion, sabotage, and direct attack against regular forces are equally part of a guerrilla force's repertoire. Indeed, a major part of the effort by the French Resistance and Soviet partisans in World War II was sabotage.

general-purpose forces. The third criterion captures the tactical-level models, which are currently used to simulate raids characteristic of SOF. Output from these models can become input for higher-level models. *Coverage* implies that the model offers at least some inputs and outputs associated with the task. It does not imply that the model in question is suitable for analysis that could support resource-allocation decisions. We further distinguished between *explicit* coverage, implying that SOF are simulated at some level of aggregation, and *implicit* coverage, suggesting that some effects of SOF are modeled but the forces are not simulated.[20]

As shown in Figure 2.3, the candidates offer inadequate coverage of SOF tasks. Although tactical-level models, such as Security Exercise Evaluation Simulator (SEES) and Janus, can be used to simulate certain actions associated with counterterrorism, it would be incorrect to suggest that they cover counterterrorism. For example, counterterrorism is dominated by the need for timely, detailed intelligence on terrorist groups, their composition, locations, methods, and resources, but intelligence is not represented in these tactical-level models. Recovery of personnel and equipment is not covered, nor is support for an insurgency. Panther,[21] a hybrid of map exercise and computer simulation used to drive exercises in counterinsurgency, simulates some aspects of guerrilla warfare explicitly.

The Regional Development Simulation System (RDSS) offers implicit coverage of counterinsurgency at the level of national policy. For example, an analyst can alter the effort apportioned to internal security.[22] As might be expected, coverage clusters around the most easily simulated tasks included in reconnaissance and combat, especially strike reconnaissance, reconnaissance directed against conventional forces, destruction of key assets, and occupation of key facilities. Operational-level models, such as Corps Battle Simulation (CBS),

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[20]For the Enhanced Naval War Gaming System (ENWGS), we also noted the possibility of scripting an action. *Scripting* means that an event is introduced arbitrarily by human players.

[21]At the time of the survey, Panther was being revised and rewritten in Pascal. This new model has since been named Victors. It is currently undergoing enhancement to better support exercises held in Latin American countries under the auspices of USSOUTHCOM.

[22]The Combat Sector of RDSS calculates an offensive potential for each side (Government and Opposition). Government Raw Offensive Forces are calculated by summing the effective strengths of Government Offensive Combat Strength (armed forces tasked to find, fix, and destroy insurgents), Government Security Strength (armed forces and police defending targets of insurgent activity), and Government Mobilized Population (part-time, amateur force protecting communities). The next calculation converts Government Raw Offensive Forces to Government Offensive Potential by applying the Government Combat Force Multiplier and the Government Firepower Rate. The latter parameter expresses the government's policy decision to employ massive amounts of firepower. A higher setting of this parameter increases Government Offensive Potential, but also increases the Level of Violence and the Supply Usage Rate. Booz-Allen & Hamilton, Inc., *Regional Development Simulation System—Single Nation Model (RDSS-SNM), Analyst's Guide* (Preliminary Draft), Washington, D.C., 9 June 1992, pp. 30—31, 36—38.

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National-Level Tasking		Large-Force Operations						Guerrilla Warfare	
Model	Counter-terrorism	Beach reconn	Strike reconn	Conven forces reconn	Destroy key assets	Occupy key facilities	Recover personnel, materiel	Support insurgency	Suppress insurgency
CBS			explicit	explicit	explicit	explicit			
CEM									
CFAW				explicit	explicit				
CTLS									
Eagle									
ENWGS		scripted							
ITEM									
Janus					explicit	explicit			
JCM				explicit	explicit	explicit			
JTLS			explicit	explicit	explicit	explicit			
Panther									explicit
RDSS									implicit
RSAS-ITM					explicit	explicit			
SEES					explicit	explicit			
TAC RAM									
TAC THUNDER									
TACWAR									
TWSEAS-M		scripted	explicit	explicit					
TAM									

NOTE: See "Contexts for Employment of SOF" for definitions of the headings "National-Level Tasking," "Large-Force Operations," and "Guerrilla Warfare." Subheadings are defined as follows: "reconn": "beach reconn" = hydrographic reconnaissance in support of amphibious operations; "strike reconn" = strike reconnaissance including target designation; "conven forces reconn" = reconnaissance directed against opposing general-purpose forces.

Figure 2.3—Coverage of Tasks Performed by SOF

Joint Conflict Model (JCM), Joint Theater Level Simulation (JTLS), and RAND Strategy Assessment System—Integrated Theater Model (RSAS-ITM), typically simulate these tasks in enough detail to allow realistic play in exercises.

Evaluation of Theater-Level Models

Theater-level models are of particular importance to SOF because they represent the operational level of war, the level at which the important effects of special operations are felt. On the basis of the survey, we evaluated currently used theater-level models according to three criteria: (1) relevance to special operations, (2) suitability for iterative analysis,[23] and (3) current use in the resource-allocation process. The models fell into three categories: (1) interactive

[23]Iterative use of a model is important because the inherent uncertainties of warfare require an analyst to examine ranges of outcomes. It would, for example, be unsound to generate and analyze just one outcome of a theater-level campaign.

exercise drivers, (2) semi-autonomous models, and (3) autonomous piston-style models.[24] This evaluation revealed a dilemma for SOF analysis: No category of models is at least moderately relevant to SOF analysis, suitable for iterative analysis, and currently used to support resource-allocation decisions.[25] Figure 2.4 summarizes this dilemma.

Exercise drivers are relevant because they address, through wargaming, certain areas of inherent SOF interest, i.e., the operational level of warfare; joint and combined forces; command, control, communications, and intelligence (C^3I); movement and maneuver; insurgency; and political, economic, and social factors. But such models require too much manpower and too long run times to permit iterative analysis. Currently, models in this category are not directly used to support resource-allocation decisions, although they may find such use in the future. Semi-autonomous models are at least moderately relevant, and they

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Category of Model	Relevance to areas of SOF interest?	Suitability for iterative analysis?	Current use in resource-allocation decisions?
Interactive exercise drivers (CBS, JCM, JTLS)	high	low	low
Semi-autonomous models (CTLS, Eagle, ITEM, RSAS)	medium	high	low
Autonomous piston-style models (CEM, TAC THUNDER, TACWAR)	low	medium	medium

Figure 2.4—Dilemma for SOF Modeling: Relevance of Models to Analysis of SOF

[24]Interactive exercise drivers are designed to support command-post exercises. They require many human decisions and generate combat results that are sufficiently realistic for gaming purposes. Semi-autonomous models are typically used for interactive gaming until the analyst is satisfied that the basic issues have been captured. Thereafter, the analyst runs the model iteratively, testing sensitivity to parameter changes or alternative concepts of operation. Autonomous piston-style models are designed to run without human interaction, although some interaction is allowed. Piston-style modeling limits ground-force maneuver to advance or retreat on a major axis as adjudicated by ground combat algorithms.

[25]At the time of the survey, the Joint Warfare Center (JWC) was sponsoring development of the Joint Conflict Model (JCM) by Lawrence Livermore National Laboratories to support interactive wargames. JWC had received a prerelease version that was inoperable during our visit. JCM is an adaptation and further development of Janus that allows simulation of some tasks associated with SR and DA. JCM is intended primarily for interactive use, but it might also be run iteratively (as Janus is) for a given scenario while varying such parameters as probable kill for pairings of weapons and targets.

allow iterative analysis; but they are not in current use by analytic activities in direct support of resource-allocation decisions. Autonomous piston-style models are used in direct support of resource-allocation decisions, but they have little relevance to SOF.[26] Models in this category typically focus on large battles of attrition that afford little scope for special operations.

Security trends may prompt development of models that handle issues central to analysis of special operations better than is currently possible. During the Cold War, U.S. defense planning was dominated by the NATO Central Front, characterized by immense conventional battles and probable use of nuclear weapons on a large scale. In the post-1989 security environment, planning centers on major regional contingencies (MRCs), especially in the Persian Gulf region and the Korean peninsula. Desert Storm, a vivid demonstration of NATO-derived capabilities after extensive buildup, will probably appear anomalous. MRCs are more likely to require rapid commitment of U.S. forces in operations that complement the efforts of regional allies. As U.S. defense planners contemplate such contingencies, they will need models that handle issues that were less prominent when the Central Front dominated planning. Such issues include intelligence, command and control, deep battle, maneuver, and forced entry[27]—issues that have inherent interest for special operations.

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[26]Why are autonomous, piston-style models currently used to support resource-allocation decisions while the generally newer semi-autonomous models are not? The answers to this question are historical and programmatic. CEM, for example, traces its lineage to the Theater Combat Force Requirements Model (TCM) initiated by Research Analysis Corporation in 1968. TCM was subsequently adopted by an Army project known as Conceptual Design for the Army in the Field (CONAF) and renamed CONAF Evaluation Model I (CEM I). After several cycles of improvement, CEM IV was transferred to the Army in 1974 and renamed Concepts Evaluation Model IV, retaining the same acronym. According to current plans, CEM will be superseded by Current Theater-Level Simulation (CTLS), a more advanced semi-autonomous model that will better support operational-level analysis. U.S. Army Concepts Analysis Agency, *Concepts Evaluation Model VI (CEM VI)*, Volume I—*Technical Description*, Bethesda, Maryland, 1987, p. 1-1.

[27]For example, RAND is currently developing the Theater Level Campaign/Non-Linear Combat (TLC/NLC) model to simulate combat phenomena at the operational level, using a flexible gameboard and a supporting toolkit. TLC/NLC allows the user to specify objects and processes at desired levels of resolution. The gameboard uses nodes, networks, and regions in preference to the piston-, grid-, and hex-based networks commonly used in other models. Ground and air attrition is based on heterogeneous, situationally dependent attrition methodologies. Ground attrition calculations are based on the Calibrated Differential Equation Methodology (CADEM), a RAND-developed extension of the Attrition Model Using Calibrated Parameters (ATCAL) developed by the U.S. Army Concepts Analysis Agency (CAA). CADEM begins with killer-victim scoreboards generated by higher-resolution models, exercise data, or historical data, extended by experience or expert judgment to account for situational factors. The intent is to support defense analysis, especially force-structure and resource-allocation issues, by operational-level and theater-level modeling. Features of TLC/NLC will ultimately be integrated into RAND-ITM.

Forced entry means deploying military forces into enemy-held territory under combat conditions. The usual means are airborne, heliborne, and amphibious assault, often in combination.

Insights at Midpoint

At midpoint, we became convinced that analysis of SOF contributions is exceptionally challenging.

Leverage

SOF exerts leverage by accomplishing tactical-level actions that have much wider effects. For example, SOF actions to suppress launches of Iraqi-modified Scud missiles during Desert Storm, if they helped to persuade the Israeli leadership not to intervene,[28] may have had a strategic effect. Such leverage is a fundamental reason for maintaining elite forces, but difficult to analyze because the connections between tactical-level actions and the course of operations or campaigns are difficult to trace and extremely difficult to quantify. As a result, current models do not handle the operational level of warfare well. As Desert Storm illustrated, operations are not the cumulative result of completing tactical-level tasks, yet they are portrayed as such, especially in piston-style models.

Integration with General-Purpose Forces

SOF are often integrated with general-purpose forces. In the case of national-level tasking, SOF may be supported by general-purpose forces, e.g., the USS *Nimitz* launched the RH-53D helicopters employed in Eagle Claw. In the case of large-force operations, actions by SOF are part of the overall commander's concept. Thus, special operations must be evaluated as *contributions* to the success of the larger operations. For example, reconnaissance against general-purpose forces performed in the Euphrates Valley during Desert Storm must be evaluated in the context of operations by XVIII Airborne Corps and VII Corps. When general-purpose forces and SOF are integrated, independent analysis of SOF is either impossible or irrelevant. But analysis of general-purpose forces is beyond the purview of USSOCOM.

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[28]According to unclassified accounts, Coalition intelligence could not confirm destruction of even one mobile Scud launcher during Desert Storm. However, deployment of Patriot missiles to Israel and the effort expended on hunting Scuds probably convinced the Israeli leadership that the Coalition was doing all in its power to protect Israel. Moreover, the Coalition inhibited Scud firings even if it did not destroy many launchers. "Not only did they [SAS] take out launchers with ruthless precision, but also the suddenness of their own attacks and the uncanny speed with which enemy aircraft arrived overhead so inhibited the remaining launch teams that after a while the Iraqis scarcely dared to bring their weapons into the open. The result was that attacks on Israel were effectively suppressed." De la Billière, *Storm Command: A Personal Account of the Gulf War*, Harper-Collins, London, 1992, pp. 226—227. "Few direct Scud kills could be confirmed—and CIA analysts still refused to count any mobile launchers as destroyed. But the harassment campaign clearly confounded the missile crews. . . . The daily average or five missiles during the initial ten days of the war dwindled to one a day for the balance of the conflict." Atkinson, *Crusade*, 1993, p. 179.

Extreme Uncertainty

National-level tasking and guerrilla warfare present exceptional challenges to modeling because of the gross uncertainties and poorly understood variables. Counterterrorism is surrounded by gross uncertainties about the terrorists' aims, their infrastructure and *modus operandi*, and the circumstances in which they will strike. Poorly understood variables are especially characteristic of insurgency and counterinsurgency. For example, insurgency theory stresses the importance of "perceived relative deprivation," which compares a group's expectations with what it believes it currently possesses or is likely to obtain in the future. Perceived relative deprivation is crucial to a sophisticated analysis of insurgency, but it does not lend itself to precise measurement, if it can be measured at all. In many instances, simple conceptual models need to be developed before computer-based modeling becomes feasible.

Inadequacy of Currently Used Models

Currently used models are inadequate to analyze SOF contributions. They afford very limited coverage of special operations and moreover they have little intrinsic relevance. Their coverage of special operations is confined chiefly to aspects of reconnaissance and combat action. Their relevance to special operations is low because they tend to neglect areas of strong interest, such as intelligence and maneuver. These statements about currently used models are not intended to be pejorative. Most of the operational- and theater-level models were designed primarily to analyze NATO's Central Front or to support command-post exercises at division, corps, and joint task force levels. In most models, SOF were added subsequent to the initial development, if they appear at all. Moreover, some SOF tasks are not amenable to modeling in the current state of the art. Considering this developmental history and the inherent difficulties of modeling special operations, it is not surprising that currently used models are inadequate.

3. Analysis of SOF Contributions

From the experience and knowledge accumulated during the survey, we developed a framework for analyzing the contributions of SOF (Task 3). This framework helps to evaluate SOF contributions to achieving objectives that form a hierarchy extending from national goals to operational tasks and employment concepts. This section describes that framework, which contains four contexts, and provides an example within each context.

Framework for Analysis of SOF Contributions

The framework discerns four *levels of analysis*, ranging from systems level to resourcing level, and appropriate analytic tools at each level. It postulates a *hierarchy of objectives* that provides the motives for SOF employment and criteria to evaluate SOF contributions. It identifies four *contexts* for SOF employment: national-level tasking, large-force operations, guerrilla warfare, and other use.

Levels of Analysis

Military forces can be analyzed at four levels: systems level, tactical level, operational level, and resourcing level.[1] These levels, their interrelationships, and associated analytic tools are illustrated in Figure 3.1.

Systems Level. At the systems level, the analytical aim is to determine the optimal design for a given system within budgetary constraints. Analysis typically focuses on trade-offs in the performance characteristics of major items of equipment. The inputs are requirements and employment concepts. *Requirements* are authoritative statements of acceptable performance derived from operational-level analysis. For example, operational-level analysis would indicate what stealth characteristics and self-protection should be built into an insertion platform, such as a helicopter. *Employment concepts* link force elements, such as platforms, sensors, and weapons, to accomplish tasks. They set parameters for design and testing of equipment. The outputs are performance

[1]This discussion is not intended to thoroughly explore the topic. It defines levels of analysis in sufficient detail to support a construct for analysis of SOF contributions and recommendations for model development offered in this report.

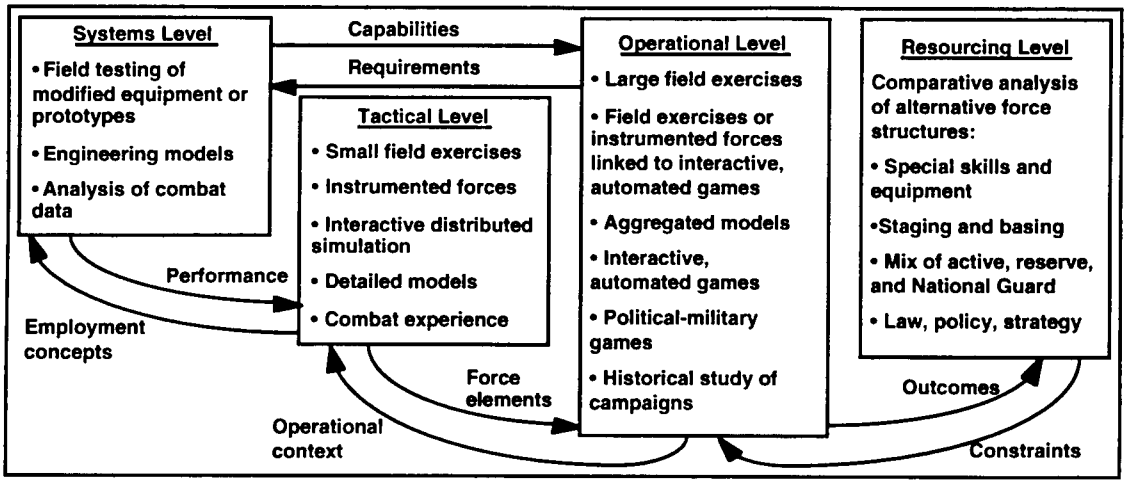

Figure 3.1—Levels of Analysis

and capabilities. *Performance* concerns the physical characteristics of systems, such as the range, payload, and cruising speed of an aircraft. *Capabilities* combine the performance characteristics of several systems in statements of general ability, e.g., the capability to detect and destroy mobile targets at operational depths. Systems-level analysis uses the results of field testing, the outputs of engineering-level models, and combat data, if any are available. Field testing verifies that the system meets requirements in the context of employment concepts (discussed later in this section).

Tactical Level. At the tactical level, the analytical aim usually is to find the most effective employment concepts to accomplish the tasks implied by operational-level objectives. For general-purpose forces, tactical-level analysis produces doctrine and standard procedures disseminated through course materials and field manuals. For SOF, the process is less straightforward because tactics are inherently more flexible and innovative. The inputs are performance characteristics of systems and an operational context. An *operational context* establishes the physical environment and the tasking, either explicit in an operations order or implied by objectives. For SOF, the operational context has an extremely wide range, extending from nearly routine support of general-purpose forces to actions controlled at the highest level of government. The outputs are employment concepts and force elements. *Force elements*, such as teams, units, and task forces, with their associated support requirements and capabilities, provide the basis for operational-level analysis.

A variety of tools support tactical-level analysis. Small field exercises or demonstrations using instrumented forces can be used to explore new

employment concepts. Interactive distributed simulations can link trainers and actual equipment in a shared virtual reality. For example, aircraft and ground combat systems in dispersed locations can be linked to allow human operators to manipulate their systems as though they were participating in the same engagement. Detailed models that incorporate performance parameters of actual systems can replicate expected patterns at the tactical level and permit iterative analysis of outcomes. Combat experience validates or rejects existing employment concepts and prompts the development of new concepts.

Operational Level. At the operational level, the analytical aim usually is to identify the requirements for new systems, or to identify the best concept of operations in an area of operations. A *concept of operations* includes the objectives, the sequence and timing of operations to attain those objectives, and a time-phased list of forces. Inputs are capabilities, force elements, and constraints set at the resourcing level. *Constraints* reflect decisions concerning force levels, for planning purposes and execution. The outputs are operational contexts to support tactical-level analysis and assessments of outcomes to inform analysis at the resourcing level. *Outcomes* include estimates of the ability of unified commands to attain their objectives within a reasonable time and at acceptable cost.

A wide range of tools supports operational-level analysis. Large field exercises help to examine sustainment, mobility, interoperability, and the best mix of forces. In the future, field exercises and instrumented forces, such as those at the NTC, may be linked to interactive, automated games to examine the sequence and timing of operations. Aggregated models help to examine the sensitivity of outcomes to changes in key variables. Historical study of previous operations and campaigns informs planning and helps to develop the operational art taught at war colleges and universities.

Resourcing Level. At the resourcing level, the analytical aim is to plan the best force structure attainable within fiscal constraints.[2] The basic tool is comparative analysis, which considers such issues as support to the NCA and to the unified commands across a wide range of contingencies. The Joint Chiefs of Staff are the ultimate source of military advice for the allocation of resources worldwide. But the allocation of resources to force development during peacetime is an extremely elaborate process involving congressional committees, the Department

[2]USSOCOM, in conjunction with the unified commands, currently conducts a Joint Mission Analysis to identify a fiscally unconstrained force structure to accomplish all planned tasks with minimal risk. The *Special Operations Master Plan* develops the force best able to attain national strategic objectives within fiscal constraints.

of Defense, and the military services. In this process, USSOCOM performs the functions of a military service by administering Major Force Program (MFP) 11.

Hierarchy of Objectives

Military operations are conducted to accomplish objectives in a hierarchy that extends from national goals to employment concepts and is presented in Figure 3.2. This hierarchy is familiar to military planners and analysts of military affairs, although it may be presented with differently defined levels or different terminology.

National goals are rooted in the historical experience of the nation and find expression in fundamental documents such as the *Declaration of Independence. National security objectives* are contained in broad statements of American policy that integrate political, economic, and military objectives. They form the basis for *national strategy.* SOF may contribute directly to attainment of national security objectives when they receive national-level tasking. *National military objectives* are expressed in the president's annual statement of national security strategy and in *Defense Guidance* issued by the secretary of defense. *Campaign objectives* are framed by the commander of a joint task force or the commander in chief (CINC) of a unified command. They express his intentions developed from an overall campaign strategy. *Operational objectives* contribute to attaining campaign objectives. They are developed within the headquarters of the combatant command, usually by component commanders. *Operational tasks* are

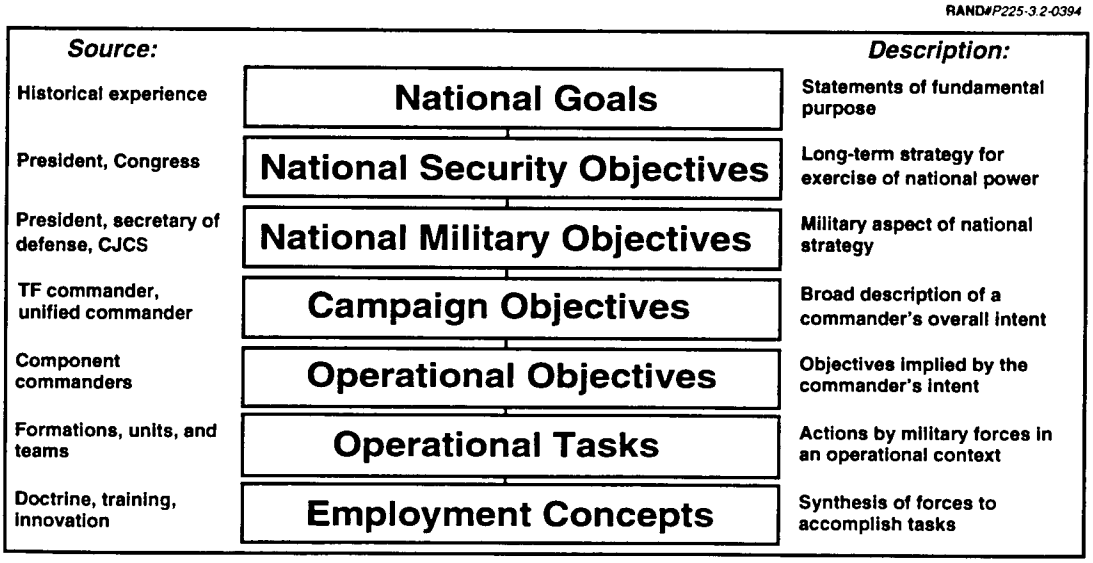

Figure 3.2—Hierarchy of Objectives

accomplished by force elements according to employment concepts. Whenever the United States employs military force, there must be a national goal and an operational task (implying an operational concept), but other levels may be absent.

Contexts for Employment of SOF

Special operations forces should be analyzed and modeled, if modeling is appropriate, within four operational contexts. The first three contexts can be reasonably well bounded; the fourth captures a miscellany of collateral activities. Figure 3.3 summarizes these four contexts.

The contexts differ in their level and type of objectives, command and control mechanisms, and the missions, or activities, typically performed. These differences imply different demands on modeling and analysis of the SOF contributions. Each context is discussed in the following subsections.

National-Level Tasking

National-level tasking comes from the highest levels of government. The president or secretary of defense directs U.S. Commander in Chief, Special Operations Command (USCINCSOC), who may task an operational command such as the Joint Special Operations Command (JSOC) to accomplish the task. Many famous special operations were conducted in this context. Four notable

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Context	Objectives	Command and Control	Missions or Activities
National-Level Tasking	Set by NCA; may be political, military, economic, or psychological objectives.	NCA directs USCINCSOC, who designates an operational commander.	Often counterterrorism, but may be any mission.
Large-Force Operations	Set by JTF or theater commander; primarily military objectives.	NCA → JTF or theater commander → SOC commander → tactical-level commanders.	Usually reconnaissance and combat actions integrated into larger operations by general-purpose forces.
Guerrilla Warfare	Set by interagency authority or regional military commander; political, military, economic, and psychological objectives.	Example of Vietnam conflict: NCA → CINCPAC → Military Assistance Command, Vietnam (MACV).	Usually insurgency or counterinsurgency assisting indigenous forces.
Other Use	Set by various authorities; may be political, military, economic, psychological, or humanitarian objectives.	Wide range of possible relationships involving NCA, JTF or theater commander, interagency task force, alliance, or international organization.	Collateral activities: security assistance; humanitarian aid; antiterrorism; counterdrug operations; search and rescue; civic action; noncombatant evacuation; peacekeeping; show of force.

Figure 3.3—Contexts for Employment of SOF

examples are Telemark during World War II,[3] the Son Tay Raid, the Israeli action at Entebbe,[4] and Eagle Claw. Eagle Claw is particularly important because it prompted concern about efficiency that led to the creation of USSOCOM. Three of these examples are recovery operations or hostage rescue. But SOF might accomplish any task as a national-level tasking. As an example, the Telemark raids during WWII involved combat to destroy facilities and stocks needed to develop nuclear weapons.

Analysis of national-level tasking is based on the objectives that prompt the employment of SOF and that provide criteria to evaluate its contribution. A complete analysis starts with the highest-level objectives and descends to the operational tasks that SOF are directed to accomplish. National-level tasking usually involves a truncated hierarchy of objectives, shown in Figure 3.4.

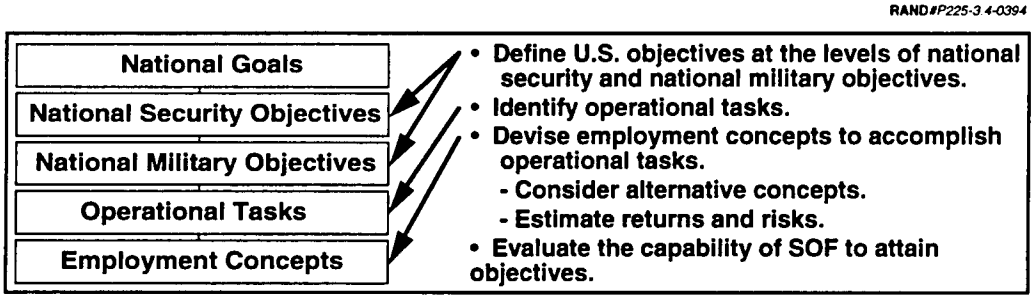

Figure 3.4—Analysis of National-Level Tasking

[3]The Norsk hydroelectric plant near Rjukan in Telemark, Norway, some 60 miles west of Oslo, produced heavy water (deuterium combined with oxygen), useful in the development of nuclear weapons. The British Special Operations Executive supported several attempts to deny this heavy water to Germany. On 19 November 1942, the British attempted a raid from Scotland using gliders, but all who survived the landing were killed by the Germans. In a subsequent attempt, Norwegian agents parachuted onto the Hardanger Plateau, where they established a base camp. On the night of 27 February 1943, nine of the men raided the Norsk plant and caused considerable damage with plastic explosives. None of those agents were caught, although they were questioned by police during their attempt to depart the area. On 20 February 1944, Norwegian agents sank the Norwegian ship *Hydro* as it was ferrying a cargo of heavy water across Lake Tinnsjoe. Thomas Gallagher, *Assault on Norway*, Harcourt Brace Jovanovich, New York, 1975, and Philip Warner, *Secret Forces of World War II*, Scarborough House, Chelsea, England, 1991, pp. 42–44.

[4]On 27 June 1976, Palestinian and West German terrorists hijacked an airliner and compelled the crew to land at Entebbe in Uganda. The terrorists separated the Israeli passengers and held them hostage while demanding the release of other terrorists. On 3 July, the Israeli Defense Forces landed elite troops in four C-130 aircraft. Assisted by several deceptions, these troops surprised the terrorists and Ugandan soldiers who supported them. In less than two hours from first landing to last takeoff, the Israelis killed thirteen terrorists, liberated the hostages, and destroyed eight Ugandan MiG aircraft that might have pursued. The mission leader, Lt. Col. Yoni Netanyahu, was shot as he led the assault and died of his wounds. The rescue was an extremely risky operation with little margin for error. Max Hastings, *Yoni: Hero of Entebbe*, Dial Press, New York, 1979; Chaim Herzog, *The Arab-Israeli Wars: War and Peace in the Middle East*, Random House, New York, 1982, pp. 328–336; T. Williamson, *Counterstrike Entebbe*, Collins, London, 1976.

A hierarchy of objectives begins with national goals and national security objectives that prompt an independent operation. In some instances, national military objectives may be involved; more often, a national-level tasking is conducted to accomplish political or psychological objectives. On the right side of the figure are analytic steps in logical sequence. Note that the analysis should include alternative employment concepts and their associated risks before evaluating the SOF contribution. Employment concepts describe how various forces will contribute to a desired result. It is incorrect to assume that only one employment concept is feasible or that SOF is the only force to accomplish the task. This analytic process is analogous to operational planning, except that the operational planner usually has a more limited number of alternatives to consider and may lack the time or resources to conduct an exhaustive analysis.

To illustrate the method, we offer a brief analysis of the well-known Son Tay Raid. What were the American objectives in conducting this raid? For the men who actually carried out the raid, it was an act of loyalty and solidarity with the men in a North Vietnamese prison camp. On the official level, there appear to have been at least two related objectives:

- Free the American prisoners of war.
- Convince North Vietnamese leadership of U.S. determination.

First, the United States wished to free all prisoners of war then held in North Vietnam, an objective that could be achieved only through agreement with the North Vietnamese leaders. Note that this objective was humanitarian or psychological, not military. Second, to accomplish this overall objective, the United States had to convince the North Vietnamese leaders that it was determined not to accept any agreement that failed to secure the prisoners' release. This subsumed objective was purely psychological. The Son Tay Raid might also have been intended to assure Americans that their government had not abandoned the prisoners of war, but at the time, President Nixon appears to have been more worried that the intrusion into North Vietnam would incite protests from Americans opposed to the war.[5]

To accomplish an operational task requires an employment concept that explains how various force elements contribute to a desired result. For general-purpose forces, employment concepts are normally identical or very similar to tactical

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[5]"The march on Washington just six months earlier, after the Cambodian invasion, still haunted him [Nixon]. 'Christ, they surrounded the White House, remember? This time they will probably knock down the gates . . .' The president also wondered if [Senator J. William] Fulbright would call the raid 'an invasion' of North Vietnam." Despite these misgivings, Nixon quickly approved the raid in the hope of saving lives. Schemmer, *The Raid*, 1976, pp. 164-165.

doctrine. For SOF, employment concepts are innovative and cannot be prescribed by doctrine, except in very general terms. In the context of national-level tasking, they may be especially innovative and imaginative. Figure 3.5 defines an employment concept.

An employment concept has five elements:

- *Surveillance:* the process of acquiring raw intelligence data through combinations of platforms and sensors, including human agents.
- *Assessment:* refinement, correlation, and analysis of raw intelligence to produce usable intelligence adequate to plan and execute the task.
- *Control and coordination:* overall planning and direction, including the real-time control of forces during execution.
- *Mission preparation:* specialized training, rehearsal, and positioning of forces to execute the task.[6]
- *Mission execution:* actions to accomplish the task, typically including insertion, combat action (or reconnaissance), and recovery of SOF.

Mission preparation can require weeks and even months of rehearsal for especially complicated operations and can be crucial to success. Recovery

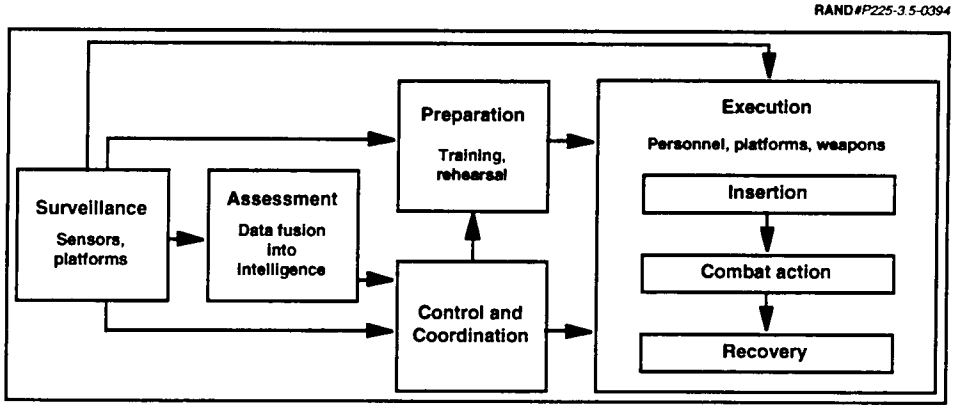

Figure 3.5—Generic Employment Concept

[6]SOF typically use speed and stealth to avoid protracted combat. When possible, they ensure these qualities through detailed mission preparation, sometimes including full-scale rehearsals. The time available for preparation varies widely. At one extreme, operations such as the Son Tay Raid or Eagle Claw may demand months of preparation. At another extreme, SOF might have to accomplish a hostage rescue of airline passengers with only hours to prepare. In general, special operations are more sensitive to preparation than are larger, conventional operations because special operations tend to be complex and the margin for error can be small.

implies the return of SOF to an area under friendly control, for example, to a friendly country or secure base camp. Recovery may employ the same means as insertion or entirely different means. During Eagle Claw, for example, insertion into Tehran involved a series of flights over the Iranian desert using RH-53D and MC-130 aircraft, whereas recovery was planned by RH-53D to Manzariyeh, a city in Iran, and then by C-141 out of Iran.

Figure 3.6 presents a simplified overview of the employment concept for the Son Tay Raid. Even this simplified overview shows that special operations can involve complex combinations of diverse surveillance means and various general-purpose forces.

Drones were the best potential source of photographic intelligence, but a key flight banked too soon and produced no usable imagery of the prison camp. The planners decided against scheduling more flights to avoid warning the North Vietnamese of American interest in the camp. Extensive preparation was a notable feature of the raid and, from a technical perspective, undoubtedly contributed to its outstanding success. The controlled crash of an HH-3 helicopter into the prison compound illustrates the innovative, daring quality that special operations can have at this level.[7] Three carriers in the Gulf of Tonkin launched attack aircraft to divert North Vietnamese fighters from the area

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Surveillance	**National collection means, SR-71, Buffalo Hunter drones, prisoners' mail, human agents**
Assessment	**Radar coverage, opposing air activity, weather conditions, guards, reaction forces, configuration of compound, condition of prisoners**
Control	**JCS (Special Assistant for Counterinsurgency and Special Activities) → mission commander (Monkey Mountain) → raid commander**
Preparation	**Assault group rehearsal on full-scale mock-up at Eglin AFB; full flight profiles rehearsed over continental United States**
Execution	**Insertion by HC-130 (refueling), MC-130 (navigational assistance), A-1 (fire support), HH-53, HH-3 aircraft; controlled crash of HH-3; diversion flown by carrier-based aircraft; SF assault force equipped with specially procured small arms, special goggles, and night-vision devices**

Figure 3.6—Employment Concept for a National-Level Tasking: Son Tay Raid

[7]The planners decided to execute a controlled crash in order to insert troops quickly into the cleared area within the Son Tay compound. The smaller UH-1 helicopter would just fit into the compound, but it carried only ten men and was difficult for the men to exit quickly. Moreover, the UH-1 was not designed for aerial refueling and could scarcely maintain the slowest flying speed of the C-130 mother ship. The larger HH-3 carried 14 men, was designed for aerial refueling, and flew faster, but this 73-foot-long aircraft barely fit into the 85-foot clearing. The planners anticipated that the HH-3 rotars would contact some tree limbs during the descent. However, the trees were much larger than expected, causing an undesirably severe crash. Lying on mattresses, the raiders escaped injury, although one of them was thrown out of the helicopter by the impact. Schemmer, *The Raid*, 1975, pp. 113—114, 202—203.

where the raid was conducted. In this instance, a large feint by general-purpose forces contributed to success of a much smaller SOF effort.

Although a navigational error caused Colonel Arthur D. Simons' helicopter to initially land at a different compound, the raid was technically successful. Unfortunately, the raiders found no American prisoners in the Son Tay compound. At some time during mission preparation, the North Vietnamese had relocated the prisoners. The U.S. planners suspected or even knew that the prisoners were probably gone, but still elected to launch the raid.

Obviously, the Son Tay Raid made no direct contribution to freeing American prisoners of war. But did it make an indirect contribution by demonstrating American determination? This question cannot be answered with certainty. The raid demonstrated strong concern and showed that the United States would employ force in North Vietnam, but we do not know what effect, if any, it had on the North Vietnamese leaders. Arguably, the American position in Southeast Asia was deteriorating so rapidly in 1970 that the United States may have had few better options than to conduct the raid without knowing its effects. Figure 3.7 summarizes an evaluation of the SOF contribution.

There is also a moral dimension to the Son Tay Raid that is not addressed by this analysis: Just by conducting the raid, whatever its outcome, the United States kept faith with its men in captivity. As an expression of national character, the Son Tay Raid has a value that transcends its contribution to achieving a national security objective at the time.

Large-Force Operations

USCINCSOC supports combatant commanders in regional theaters by providing forces that are appropriately trained, equipped, and ready. These functions are analogous to those performed by the chief of a military service. When USCINCSOC supports a combatant commander, SOF are usually integrated into

U.S. National Security Objectives	Evaluation of SOF Contribution
Free U.S. prisoners of war (humanitarian and psychological objective).	Failure: No U.S. prisoners of war were found in the Son Tay compound.
Convince North Vietnamese leadership of U.S. determination to recover its prisoners of war (psychological objective).	Partial success: • Demonstrated concern. • Proved North Vietnam was not a sanctuary.

Figure 3.7—Evaluation of SOF Contribution: Son Tay Raid

larger operations by general-purpose forces. In this context, SOF typically perform reconnaissance and combat, but might accomplish other tasks. Analysis of SOF integrated into larger operations proceeds from the objectives that establish the motives for employing SOF and provide the criteria to evaluate their contribution. These objectives are formulated by the theater commander and his component commanders, or by the commander of a joint task force.

Recent examples of large-force operations are Urgent Fury (25–27 October 1983), Just Cause (20–23 December 1989), and Desert Storm (17 January–28 February 1991). From an SOF perspective, *integration* is the distinctive feature. To take the first example, Urgent Fury was originally conceived as a special operation directed by Joint Special Operations Command with handover to general-purpose forces, but it rapidly assumed the character of a small, conventional operation. In a command-and-control sense, integration occurred when control of the Ranger battalions passed to MG Edward Trobaugh, commanding 82nd Airborne Division, whereas the overall combatant commander became VADM Joseph Metcalf, commanding Combined Joint Force 120, who was subordinate to the U.S. Commander in Chief, Atlantic Command (USCINCLANT). Just Cause was a much smoother operation because it was planned from the beginning as an integrated effort of SOF and general-purpose forces. *Integration* may also imply executing a distinct special operation in the broad context of a campaign. For example, prior to Desert Storm, the U.S. Commander in Chief, Central Command (USCINCCENT), was prepared to execute Pacific Wind.[8]

During a theater-level campaign, the hierarchy of objectives extends from national goals to operational tasks and their associated employment concepts. Figure 3.8 illustrates the hierarchy with an example drawn from Desert Storm. The criteria for evaluating the SOF contribution are typically at the level of operational objectives, in this case, suppression of opposing air defense. This objective was attained at medium to high altitudes by accomplishing a range of tasks, including offensive counterair, combat air patrol, suppression of surface-to-air missiles (SAMs), and the destruction of early warning/ground control intercept (EW/GCI) radars.

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[8]Saddam Hussein refused to allow the evacuation of the embassies in Kuwait City, giving rise to fears that he would hold diplomatic personnel hostage. Pacific Wind was a special operation to recover them. It required precise air strikes to cause a power outage in Kuwait City, destroy a nearby hotel used by the Iraqis, and suppress defenses along the shore. The rescue force would evacuate U.S. and British personnel by helicopter. SOF rehearsed Pacific Wind at various locations in CONUS, but the operation was cancelled when Saddam Hussein allowed peaceful evacuation in December 1990. Rick Atkinson, *Crusade: The Untold Story of the Gulf War*, Houghton Mifflin Company, Boston, 1993, p. 141.

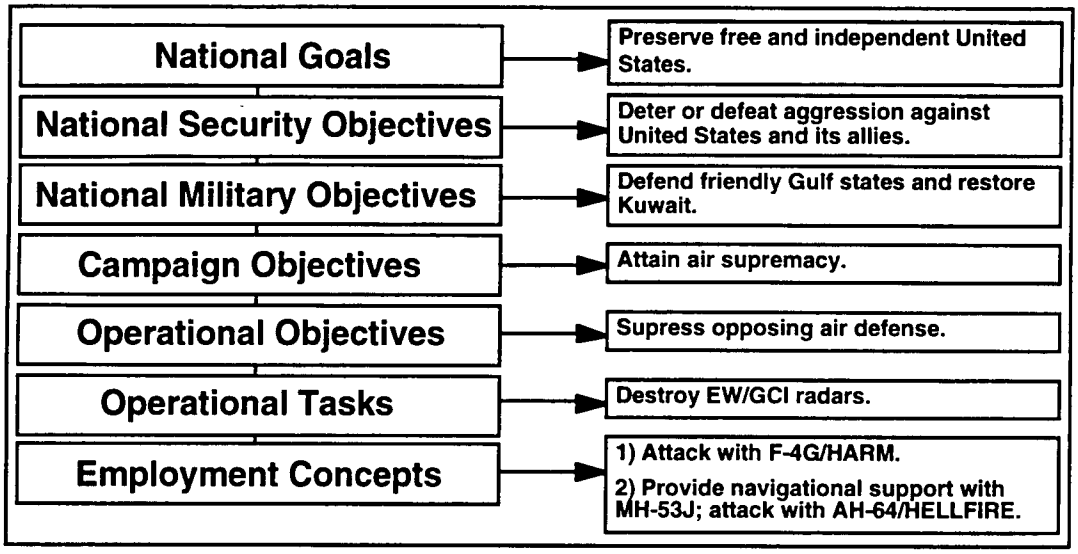

Figure 3.8—Hierarchy of Goals: Theater Example

This example shows two employment concepts for the destruction of EW/GCI radars. In the course of Desert Storm, attack aircraft with High-Speed Anti-Radiation Missiles (HARMs) were the major killer of air defense radars, but SOF also contributed. The most effective operational concept depends on the situation and operational requirements. At the outset of the air campaign during Desert Storm, it was crucial to destroy certain EW/GCI radars with high certainty and to report in real time on this destruction so that attack aircraft could use the resulting corridor. Special operations helicopters (MH-53J Pave Low), in conjunction with Army attack helicopters (AH-64 Apache), satisfied this requirement.

The operational tasks may duplicate those performed by general-purpose forces, e.g., destruction of EW/GCI radars, or they may be more exclusively associated with SOF, such as hydrographic reconnaissance. In discerning appropriate operational tasks, commanders are generally guided by previous experience. But experience cannot exhaust the possible employment of SOF. In some future conflict, which itself is likely to be unforeseen, SOF may accomplish an operational task novel in its history. A novel employment concept is even more likely. Alternative employment concepts might involve SOF alone, SOF together with general-purpose forces, or general-purpose forces alone. Figure 3.9 illustrates the steps in analysis.

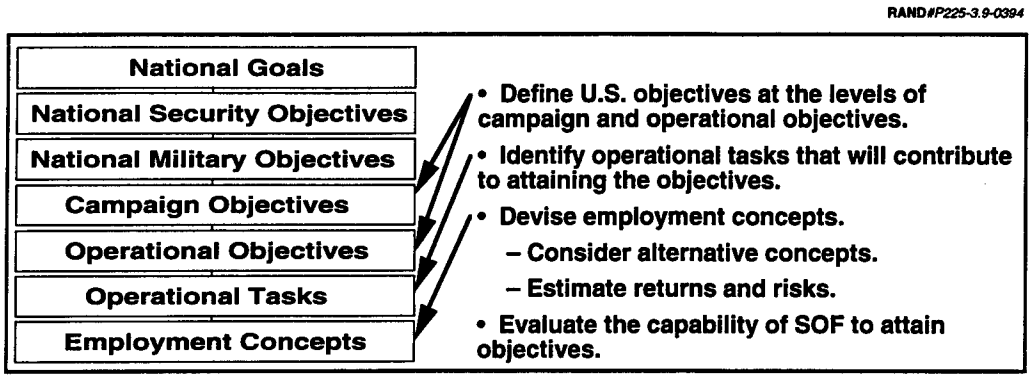

Figure 3.9—Analysis of Large-Force Operations

An example drawn from Desert Storm will serve to illustrate the analytic method. During this operation, the USCINCCENT General H. Norman Schwarzkopf made deception an integral part of his plan of maneuver to achieve tactical and operational surprise. USCINCCENT masked the movement of two corps west of Wadi al Batin while simulating large-scale preparations for attack across the Kuwaiti-Saudi border. After deciding not to conduct an amphibious assault on D-Day, USCINCCENT maintained the capability to conduct an assault on command while simulating the onset of an assault to fix Iraqi defenders along the Gulf littoral. His campaign objective was to defeat the opposing ground forces. His operational objective was to deceive the Iraqi commanders concerning the Coalition's plan of maneuver, so that they would not redeploy forces from the littoral.[9] The operational task for SOF was to simulate the threat of an amphibious assault.

The employment concept for SEAL teams conducting a deception operation during Desert Storm has the same components as the earlier example of the Son Tay Raid and is depicted in Figure 3.10. The results of surveillance, often employing a wide variety of means, are fused to produce as complete an intelligence picture as possible. The intelligence requirements for a SOF task generally include the elements that would be required by general-purpose forces but in much finer detail: Whereas an amphibious force commander would be concerned with large enemy forces in proximity to the objective area, SOF would be concerned with the exact locations, patrol areas, and surveillance means of

[9]The Iraqis deployed large forces on the Gulf littoral to defend against an amphibious assault. From south to north, these forces included the 18th, 19th, and 11th Infantry Divisions. In addition, the Iraqis deployed the 15th Infantry Division in Kuwait City. CINCCENT asked LtGen. Walter E. Boomer, commanding Marine forces, if he could conduct his attack without an amphibious assault. Boomer replied: "I can do it. But we'll have to continue the deception of a full-blown landing. That has to be a high priority. We've got to keep those three [18th, 19th, 11th] Iraqi divisions tied up on the coast." Atkinson, *Crusade*, 1993, p. 239.

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Surveillance	National collection means, RF-4C, RC-135, naval tactical intelligence, previous hydrographic reconnaissance
Assessment	Opposing sensors; opposing ground, air, and naval forces in the objective area; response capabilities; weather, light, sea state, obstacles
Control	USCINCCENT → commander SOCCENT → Naval Special Warfare Group One → Task Unit Mike
Preparation	Rehearsal, deployment of SOF and supporting naval forces
Execution	SEAL insertion by Fountain high-speed boats, rubber raiding craft, combat swim, vicinity Mina Saud; demolitions; navigational markers; deceptive use of automatic weapons, grenade launchers, naval gunfire, and air strikes

Figure 3.10—Employment Concept During a Large-Force Operation: Simulating an Amphibious Assault (Desert Storm)

even very small forces. Of course, SOF themselves make large contributions to intelligence. In this instance, previous beach reconnaissance provided intelligence to support a deception operation.

Even this highly simplified overview suggests the complexity of a special operation, including the interplay with general-purpose forces. In this example, naval gunfire and attacks by tactical aviation contributed to the deception.

As in the previous context, the SOF contribution is evaluated against the campaign and operational objectives. Figure 3.11 illustrates a simple evaluation, in which the deception operation, in conjunction with raids, appears to have been an unqualified success attained with no loss to SOF.[10] However, this analysis contains two assumptions:

- Iraqi commanders were deceived into believing that an assault was imminent or already in progress.
- Deception accounts for the Iraqi failure to redeploy forces from the littoral during Desert Storm.

[10]MGen. (USMC) J. M. Myatt, commanding the 1st Marine Division, believed that very large Iraqi forces had been committed to coastal defense: "I think what we can't dismiss is the level of effort put into defenses along the beaches by the Iraqi. I have to tell you that they were concerned from day one about a threat from the sea. When you get down and you look at the really fine engineering effort that was done on defense of the beaches and defense in-depth against an attack coming from the sea, it tied up at least six of the 11 Iraqi divisions that were facing I MEF. . . . our forces afloat did demonstrations and they did raids. They played a very key role, and I think it saved a lot of Marine lives." J. M. Myatt, "The 1st Marine Division in the Attack," *Proceedings*, November 1991, p. 76. On 29 January 1991, 13th MEU(SOC) raided Umm Al-Maradim Island off the southern coast of Kuwait, but found it abandoned by the Iraqis. A planned raid on Failaka Island, a Kuwaiti island east of Kuwait Bay, was called off after the USS *Tripoli* and the USS *Princeton* struck sea mines. Feints were conducted against Ash-Shuaybah, Failaka, and Bubiyan Island using combinations of naval gunfire, attack helicopters, and A-6 and AV-8 aircraft.

Campaign Objective	Evaluation of SOF Contribution
Defeat opposing ground forces.	Success: I MEF defeated Iraqi ground forces.
Operational Objective	**Evaluation of SOF Contribution**
Deceive opposing commanders about the plan of maneuver.	Apparent success: • No losses to U.S. forces during the simulated amphibious assault. • Elements of Iraqi two heavy divisions remained in the vicinity of Kuwait City.

Figure 3.11—Evaluation of SOF Contribution: Simulating an Amphibious Assault (Desert Storm)

The first assumption might be examined by debriefing captured Iraqi officers. The second assumption might be more difficult to investigate, even given complete access to Iraqi officers and captured records. It could well be that Iraqi officers lacked the authority or the means to redeploy their forces. They may also have lacked the will, a failing they might wish to conceal for reasons of personal pride.

Deception is a normal part of military operations, even those conducted by relatively unsophisticated commanders, and it is often supported by special operations. It aims at the mind of opposing commanders and thus is a psychological objective whose attainment may be difficult to discern or prove amid a welter of other plausible explanations for opposing behavior. Assuming that the SEALs' deception was at least partially responsible for the Iraqi failure to redeploy forces from the littoral, we may attempt a more complete analysis of this SOF contribution to Operation Desert Storm. Figure 3.12 outlines such an analysis that might be supported by models at the operational level.

As noted above, USCINCCENT had decided not to include an amphibious assault in the initial D-Day attacks. His decision was based, in part, on an assessment that littoral fortifications[11] and sea mines might cause significant casualties. In addition, the Marine component of Central Command (MARCENT) no longer considered that it needed the coastal road to support an attack into Kuwait City. USCINCCENT still retained the option of an amphibious assault using forces already afloat, and he wished to prevent the

[11]Littoral fortifications included underwater obstacles, land mines, barbed wire, anti-tank ditches, bunkers, and fortified buildings. Once off the beach, the Marines would have to attack through urban areas offering good defensive positions. Given the rapid progress of land operations, just these littoral fortifications might have caused USCINCCENT to withhold an amphibious assault, even had sea mines posed no threat. See Department of Defense, *Conduct of the Persian Gulf War, Final Report to Congress*, Washington, D.C., April 1992, pp. 294—295.

Operational objective: Deceive Iraqi commanders about the plan of maneuver:

- **Concept for general-purpose forces: Approach (feint) with amphibious task force.**
  - **Return: High likelihood of lasting deception; rapid transition to an actual assault, if required, adding combat power on the ground.**
  - **Risk: High risk of ship loss to sea mines—estimate using simple model.**
- **Concept for SOF: Simulate an amphibious assault using SEAL teams.**
  - **Return: High likelihood of transient deception; slower transition to an actual assault, if required—rough estimate of time difference.**
  - **Risk: Low risk of discovery and casualties to SEAL teams.**
- **Evaluate using aggregated model of ground combat:**
  - **Estimate Iraqi/friendly force ratios and likely effects of Iraqi redeployment options: (1) linear defense, (2) mobile reserve.**
  - **Assess requirement for amphibious assault and associated risks.**
  - **Evaluate SOF contribution toward objective.**

Figure 3.12—Analysis of Alternative Concepts for Deception (Desert Storm)

Iraqi divisions on the littoral from redeploying against Marine and Army units attacking northwards. Broadly speaking, USCINCCENT could employ SEALs to simulate an amphibious assault or he could conduct a feint using an amphibious task force. A feint would offer two advantages: a high likelihood of lasting deception and a more rapid transition to actual amphibious assault if required. Duration of the deception could have been important if the coalition ground offensive had developed slowly.

To offer a convincing threat, the task force would have to approach the littoral within visual observation, passing through Iraqi minefields during the approach.[12] However, prior to offensive operations, Coalition forces did not enter the northern tip of the Persian Gulf and thus had little opportunity to observe or counter Iraqi minelaying. The Iraqis actually laid their minefields well at sea and failed to mine the approaches to the Kuwaiti beaches. Had the Coalition been aware of these unexpected dispositions, they could easily have cleared passages through the minefields and approached the beaches with relative impunity.[13] In the event, two Coalition ships sailed into unsuspected

[12]The Navy component of Central Command (NAVCENT) originally planned to conduct a diversionary attack on Failaka Island with two Marine companies employing light armored vehicles and tanks. After the USS *Tripoli* and USS *Princeton* struck sea mines, this plan was scaled down and finally abandoned. On the second day of the ground offensive (25 February), U.S. forces conducted a feint near Ash-Shuaybah employing naval gunfire and helicopters. USS *Missouri* fired on the beaches, and Marine helicopters, some with special emitters, flew in sight of the Iraqi defenders. The Iraqis responded by firing two Silkworm missiles. The first fell into the water between the USS *Missouri* and one of her escorts. HMS *Gloucester* destroyed the second Silkworm with a Sea Dart SAM. DoD, *Conduct of the Persian Gulf War*, 1992, pp. 273 and 302—303.

[13]According to their postwar report, the Iraqis sowed 1,167 sea mines. Most of these mines were Iraqi versions of Soviet mines designed prior to World War II. The Iraqis also used small

minefields and suffered severe damage. The risk to Coalition ships could be assessed by considering the Iraqi stocks of sea mines, the area where they might be sown, and the number of ships in the contemplated amphibious task force. In contrast, the SEALs ran very little risk to sea mines owing to their stealthy insertion.

But even with the addition of naval gunfire and airstrikes, a deception operation with SEALs could have only transient value. Troops on the beaches would observe that no amphibious assault ships were in sight, and soon the Iraqi leaders would see through the deception. Also, a deception operation would not help to prepare for an actual assault, should USCINCCENT later decide to execute this option.

As a final step in the analysis, a model of ground combat might be used to compare the two alternatives of feint and deception. The model might be designed to output Iraqi/Coalition force ratios and likely effects, considering two Iraqi redeployment options: linear defense reinforced by units drawn from the littoral, and mobile reserve employing these same forces. Analysis of the amphibious assault option would consider the requirement for conducting such an assault and the risk of failure. Finally, the contribution of deception employing SEALs could be evaluated in this context. It would appear *prima facie* that the SEALs offered a low-risk alternative to a feint whose advantages (lasting deception and rapid transition to assault) were not required as the campaign actually developed.

The example of "Scud hunting" during Desert Storm gives an additional illustration of the method. Note that this employment of SOF was not anticipated prior to the beginning of offensive operations.[14] The employment

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numbers of magnetic and acoustic influence mines; however, 95 percent of the acoustic influence mines were inoperable. The Iraqis deliberately set some mines adrift, and about 13 percent of the moored mines seem to have broken loose. The fixed sea mines were sown in several fields, forming a 150-mile crescent from the Saudi-Kuwaiti border to a point east of Failaka Island. With the exception of Silkworm anti-ship missiles, these fields were not covered by fire and could have been cleared fairly easily had their locations been known. In addition to sea mines, the Iraqis sowed land mines on the beaches, but those would not have affected a feint. DoD, *Conduct of the Persian Gulf War*, 1992, pp. 273—286.

[14]The British commander General Sir Peter de la Billière had a long association with SAS, dating from 1956, when he fought the communist insurgency in Malaysia and culminating in command of the Special Air Service Group from 1979 to 1983. He was naturally eager to employ SAS against Iraq, but uncertain how it should be employed: "While the world's attention was focused on the air war, I was faced by another pressing problem, that of Special Forces. Having steam-rollered Norman Schwarzkopf into agreeing that they should be sent in, I now found myself repeatedly wondering whether they would find a worthwhile role in the western desert." SAS undertook the task of locating and destroying Scud missiles when they proved unexpectedly difficult to target: "So, from information-gathering, deception, and offensive action in general, we hastily switched the SAS's aim, as Norman put it, to 'Scuds, Scuds, and Scuds again,' so vitally important did it seem to close down the attacks on Israel." Sir Peter de la Billière, *Storm Command*, Harper-Collins, London, 1992, pp. 221

concept in Figure 3.13 is drawn from unclassified sources.[15] According to those sources, a forward air controller attached to special operations ground teams directed A-10 attacks on modified Scud missile launchers in southwestern Iraq.

The wide range of surveillance means, extending from Defense Support Program (DSP) early-warning satellites to small SOF teams, is remarkable and must have posed problems for integration of intelligence. Reportedly, DSP satellites were able to transmit data that allowed ground stations to plot back azimuths to the probable launch locations within about two minutes. But within ten minutes, the mobile launchers could be displaced up to five miles and be hidden from aerial reconnaissance. These time factors made rapid acquisition and engagement of the launchers vital to success. This employment concept depicts SOF directing air attacks, but when attack aircraft could not respond quickly enough, SOF might also attack the launchers directly, using anti-tank guided missiles (ATGMs), small arms, and demolitions.

Assuming an employment concept as given above, we can undertake a detailed analysis of the SOF contribution, including comparison with an alternative concept. This analysis is summarized in Figure 3.14.

At the outset of Desert Storm, the Coalition had inadequate intelligence about numbers of modified Scuds in the Iraqi inventory and their probable deployment

RAND#P225-3 13-0394

Surveillance	**National collection means, DSP early warning, TR-1, RF-4C, JSTARS, aerial reconnaissance, SOF teams on the ground**
Assessment	**Fixed support facilities, numbers and probable locations of mobile launchers, hide sites, air defenses, reaction forces**
Control	**USCINCCENT → commander SOCCENT → mission commander in coordination with strike assets**
Preparation	**Initial trial and error by SAS; in-theater rehearsal**
Execution	**Insertion and extraction of SOF teams by MH-53J helicopter; reports by burst transmission; laser designation of targets; attack by F-15E and F-16C using CBU-87, -89 and GBU; attack by A-10 using Maverick and 30-mm cannon; attack by B-52 using general-purpose bombs and area-denial munitions; in addition, direct attack by SOF using anti-armor munitions**

Figure 3.13—Employment Concept During Large-Force Operations: Destroying Missile Launchers

and 224. Following the British example, U.S. SOF also became involved in the Scud hunt. See Atkinson, *Crusade*, 1993, pp.140–144 and 177–178.

[15]Atkinson, *Crusade*, 1993, pp.175–181; de la Billière, *Storm Command*, 1992, pp. 224–227 and 266–268; Benjamin F. Schemmer, "Special Ops Team Found 29 Scuds Ready to Barrage Israel 24 Hours Before Cease-Fire,"*Armed Forces Journal International*, July 1991.

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Operational objective: Destroy and suppress mobile missile launchers:

- **Concept for general-purpose forces: Surveillance by DSP, reconnaissance satellites, JSTARS; execution by tactical aircraft using onboard systems.**
  - **Return: Relatively low probability of accurately discriminating and acquiring target.**
  - **Risk: Very low when aircraft remains above 15,000 feet.**
- **Concept for SOF: Insert small teams by helicopter to laser-designate launchers or attack them directly using ATGM.**
  - **Return: Apply a simple model of SOF coverage within areas of Scud deployment when clued by DSP and JSTARS. Calculate TACAIR responsiveness to laser designation and SOF lethality against a nominally protected target.**
  - **Risk: Low risk in rugged terrain; moderate risk in flat desert.**
- **Evaluate by comparing expected returns and risks:**
  - **Estimate improved accuracy of TACAIR with SOF laser designation.**
  - **Estimate additional engagement opportunities for SOF in direct action.**
  - **Consider political advantage of employing SOF.**

Figure 3.14—Analysis of Alternative "Scud Hunting" (Destruction of Mobile Launchers)

patterns. Also, the Coalition leaders had not fully anticipated the difficulty of identifying Scud launchers and the political effect of Scuds fired against Israel.

The key to success during what came to be called the "Great Scud Hunt" was rapid acquisition and engagement because of the 10-minute window following launch, after which a mobile launcher could be anywhere within a circle roughly 10 miles in diameter. Another key to success was the ability to locate concealed launchers. The Iraqis typically concealed their launchers in culverts, ravines, and buildings, including ferro-concrete aircraft shelters. In addition, they used decoys that appeared realistic from the air but would fail to deceive ground observers.

The analysis begins with consideration of a non-SOF employment concept: reconnaissance with national means and JSTARS, followed by attack with tactical aircraft using their onboard systems to discriminate the target. Calculations of acquisition and discrimination need only be accurate enough to provide a baseline for analysis. Following suppression of the Iraqi surface-to-air missiles, the risk to tactical aircraft was low, as long as they remained above 15,000 feet. However, at that altitude, the pilots had limited capability to discriminate targets.

Note that SOF do not offer a complete alternative to general-purpose forces. Instead, they supplement other means of target acquisition and attack. A simple model of target acquisition might reflect the area that one SOF team could monitor within a given time. The mobility of Scud launchers makes the time factor critical. To estimate the return for a given level of SOF effort, the simple model would include a notional configuration of Scud launch areas, known during Desert Storm as "Scud boxes." During the progress of the war, Coalition forces gained a more precise understanding of such launch areas, increasing the returns from SOF employment. Of course, SOF also ran a risk of detection by Iraqi ground forces. One British Special Air Service team was "bounced" by Iraqi forces and suffered casualties.

In addition to estimating the expected improvement in target acquisition, including target discrimination (e.g., discriminating mobile launchers from similarly configured tractor-trailers and decoys), the analysis should consider SOF capability to designate targets by laser, thus increasing the accuracy of weapon delivery, and SOF capability to conduct direct attacks using portable weapons such as ATGMs. The resulting analysis would yield a rough evaluation of the contribution SOF made during the Great Scud Hunt. Applying the same methodology to a problem in another theater, such as modified Scud in the DPRK, would be more speculative, but still useful.

Guerrilla Warfare

The third context for SOF employment is guerrilla warfare, often included in the expression *low-intensity conflict* (LIC).[16] *Guerrilla warfare* implies military and paramilitary action involving irregular forces that decline to accept or cannot conduct protracted, decisive combat. In this context, SOF either assist the insurgents or help an established government to suppress an insurgency. U.S. thinking on guerrilla warfare is still dominated by the national experience in Vietnam. From the U.S. perspective, the Vietnam conflict could be characterized as guerrilla warfare from 1957 to early 1967,[17] and thereafter as conventional

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[16]For the reasons given in Section 2, this report employs the term *guerrilla warfare*. The official definition of *low-intensity conflict* embraces a wide range of phenomena: "LOW-INTENSITY CONFLICT (LIC): Political-military confrontation between contending states or groups below conventional war and above routine, peaceful competition among states. It frequently involves protracted struggles of competing principles and ideologies. Low-intensity conflict ranges from subversion to the use of armed force. It is waged by a combination of means employing political, economic, informational and military instruments. Low-intensity conflicts are often localized, generally in the Third World, but often contain regional and global security implications." Locher and Stiner, *United States Special Operations Forces, Posture Statement*, 1992, p. D-3.

[17]On 20—21 March 1967, President Lyndon B. Johnson met with senior Vietnamese and U.S. officials in Guam. He announced within this circle that the mission of pacification would be placed

war, although without discernible front lines and still having many traits of guerrilla warfare. That is, in 1967, it ceased to be an interagency effort with primarily nonmilitary objectives and became instead a theater-level campaign with primarily military objectives, but the United States denied itself the best opportunity to gain a military decision by exempting North Vietnam from the ground war for fear of Soviet and Chinese intervention.

Figure 3.15 illustrates a hierarchy of objectives for guerrilla warfare and the analytic steps to evaluate the SOF contribution. The hierarchy leaps from national military objectives to operational tasks because, in the absence of theater-level operations, there are no campaign objectives in the strict military sense, although the protagonists will have overarching goals.

In support of an interagency effort, SOF will accomplish both operational tasks and collateral activities. The primary collateral activity will usually be training the host-nation forces. Another example of a collateral activity is humanitarian action, such as famine relief. The truncated hierarchy of objectives implies that SOF contributions are evaluated at the levels of national security objectives and national military objectives.

The foremost historical example of guerrilla warfare in U.S. experience is the Vietnam conflict. The American national security objective was to preserve an

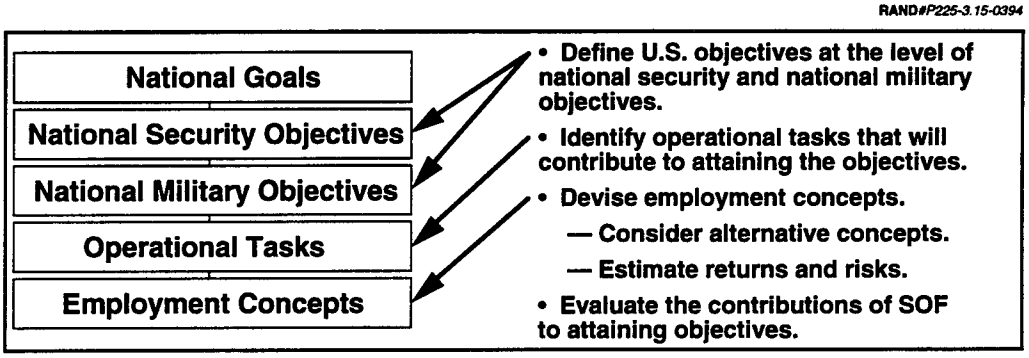

Figure 3.15—Analysis of Guerrilla Warfare

under the Military Assistance Command, Vietnam (MACV). Two months later, pacification was given to the Civil Operations and Revolutionary Development Support (CORDS), an integrated civilian-military command subordinate to MACV. Thus, in a formal sense, the transition to conventional war can be dated from March 1967, when control passed to the military commander. However, large-scale deployment of U.S. ground forces had begun much earlier. On 21 July 1965, President Johnson had approved a plan that doubled draft calls and increased U.S. troop strength in South Vietnam to 175,000. The first major conventional battle was fought in the Ia Drang Valley during October 1965. The Vietnam War did not become an entirely conventional war until North Vietnam conducted a large-scale invasion in 1975.

independent, non-Communist South Vietnam. This objective subsumed at least two national military objectives:

- Ensure survival of non-Communist forces, including the irregular self-defense forces.
- Engage and defeat insurgent forces.

An operational task to attain these objectives was to strike at the insurgents with mobile light infantry, primarily indigenous forces. Indeed, at the outset of American involvement, this operational task was considered central. After the arrival of large, general-purpose forces, however, it receded into the background.

An excellent example of mobile light infantry was the Mobile Strike ("Mike") Force, an employment concept, which is shown in Figure 3.16. These strike forces were rapidly inserted and conducted brief, violent combat actions. They were intended to complement the static forces of the Civilian Irregular Defense Group. Each Mike battalion was composed of locally recruited Montagnards from the central highlands and was officered by a Special Forces Operational Detachment—Alpha (SFOD-A). Most of the "strikers" were airborne-qualified, although airborne assaults were seldom conducted. Their tasks included reinforcing a threatened camp or hamlet, patrolling, conducting special missions in remote areas, and responding rapidly to prevent a camp or hamlet from being overrun.[18] In 1967, the Mobile Strike Forces were incorporated into the overall Military Assistance Command, Vietnam (MACV), planning.

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Surveillance	**Communications intercepts, human agents, prisoner interrogation, air and ground reconnaissance, patrol reports, tactical intelligence**
Assessment	**Insurgent forces: unit identification, personnel, equipment, patterns of activity Friendly forces: fortified villages, civilian irregular defense**
Control	**Military Assistance Command, Vietnam → 5th Special Forces Group → SF Operational Detachment (SFOD) C → SFOD-A → Mike Force battalion**
Preparation	**Recruitment from Montagnard tribes, regular organization and pay, light infantry and airborne training**
Execution	**Insertion by ground movement, heliborne, air drop; taskings include reinforcement, patrol, remote-area operations, and rapid response to insurgent attacks**

Figure 3.16—Employment Concept During Guerrilla Warfare: Mobile Strike Force (Vietnam)

[18]The 5th Special Forces Group also created guerrilla units, based on Mike companies, to operate in remote and largely unpopulated areas. However, this analysis concerns only the regular Mike Force units. Simpson, *Inside the Green Berets*, 1984, pp. 163—168.

Evaluation of the Mike Force is controversial, even several decades after the event. Much of the available material is provided by Special Forces officers who were favorably disposed toward Mike Force. The government of South Vietnam's antagonism with the Montagnards caused it to be less appreciative. Commanders of large U.S. combat forces tended to regard the entire SF effort, including Mike Force, as of small consequence. But U.S. sources tend to agree that the Mike Force was well disciplined, enterprising, and inexpensive. Because the Mike Force battalions operated as light infantry outside the protective fan of American field artillery, the insurgents were more disposed to engage them than main-force elements. Because the Mike Force troopers were indigenous people, they were better adapted and acclimatized than American soldiers, especially in light of the American rotation policies, which generally required one-year tours in Vietnam. The Mike Force units usually performed well in combat, although outside the range of U.S. artillery support.

A rough evaluation of the Mike Force appears in Figure 3.17. On the level of the national security objective, Mike Force was a mixed success. Its antagonism with Saigon notwithstanding, the Mike Force helped the SF and its Montagnard allies to maintain at least minimal control of the highlands. From the U.S. perspective, the Mike Force offered an important advantage: officered by SF and manned by tough tribesmen, it was considerably more reliable than most regular South Vietnamese forces. Certainly, the Mike Force helped to ensure the survival of the non-Communist irregular forces, and it had at least limited success in defeating Viet Cong forces. Because Mike Force was light, it had more engagement opportunities, but lightness also meant that it could not apply annihilating force.

National Security Objective	Evaluation of SOF Contribution
Preserve an independent, non-Communist South Vietnam.	Mixed success: • Viet Cong influence in highlands curtailed. • Antagonism with Saigon government.
National Military Objectives	**Evaluation of SOF Contribution**
1) Ensure survival of non-Communist irregular forces. 2) Engage and defeat Viet Cong forces.	1) Success: Few villages or camps overrun. 2) Mixed success: Engagement on nearly equal terms, except close air support.

Figure 3.17—Evaluation of SOF Contribution: Mobile Strike Force (Vietnam)

Other Use

Other use captures a wide range of SOF employment in noncombat roles. By virtue of their inherent capabilities, SOF may be tasked to participate in collateral activities that include security assistance, humanitarian assistance, antiterrorism and other security activities, counterdrug operations, and personnel recovery.[19] In addition to these activities, SOF can perform or assist in noncombatant evacuation, peacekeeping, and show-of-force operations. All these tasks and activities might be performed without recourse to combat, but, in some activities, such as noncombatant evacuation, SOF might have to transition quickly to combat. Examples of SOF employment in this context include:

- Support to King Faisal (show-of-force in Saudi Arabia, 1963)
- Provide Comfort (humanitarian assistance in Turkey and Iraq, 1991)
- Eastern Exit (noncombatant evacuation in Somalia, 1991)
- Andean Drug Strategy (counterdrug in Latin America, 1991).

In each example, SOF contributed strongly, but they were the predominant force only in the first example, support to King Faisal of Saudi Arabia.

The analytic steps for other use are identical to those for previous contexts, the hierarchy of objectives is different. Figure 3.18 illustrates the difference. Whereas non-operational tasks are performed in the other three contexts, in this context the only task performed may be non-operational. Collateral activities may not involve combat or require an employment concept.[20]

Again, we illustrate the method with an example, support to King Faisal in 1963.[21] The national security objective was to ensure the survival of moderate, friendly states in the Persian Gulf region, an objective that has changed little over the years. The national military objective was to demonstrate American support for the Saudi monarchy. A non-operational task to help attain these objectives was a show of force. A *show of force* can take many forms. Typically, it is conducted as an exercise, overflight, port visit, or other deployment of force into

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[19]See DoD, *United States Special Operations Forces Posture Statement*, June 1992, p. 16.

[20]An employment concept has five elements: surveillance, assessment of data and its fusion into intelligence, control during the mission, preparation, and execution. Most collateral activities, such as security assistance, humanitarian assistance, antiterrorism, civic action, peacekeeping, and show of force, do not normally require fully developed employment concepts. But some aspects of counterdrug operations, personnel recovery, and noncombatant evacuation are analogous to combat or potentially involve combat and, hence, require employment concepts.

[21]See *Doctrine for Army Special Operations Forces*, Department of the Army, United States Army Field Manual 100-25, 12 December 1991, pp. 2-10.

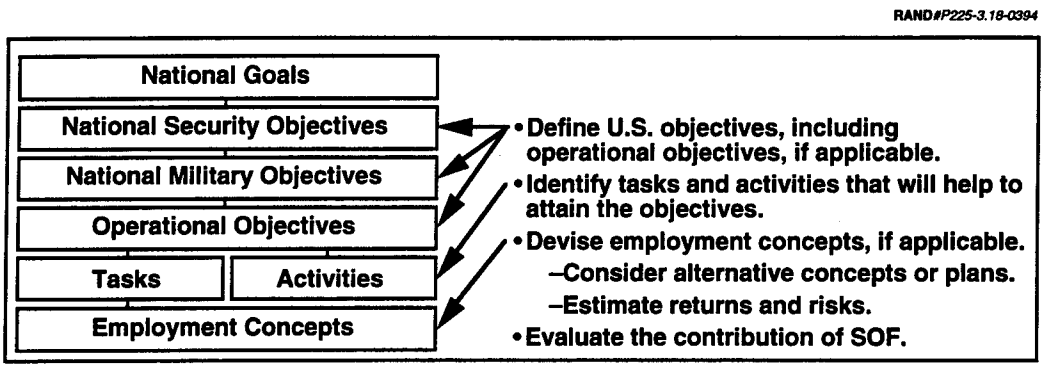

Figure 3.18—Analysis of Other Use

a region. In this example, the United States decided to conduct a show of force using SOF.

The background to this show of force explains why SOF was chosen. In September 1962, a coup overthrew the monarchy in Yemen. President Gamal Nassar of Egypt had himself toppled the Egyptian monarch through a military coup. Nassar was a charismatic leader who had the ambition of uniting the Arab world under his leadership. He not only supported the coup against the monarchy, but also deployed Egyptian troops to Yemen. There they remained until 1967, the year of Egypt's humiliating defeat by Israel in a war provoked by Nassar. Saudi Arabia, itself a monarchy, naturally supported the royalists attempting to regain power in Yemen. Nassar was openly antagonistic to conservative, monarchal governments, causing King Faisal of Saudi Arabia to see a threat to his own throne. Faisal did not wish to provoke Nassar by an overt challenge, and he was sensitive to pan-Arab criticism. But he felt a need for some display of support that would warn Nassar against further adventures on the Arabian Peninsula. In this situation, King Faisal asked for a visible demonstration of American support. In response, the United States ordered elements of the 10th Special Forces Group to perform a mass parachute jump in Riyadh, together with a Saudi airborne unit.

Special Forces appear to have been an ideal choice in these circumstances. Their airborne demonstration in conjunction with Saudi forces was highly visible and showed a close relationship between the Saudi monarchy and the United States. Of special importance from King Faisal's perspective, the demonstration did not

appear to threaten American intervention.[22] Figure 3.19 evaluates the SOF contribution.

Although not immediately threatening Egypt, SOF still constituted a considerable military capability in the region, as exemplified by the considerable success enjoyed by British Special Air Service against guerrillas from Yemen operating in the Dhofar Province of Oman. As events transpired, little threat to the Saudi monarchy materialized. Yemen divided into two countries: the moderate Yemen Arab Republic and the radical People's Democratic Republic of Yemen, which remained hostile to Saudi Arabia. But the People's Democratic Republic of Yemen without Egyptian support offered only a minor threat to Saudi Arabia. Even this threat disappeared in May 1990, when the competing states formed a unified Yemen.

Categorizing Tasks

Having developed an analytic method, we can address this question: To what extent could models in the current state of the art support analysis required for resource-allocation decisions? This ability is more demanding than just obtaining coverage to support training, exercises, or mission planning. Currently and in the foreseeable future, some SOF tasks cannot be modeled for resource-allocation decisions because they are dominated by uncertainty or are too poorly

National Security Objective	Evaluation of SOF Contribution
Ensure survival of moderate, friendly states in the Persian Gulf region.	Success: Overt challenge to Saudi monarchy did not materialize.
National Military Objectives	**Evaluation of SOF Contribution**
Demonstrate military support for the Saudi monarchy without threatening intervention.	Success: • Demonstration was highly visible. • Capabilities were appropriate. • Intervention appeared remote.

Figure 3.19—Evaluation of SOF Contribution: Support to King Faisal

[22] A demonstration or show of force is usually conducted by general-purpose forces. In this example, an element of the 83rd Airborne Division might have been tasked. However, deployment of general-purpose forces would have appeared to threaten U.S. intervention more than deployment of Special Forces did. Special Forces offered some additional advantages: They were acquainted with Saudi procedures and were potentially useful in counterinsurgency operations, such as those conducted by the British SAS to support the Sultan of Oman. Thus, a demonstration by Special Forces might deter the Egyptians from supporting an insurgency directed against the Saudi monarchy.

understood. *Dominated by uncertainty* means that the range of plausible inputs is so large that the outputs will not be useful. *Poor understanding* implies an inability to devise or justify algorithms, to define variables, or to discover values for those variables that can be defined. In the next subsection, we outline analytic support that is required for resource-allocation decisions. In following subsections, we set forth tasks in each of the four contexts and identify to what degree each can or cannot be modeled.

Analytic Support for Resource-Allocation Decisions

Analysis required to support resource-allocation decisions must include employment of SOF at every level through the accomplishment of national military objectives, both independently and in conjunction with U.S. and other friendly forces. Figure 3.20 presents a highly simplified overview of analytic support for resource-allocation decisions across the four contexts.

The quality and size of SOF are independent variables to be determined by analysis. Defining employment concepts at task level is the first step. These concepts involve SOF, in cooperation with general-purpose forces and foreign forces of all descriptions, performing the functions of surveillance, assessment, control, preparation, and execution.

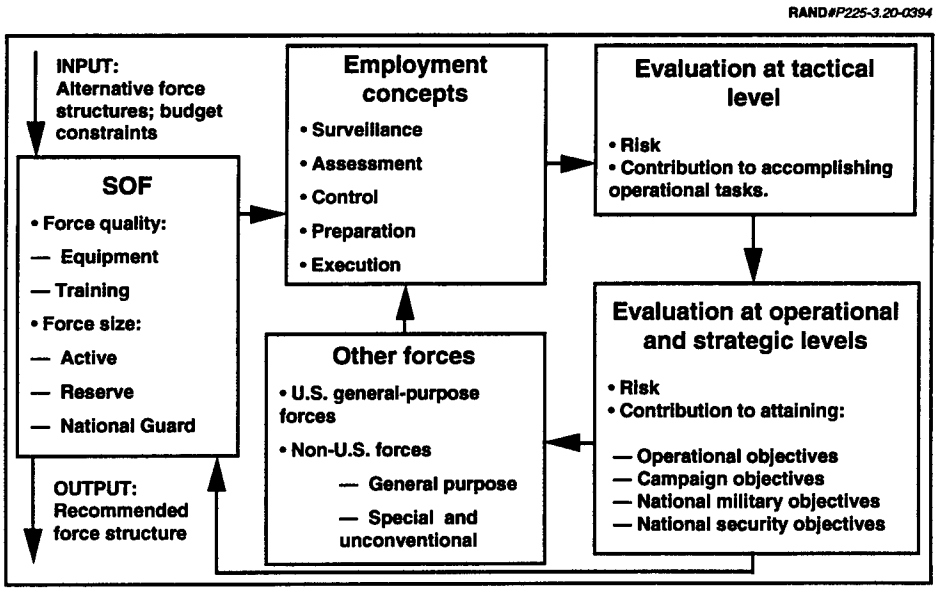

Figure 3.20—Analytic Support for Resource-Allocation Decisions

In an iterative process for alternative force structures, the analysis proceeds through task level to higher levels. In large-force operations, analysis culminates at the level of campaign objectives in support of a unified commander. In national-level tasking, analysis extends to national military objectives that are closely associated with more broadly framed national security objectives, such as combatting terrorism. Risk and the contribution to achieving objectives are related because commanders may accept high risk in operations that promise high returns if successful.

Evaluation at the tactical level identifies optimal employment concepts, especially the best combinations of sensors, platforms, and weapon systems, including SOF and general-purpose forces. *This evaluation is the precondition for analysis at higher levels.* Tactical-level analysis does not cascade into an evaluation at higher levels, because such levels are not summations of tactical-level outcomes. In fact, there are major discontinuities between tactical-level outcomes and progress toward achieving operational and campaign objectives. But evaluation at task level generates the parameters to support higher-level analysis.[23] Evaluation is always accomplished against objectives at the highest appropriate level. In every context, the evaluation will normally include consideration of other forces, including U.S. general-purpose forces and other friendly forces. For example, development of advanced strike capabilities in U.S. forces will enhance SOF effectiveness in direct action. In large-force operations, evaluation will normally be against campaign objectives of the unified commander, and SOF actions will be evaluated as contributions to the success of larger, general-purpose forces. Evaluation may suggest that different employment concepts or a different mix of SOF would be more advantageous, prompting reassessment of the alternative force structure and completing the iterative loop. The final output is a recommended force structure at a given level of expenditure.

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[23]For example, one might consider SEAL teams conducting direct action against littoral targets. An evaluation at the tactical level would indicate the feasibility of insertion under a variety of conditions (e.g., opposing surveillance, sea states, weather) using various means (e.g., small craft, swimmer delivery vehicle, combat swim). It would also include the teams' capabilities (e.g., demolitions, laser designation) to damage or direct fire on opposing assets (e.g., command and control, radars, port facilities, obstacles). This tactical-level evaluation will not sum to an operational-level evaluation; it will not indicate how SEAL teams should be allocated against various targets or the effect on friendly operations if the teams are successful. But tactical-level evaluation provides a foundation for higher-level analysis by generating rough parameters for risk and return at task level. For example, analysis of SEAL teams performing mine clearance might suggest that this task might divert too many teams from tasks that would make larger contributions to an operation or campaign.

National-Level Tasking and Large-Force Operations

How well can models support resource-allocation decisions concerning forces to conduct tasks usually associated with national-level tasking and large-force operations? Figure 3.21 sorts these tasks into two broad categories: those that can be usefully modeled and those that cannot be usefully modeled, either because they are dominated by uncertainty or because they are too poorly understood.

National-level tasking cannot be fully analyzed, much less modeled, to support resource-allocation decisions because *uncertainty dominates* estimates of threat, circumstances surrounding SOF employment, employment concepts, and even the criteria to evaluate success. Evaluation of national-level tasking can be problematic, especially when the objectives are political, humanitarian, and psychological, as the Son Tay Raid illustrates. Although influencing the minds of the North Vietnamese leadership was an important objective of this raid, even if that leadership had been more open, there might still be no reliable way to determine its mental state. In view of such uncertainties, it is unreasonable to expect modeling to produce outputs that would support decisions on the overall size and capabilities of forces required to accomplish national-level tasking.

None of the tasks associated with counterterrorism can be usefully modeled to support resource-allocation decisions. The objectives, personnel or materiel to be

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Description of Task	Can Be Usefully Modeled		Cannot Be Usefully Modeled	
	Detailed, tactical level	Aggregated, operational level	Dominated by uncertainty	Too poorly understood
Rescue hostages and recover sensitive materiel			X	
Attack terrorist infrastructure				X
Conduct geo- and hydrographic reconnaissance		X		
Conduct target acquisition	X	X		
Conduct post-strike reconnaissance		X		
Conduct conventional-force reconnaissance		X		
Destroy key assets	X	X		
Occupy key facilities	X	X		
Capture or recover personnel and materiel			X	

Usually national-level tasking

Usually integrated into large-force operations

Figure 3.21—Categorizing Whether SOF Tasks Can Be Modeled for Resource-Allocation Decisions: National-Level Tasking and Large-Force Operations

recovered, threats to the recovery force, and employment concepts of recovery tasks conducted within counterterrorism and large-force operations are dominated by uncertainty. And although elements of a task, e.g., expected situations such as combat actions to rescue hostages from a highjacked airliner, can be modeled, the entire task cannot be captured. For example, in recent years terrorists have frustrated rescue efforts by flying to another airport before SOF could deploy and prepare for action. Attack on terrorist infrastructure is not amenable to modeling because the character and extent of terrorist infrastructures are poorly understood or cannot be anticipated, especially those for future threats. Moreover, it is unclear what SOF actions would be politically acceptable and how those actions would affect the subsequent course of terrorism.

SOF contributions to large-force operations currently are modeled in detail to support training and exercises. Typically, such detailed modeling requires teams of officers with expert knowledge of employment concepts and the feasibility of special operations under various circumstances. Another class of extremely detailed models includes mission planners and simulators that can depict aspects of tactical problems, such as terrain and airspace, radar coverage, and flight profiles, with great realism. But in the current state of the art, the context of large-force operations cannot be modeled in tactical detail to support resource-allocation decisions because:

- Employment concepts are too complex and flexible.
- Task accomplishment depends on highly uncertain variables.
- Tasks do not aggregate to attainment of objectives.
- Large-force operations are themselves subject to wide uncertainties.

The wide variety of means and techniques for SOF means that just its insertion poses immense problems for detailed modeling. Even if all aspects of a SOF employment concept could be successfully modeled at the tactical level, the connections to operational-level objectives would pose daunting problems. For example, current operational-level models (apart from computer-supported gaming) inadequately capture the implications of maneuver[24] and thus cannot

[24]*Maneuver* implies taking a variety of actions, such as feints, raids, massing, secondary attack, main attack, breakthrough, river crossing, exploitation, pursuit, flanking, and envelopment, to gain advantages for friendly forces. Selecting, sequencing, and executing those actions effectively demands excellent command and control, beginning with the training and education of commanders and key staff officers. Excellent intelligence is often a prerequisite. Thus, maneuver issues are closely linked to issues of command, control, and intelligence. Hexagon- and network-based models allow simple maneuvers in wargames. They also support ex post facto analysis, i.e., "if A did this and B responded in that way, the result might be as follows," without being able to examine the likelihood

address the impact of reconnaissance against general-purpose forces, which primarily involves maneuver.

Some of the tasks associated with reconnaissance and combat action can be usefully, although not exhaustively, modeled in tactical detail. However, tactical-level modeling will not reveal the leverage SOF can exert at the operational level. Nor can the outputs of tactical-level modeling be applied to the operational level without the exercise of expert human judgment outside the model. However, all but one of the tasks associated with reconnaissance and combat action can be usefully modeled at the operational level in an aggregated fashion. Aggregated modeling means that combat actions are presented as parameters or simple algorithms, not modeled in realistic detail. The judgment that a task is amenable to modeling is technical, not programmatic, and does not imply that in every case the requisite modeling effort would be desirable.

Certain aspects of such national-level tasking as counterterrorism can be modeled for a variety of purposes *other than* to support resource-allocation decisions. Such purposes include training, mission planning, and analysis of employment concepts. Models of radar coverage and masking are routinely employed to select optimal flight paths during insertion operations. Tactical-level models can be used to practice control procedures and to explore tactical options. Models can also support decisions to purchase or develop items of equipment.

Guerrilla Warfare

Figure 3.22 categorizes tasks associated with guerrilla warfare, which are less amenable to modeling than those associated with reconnaissance and combat in the context of large-force operations, because guerrilla warfare is a less-well-understood context.

SOF contributions to guerrilla warfare can be selectively modeled in realistic detail to support training and exercises. For example, Victors is an effective training aid for staffs that may have to conduct counterinsurgency. It is also possible to model the effects of insurgency in an aggregated fashion when doing so contributes to the success of larger operations by general-purpose forces, as

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that either decision would be taken. In the current state of the art, players or analysts make decisions about maneuver that may or may not reflect the behaviors of actual protagonists. During the recent Persian Gulf conflict, for example, USCINCCENT was relieved, but also puzzled, when the Iraqis failed to anticipate a flanking attack west of Wadi al Batin.

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Description of Task	Can Be Usefully Modeled		Cannot Be Usefully Modeled	
	Detailed, tactical level	Aggregated, operational level	Dominated by uncertainty	Too poorly understood
Collect intelligence against a government				X
Perform escape and evasion			X	
Conduct subversion				X
Accomplish sabotage			X	
Engage government forces using guerrilla tactics			X	
Collect intelligence against an insurgency				X
Perform civic action to support a government			X	
Train friendly government forces			X	
Interdict insurgent routes		X		
Destroy insurgent bases and forces		X		

☐ Usually integrated into large-force operations or guerrilla warfare ☐ Usually guerrilla warfare

Figure 3.22—Categorizing Whether SOF Tasks Can Be Modeled to Support Resource-Allocation Decisions: Guerrilla Warfare

during World War II. But in that event, the context shifts from guerrilla warfare to large-force operations.[25]

Guerrilla warfare cannot be modeled to support resource-allocation decisions because too many variables are difficult to define or impossible to measure. The "law of small numbers" applies to guerrilla warfare, i.e., the less data available, the less is understood or predictable. It is extremely difficult, if not impossible, to collect reliable data on the political, economic, and social life of a country while it is in conflict. Even if the values for all identified variables were known with precision, guerrilla warfare could not be modeled to support resource-allocation decisions because the interactions of these variables are not well understood. Some critical aspects of counterinsurgency are elusive, such as the means of intelligence collection and the effect of attacks on insurgent infrastructure. Modeling is a tool to test the implications of knowledge; it cannot repair a *lack* of knowledge.

[25]The chief effect of unconventional warfare on large-force operations is typically the diversion of combat units to perform rear-area security. For example, the Germans deployed some 14 divisions in Yugoslavia during 1943 in an effort to defeat Chetniks led by Dragoljub Mihailovich and Partisans led by Josip Broz, known as Tito. Those 14 divisions were unavailable for other missions at a time when the Western allies invaded Sicily and Italy, and the Soviet Union was on the offensive following the Battle of Kursk. Impressed by the report of Brigadier Fitzroy Maclean, who had parachuted into Yugoslavia in September 1943, Prime Minister Churchill decided to offer Tito large-scale assistance.

The actions characteristic of counterinsurgency, i.e., escape and evasion, sabotage, and guerrilla warfare, are dominated by uncertainty. It is impossible to forecast the conditions under which such actions might be conducted, especially the levels of indigenous support to SOF. In addition, U.S. forces have had little to do with insurgency, as opposed to counterinsurgency, since World War II, with a consequent lack of data that could provide insights. Intelligence collection, especially agent intelligence, is too poorly understood to be amenable to modeling, especially the quality of this intelligence and its utility in the context of all-sources analysis. Subversion has psychological, cultural, and social dimensions that are poorly understood and highly situational.

Models appropriate to civic and humanitarian action in the context of counterinsurgency, interdiction of insurgent routes, and destruction of insurgent bases and forces would be highly aggregated. During Desert Storm, SOF provided trainers for Coalition forces, showing that this task may be associated with large-force operations as well as with counterinsurgency. This task is dominated by uncertainty about the levels of effectiveness attained by friendly forces and the contribution made by SOF to this effectiveness. It is extremely difficult to measure the training of U.S. forces, much less the training of foreign forces under uncontrolled circumstances.

Other Use

Collateral activities cannot be usefully modeled to support resource-allocation decisions. All these activities are dominated by wide uncertainties about the region, circumstances, extent of allied and indigenous cooperation, and U.S. objectives. The example of support to King Faisal illustrates the difficulty of evaluating a specific SOF contribution within a volatile political-military situation that includes a large number of poorly understood and exogenous variables. In addition, some of the activities, such as counterproliferation, are not clearly defined. Aggregated modeling might partially capture SOF employment that is relatively well bounded and military in character, such as noncombatant evacuation and certain simple peacekeeping operations. But such modeling would not imply that USSOCOM or any theater-level command could forecast the associated requirements except in the broadest terms. The character and scope of such operations are impossible to foresee before the need actually arises.

Conclusions

The implications for modeling to support resource-allocation decisions by context are that:

- National-level tasking cannot be usefully modeled.
- Large-force operations are
  —Partially amenable to detailed modeling.
  —Generally amenable to aggregated modeling.
- Guerrilla warfare:
  —Insurgency cannot be usefully modeled.
  —Counterinsurgency is partially amenable to aggregated modeling.
- Other use:
  —Not amenable to detailed modeling.
  —Some aspects are amenable to aggregated modeling.

Large-force operations are amenable to aggregated modeling, but comprehensive modeling of phenomena of such complexity would be daunting. Insurgency is an unpromising subject for modeling of any character when the purpose is to support resource-allocation decisions. Counterinsurgency is partially amenable to aggregated modeling, but there are numerous pitfalls: From a U.S. perspective, the Vietnam conflict will long remain a primary source of insights into the requirements of counterinsurgency; yet, two decades afterwards, many aspects of this conflict remain doubtful, controversial, or poorly understood. It is difficult to generalize about other use, which includes extremely diverse tasks and modes of employment, but it seems to preclude detailed modeling. Only certain tasks, such as search and rescue under specified conditions, are amenable to aggregated modeling.

Of course, there are many alternatives to modeling: for example, estimates based on historical experience with a certain type of force, comparisons with the requirements of other governments worldwide, trend analysis to indicate whether requirements are increasing or diminishing, and qualitative analysis.

The context of large-force operations is critically important for modeling SOF because it serves as a primary driver for force requirements. Since World War II, the United States has experienced three conflicts that qualify as major regional contingencies requiring large-force operations: Korea in 1950—1953, Vietnam in 1965—1970, and the Persian Gulf in 1990—1991. Apart from Ranger companies, SOF played a very small role in Korea, but they played important roles in the other two conflicts. They would likely play an important role in a future major regional contingency, especially if the contingency developed rapidly, included friendly indigenous forces, or involved irregular forces on either side of the conflict. Planning for major regional contingencies over the next decade will likely drive force requirements for general-purpose forces and for SOF contributing to large-force operations.

4. Recommendations

This section presents an overall approach to analysis of SOF contributions using the framework developed in the preceding section. It provides an overview of current modeling and makes recommendations for development of models that could support resource-allocation decisions affecting SOF (Task 4). These recommendations are broadly framed and do not constitute advice for sponsoring a particular model in current use or under development. [We discern *four* levels of analysis and recommend policy at *three* levels. We do not make recommendations regarding systems-level analysis.]

Approach to Analysis of SOF Contributions

An overall approach to analysis of SOF contributions should distinguish among the tactical level, the operational level, and the resourcing level, because each level presents a unique issue and is associated with particular analytic tools.

Tactical-Level Approach

The central issue at the tactical level is identification of the optimal employment concepts to accomplish tasks. Analysis focuses on combat actions of highly skilled personnel employing certain weapon systems and specialized platforms, often in close cooperation with general-purpose forces. Because outcomes are subject to massive uncertainties, the aim is *less to predict than to understand what factors are crucial to success.* Useful prediction is done at the extremes, e.g., understanding the conditions under which an employment concept is too risky. Once optimal employment concepts have been identified, it becomes possible to estimate the associated levels of effort. For the purpose of planning, programming, and budgeting, the ultimate aim is to estimate the assets and resources required to accomplish a wide range of tasks appropriate for SOF in four dissimilar operational contexts. Figure 4.1 outlines tactical-level analysis of SOF.

As observed earlier, reconnaissance and combat action must be initially understood and modeled at the level of employment concepts that describe how various force elements contribute to desired outcomes. For general-purpose forces, employment concepts are nearly identical to tactical doctrine. For SOF,

Forces	**SOF operatives, teams, raiding parties, and small units**
Issue	**What are the optimal employment concepts to accomplish tasks?**
Inputs	**Tasks implied by campaign and operational objectives; characteristics of platforms, sensors, and weapons; special skills; alternative employment concepts**
Outputs	**Success in accomplishing tasks, including time to execute and risk to friendly forces**
Tools	**• Small-scale field exercises • Instrumented forces conducting an exercise or demonstration • Interactive distributed simulation employing trainers or actual equipment • Detailed models incorporating the physical characteristics of platforms, sensors, and weapon systems • Analysis of combat experience gained in previous operations and campaigns**

Figure 4.1—Tactical-Level Analysis

employment concepts are less stereotyped and may be highly imaginative. In some instances, SOF will contribute directly to surveillance by their own actions. Control will often involve special command relationships and communications dedicated to SOF. When, as often occurs, SOF break contact with friendly forces, mission execution includes insertion and recovery.

Tactical-level modeling of SOF focuses on the factors critical to success. For example, critical factors governing insertion include environmental and situational concerns, opposing sensors and response options, alternative platforms, and methods. *Environmental and situational concerns* might include climatic and weather conditions, terrain, depths of insertion, attitudes of the indigenous people, and local availability of supplies. *Opposing sensors* might include foot patrols, radar, communications intercept, and aerial surveillance. *Response options* might include air attack, heliborne assault, quick response by military and paramilitary forces, deception, special security measures, and reconstitution. *Alternative platforms* might include standard aircraft, specially configured aircraft, surface craft, submarines, submersibles, and overland vehicles. *Methods* might include protracted, surreptitious presence in the target area and interaction with indigenous resistance groups. Recovery may not be identical to insertion, owing to the nature and duration of combat actions in the target area, opposing responses, and capabilities of friendly forces, both general-purpose forces and irregular forces.

To illustrate the complex demands placed on tactical-level analysis, we offer an example derived from Desert Storm: an employment concept for the destruction

and suppression of mobile ballistic missile launchers using SOF.[1] Figure 4.2 outlines this employment concept. Surveillance is accomplished by a variety of sensor–platform combinations, including Defense Support Program satellites, manned surveillance aircraft, unmanned aerial vehicles (UAVs), and SOF teams. Control is exerted through EC-130E aircraft. Insertion and recovery are accomplished by a variety of specialized rotary-wing aircraft and the CV-22A Osprey. SOF can report the locations of launchers, laser-designate for attack aircraft, or attack with a manportable guided missile, such as Javelin.

During Desert Storm, the British Special Air Service and U.S. SOF accomplished reconnaissance against launchers for modified Scuds deployed in the Iraqi desert. SAS troopers initially designated targets for aircraft, usually A-10s during the day and F-15Es at night, but the launchers often moved before these aircraft could destroy them. Therefore, SAS patrols began to conduct direct attacks on launchers using Milan anti-armor missiles. Each day, SAS reported the 5-kilometer square that each SAS patrol would occupy. Because of geopositioning, the patrols were able to report their exact positions. As a result, U.S. aircraft attacked SAS only once during the war (and missed).

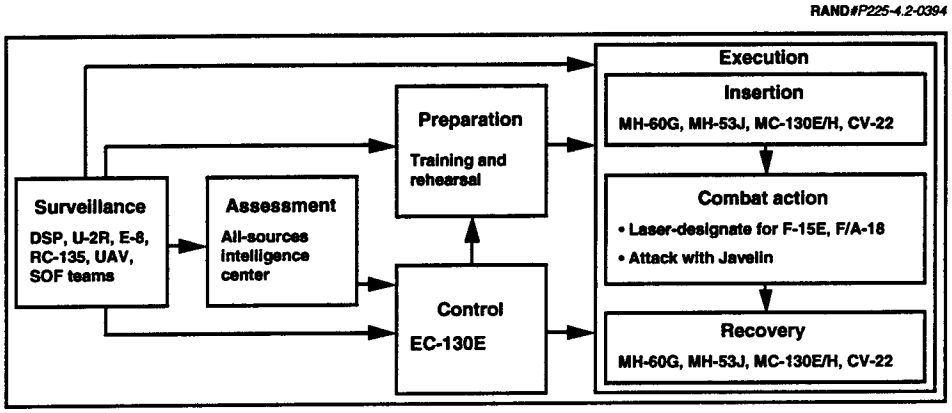

Figure 4.2—Employment Concept to Destroy Mobile Ballistic Missiles

[1]During Desert Storm, at least four employment concepts were considered to destroy and suppress the Iraqi Scud missiles: (1) Combat air patrol (CAP) over "Scud boxes" with DSP cueing. But pilots were often unable to identify the launchers at night, even when they had observed the launch plume. (2) Strike reconnaissance by British and U.S. SOF teams with strike by aircraft flying CAP. This concept proved more effective. (3) Airborne assault by two brigades of 82nd Airborne Division in the vicinity of H-2 and H-3. This concept was rejected as too risky. (4) Three-day saturation bombing of all facilities within the "Scud boxes," including the towns of Al Qaim and Rutba. This concept was rejected because it would divert too many sorties and cost too many civilian casualties. Atkinson, *Crusade*, 1993, pp. 146—148.

Figure 4.3 shows issues associated with tactical-level analysis of an employment concept such as that in Figure 4.2 to destroy and suppress mobile ballistic missiles. These issues include insertion options, timeliness and completeness of cueing, the strike reconnaissance capability of SOF, and the direct action capability of SOF. To assess the prospects for success and roughly bound the required effort, analysis should take these issues into consideration.

Each method of insertion would imply a maximum depth considering basing options, refueling possibilities, and resupply. Options would include SOF-specific aircraft and general-purpose aircraft in various combinations operating from land bases or aircraft carriers. At shallow depths, insertion might be over a littoral, employing small craft or submersibles. During Desert Storm, the British SAS eventually ran a land convoy into Iraq during daylight to resupply its teams.[2] Each insertion option implies an optimally configured SOF element with a nominal endurance time, equipped to laser-designate or engage a missile launcher. In view of the great uncertainties surrounding an actual campaign, probabilities of successful insertion would be rough estimates, perhaps an upper and lower bound of risk defined by a few key parameters.

The mobility of field-deployed ballistic missiles makes cueing an extremely important consideration. The area that a SOF team could effectively cover, whether through laser designation or direct attack, would be highly sensitive to timely receipt of intelligence. JSTARS and other reconnaissance aircraft might sense the movement of vehicles within the area of interest, but they might have

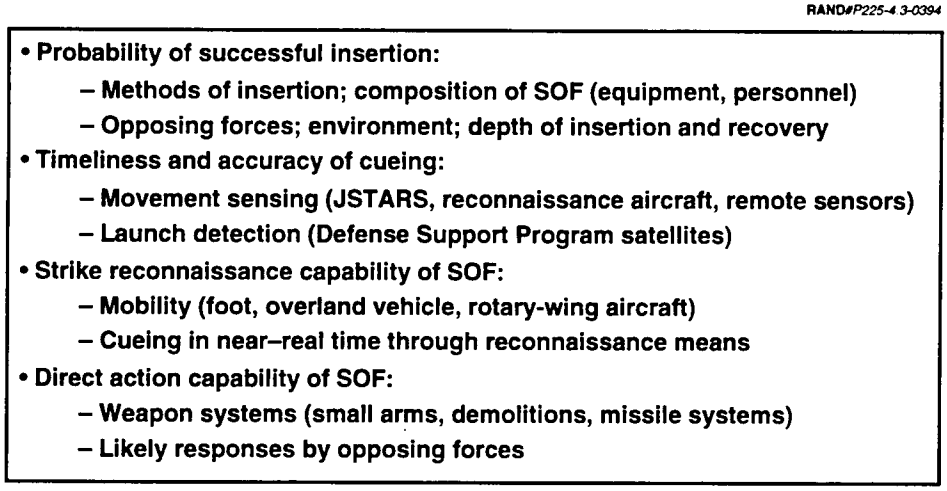

Figure 4.3—Tactical Issues: Destroy and Suppress Mobile Ballistic Missile Launchers

[2]Atkinson, *Crusade*, 1993, p. 267.

very limited ability to discriminate between missile launchers and other large land vehicles. DSP satellites would be able to detect launch plumes. Strike reconnaissance capability of SOF would depend on their own mobility and cueing. During Desert Storm, SAS officers were initially uncertain whether to operate on foot or vehicle mounted. On the Jordanian lava plateau, terrain was heavily dissected by deep, rocky wadis, making foot patrols feasible; in other areas, the terrain was so flat and featureless that foot patrols could not operate at acceptable risk. SOF must normally *remain undetected* because they lack sufficient combat power to survive against even relatively small general-purpose forces.

Analysis must also consider SOF capability to take direct action evaluated against opposing responses, such as the provision of security forces. During Desert Storm, SAS were able to engage Scud launchers directly because the Iraqis had provided only minimal security forces, typically a few air defense guns. If the situation permitted, SOF might conduct direct action from land vehicles or special operations aircraft.

Operational-Level Approach

The central issue at the operational level is evaluation of the SOF contribution to attaining objectives set by commanders of large formations. At the operational level, general-purpose forces and SOF are integrated or coordinated to accomplish campaign and operational objectives. Typically, SOF perform reconnaissance and combat action in this context, but they might also perform any tasks. Guerrilla warfare has strategic and tactical dimensions, but typically lacks an operational dimension, except from the perspective of general-purpose forces trying to conduct counterinsurgency operations. Analysis focuses on the evaluation of SOF contributions to the accomplishment of operational and campaign objectives under various scenario assumptions and concepts of operation for friendly and opposing forces. Figure 4.4 outlines operational-level analysis of SOF.

We use destruction and suppression of mobile ballistic missile launchers in the Democratic People's Republic of Korea (DPRK) to illustrate operational-level analysis. Since 1985, the DPRK has produced its own variant of the Soviet Scud-B missile. This missile apparently has a 700-kilogram payload and a range of approximately 500 kilometers. From south-central DPRK, these improved Scud-Bs cover almost the entire territory of the Republic of Korea (ROK). On 29 May 1993, the DPRK tested the indigenously produced Nodong-1 missile,

Forces	**SOF integrated into larger operations by general-purpose forces**
Issue	**How can SOF best contribute to attaining operational and campaign objectives?**
Inputs	**Alternative concepts of operations; operational and campaign objectives; employment concepts for SOF; alternatives for SOF size and mix**
Outputs	**Evaluation of the SOF contribution to attaining objectives**
Tools	**• Large-scale field exercises with SOF participation** **• Field exercises or instrumented forces linked to interactive, automated wargames that incorporate SOF** **• Aggregated models of military operations with SOF modules** **• Interactive, automated wargames** **• Political-military games** **• Historical study of SOF contributions to large operations and campaigns**

Figure 4.4—Operational-Level Analysis

estimated to have a 1,000-kilometer range.[3] From south-central DPRK, Nodong-1 missiles cover the entire ROK; all of Kyushu and Shikoku, two principal Japanese islands; and part of Honshu, the main Japanese island. From northern DPRK, Nodong-1 missiles still cover the entire ROK. In a full-scale offensive, the DPRK might launch improved Scud-Bs and Nodong-1s against leadership targets, military command centers, airfields, port facilities, and other high-value targets. The DPRK might also threaten Japan in an effort to attain Japanese neutrality. Destruction and suppression of these missiles would be an important objective for the ROK and the United States during a conflict with the DPRK. Figure 4.5 illustrates this scenario.

This employment of SOF is extrapolated from unclassified accounts of Desert Storm.[4] ROK and U.S. teams are inserted from carrier battle groups in the Sea of Japan using MH-53J and CV-22A aircraft. Through Talon Lance, they have near–real-time access to integrated intelligence derived from satellites (including DSP), aerial collection platforms, and remote sensors. After insertion, the teams perform strike reconnaissance for land-based F-15E and carrier-based F/A-18

[3]During the 29 May test series, the DPRK fired as many as three Nodong-1 missiles at ranges up to 500 kilometers into the Sea of Japan. Nodong-1s may have a large enough payload for an indigenously produced nuclear warhead. Duncan Lennox, "Missile Race Continues," *Jane's Defence Weekly*, 23 January 1993, pp. 18-19; *Aviation Week & Space Technology*, 5 July 1993, p. 17; Defense Intelligence Agency, *North Korea: The Foundations for Military Strength*, Washington, D.C., October 1991, pp. 25 and 42.

[4]Although Desert Storm provides a paradigm, employment against mobile launchers in the DPRK would have a significantly different character. During Desert Storm, the Iraqis dispersed Scud launchers across parts of the western desert and other relatively uninhabited areas. The Iraqis normally provided minimal security to the launchers, generally small numbers of troops and anti-aircraft guns. They relied primarily on decoys, hide positions, and rapid displacement to prevent Coalition forces from identifying and attacking the launchers. The North Koreans are likely to use different methods, including superhardened hide facilities and strong guard forces.

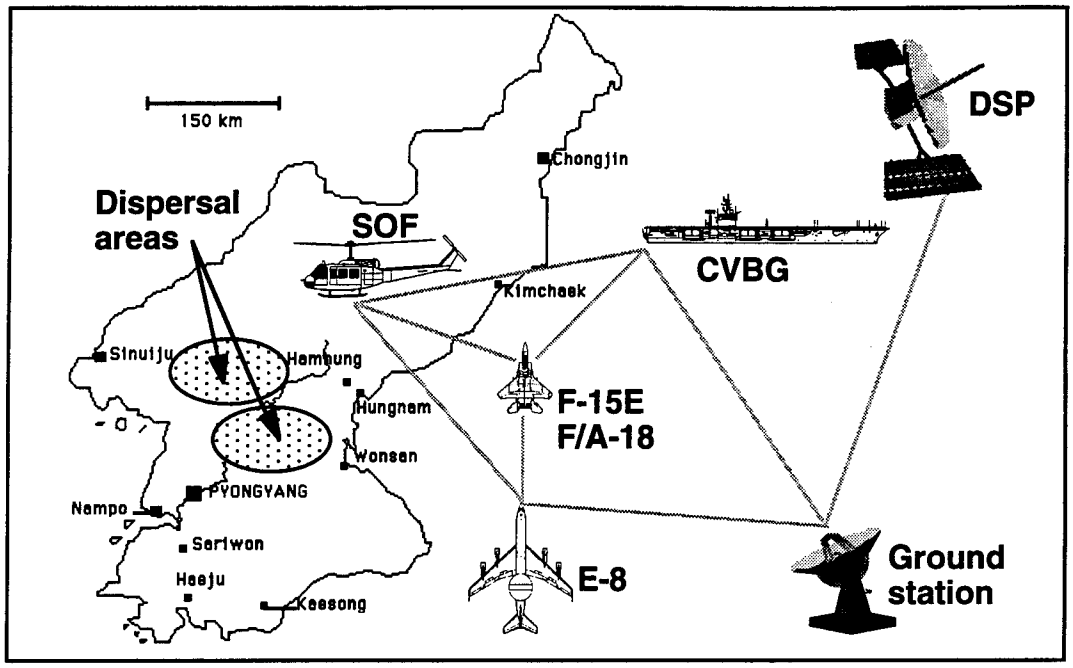

Figure 4.5—Operational-Level Scenario: Ballistic Missiles in DPRK

aircraft, or they attack launchers directly using anti-tank guided missiles. The attack aircraft might use AGM-130, Joint Direct Attack Missiles (JDAMs), or Joint Standoff Weapons (JSOWs). The area each team could cover depends on its mode of transportation within the DPRK, terrain, road networks, off-road mobility for launchers, population centers, and weather. Effectiveness in strike reconnaissance depends on the means of designation, numbers and types of attack aircraft on call, their sensors and armament, and their reaction times. After ROK and U.S. forces attained at least air superiority, friendly attack aircraft could fly combat air patrol (CAP) over suspected deployment areas. Effectiveness in direct action against the launchers depends on the protection afforded them, their mobility and dispersion, possible use of decoys, and the weapons available to SOF, including ATGM.

The analysis should consider trends and responses over the course of a campaign. The ROK and U.S. forces might begin operations with an incomplete understanding of the dispersal areas that improved markedly over time, as happened during Desert Storm. However, the DPRK might respond to successful attacks by trying to launch all missiles before they could be destroyed, by withholding missiles in superhardened facilities, or by allocating more forces to guard the launchers. The analysis should test the sensitivity of outcomes to key variables: What will be the effect if dispersal areas are larger than anticipated, perhaps extending to the Chinese border for Nodong-1? What if

DPRK air defenses, including the SA-5 air defense missile sites, are more resilient than expected?

As an added difficulty, legal, policy, and political constraints might limit SOF employment. Prior to the onset of the air campaign during the Persian Gulf conflict, Coalition forces were not allowed to operate in the northern tip of the Persian Gulf in order not to appear provocative. Similarly, ROK and U.S. SOF might be prohibited from operating on the territory of the DPRK or in DPRK airspace prior to the onset of hostilities. The output of operational-level analysis is an evaluation of the SOF contribution, in conjunction with general-purpose forces, to attaining an objective—in this case, the destruction and suppression of ballistic missiles.

Resourcing-Level Approach

At the resourcing level, USSOCOM considers a variety of issues that do not appear in analyses at the tactical level and the operational level. These issues include:

- Fiscally unrestrained force requirements to conduct:
  —National-level tasking worldwide
  —Special operations in support of general-purpose forces:
    - MRC in single theaters
    - Multiple simultaneous contingencies
  —Guerrilla warfare and collateral activities
- Attainment and maintenance of special skills:
  —Applicable worldwide
  —Regionally oriented
- Special equipment implied by SOF tasks
- Costs of staging and forward basing
- Alternative force mixes by component
- Effects of law, policy, and strategy on SOF employment.

The resourcing level of SOF analysis builds on assessment of SOF resources required across theaters, in different scenarios, and under various assumptions. *Special skills*, such as marksmanship, familiarity with foreign weapons, low-level night flying, parachuting, combat swimming, language proficiency, and knowledge of a region and its people, are costly and difficult to attain. Moreover, they require nearly constant reinforcement. Requirements for *special equipment* typically include highly modified aircraft, seaborne insertion systems,

highly portable and secure communications, and nonstandard weapons. *Staging and basing* may require creation or designation of specialized facilities, equipment, and stocks to support special operations. USSOCOM must also compare the relative cost and effectiveness of SOF in the active, reserve, and National Guard *components of the total force.* In some cases, National Guard forces may provide a desired capability at lower cost.[5] In other cases, only active-duty forces can attain the desired degree of proficiency or be available within constraints of time and national policy. Analysis includes the *effects of law, policy, and strategy* on SOF employment, for which no model currently exists at resourcing level. If one were to be developed, it would be highly aggregated, perhaps in the form of linked spreadsheets.

Overview of Current Modeling

Figure 4.6 presents an overview of current modeling as it might be used to support planning, programming, and budgeting of SOF. At each level, models are characterized by typical functions, character, and their current status.

Current Tactical-Level Modeling

At the tactical level, USSOCOM is currently sponsoring development of a mission planning aid, the Special Operations Forces Planning and Rehearsal System (SOFPARS), with Lockheed Sanders as prime contractor for the air

Level	*Functions*	*Character of Model*	*Current Status*
Tactical	**Support examination of employment concepts and estimate effort to accomplish tasks.**	**Mission planners; stand-alone detailed models; detailed models embedded in aggregated models**	**New development: SOFPARS; UCCATS/Janus applications; CBS, JTLS enhancements**
Operational	**Support evaluation of SOF contributions to operations and campaigns.**	**Decision logic controlling aggregated models**	**embryonic**
Resourcing	**Support analysis of alternative force structures, considering priorities and risks within fiscal constraints.**	**(linked spreadsheets?)**	**(nonexistent)**

Figure 4.6—Overview of Current Modeling

[5]SOF assigned to the National Guard currently include 1st Battalion, 245th Aviation (Airborne), Tulsa, Oklahoma; 19th Special Forces Group (Airborne), Draper, Utah; and 20th Special Forces Group (Airborne), Birmingham, Alabama.

planning portion. Stand-alone models, such as Urban Combat Computer Assisted Training System (UCCATS), and various applications of Janus, enable detailed simulation of employment concepts. The Joint Warfare Center sponsors a Janus variant, known as the Joint Conflict Model (JCM), that will support simulation of SOF. In addition, USSOCOM sponsors tactical-level enhancements Corps Battle Simulation and Joint Theater Level Simulation. These two models are designed to drive staff exercises by providing realistic combat outcomes.

Figure 4.7 summarizes the utility and limitations of current detailed modeling at the tactical level from an SOF perspective. Detailed models support mission planning, such as developing optimal flight paths through hostile territory, by creating virtual realities. Detailed models also support analysis of employment concepts, at least to the extent of roughly estimating the required forces. Detailed models, both stand-alone and embedded in aggregated models, also support training and exercises. Exercises at corps- and task-force levels familiarize staffs with the capabilities of SOF and increase their awareness of SOF contributions.

Detailed tactical-level models have several limitations. Currently, and for the foreseeable future, detailed models will not exhaustively simulate SOF employment. SOF employment concepts are too complex and flexible to permit exhaustive modeling, although certain aspects of an employment concept are clearly amenable to modeling. For example, a tactical-level model might demonstrate the role of stealth technology in allowing surface craft to approach a littoral unobserved. But no model is able to simulate adequately the full range of insertion modes available to SEALs, including airdrop, small craft, submersible delivery vehicle, and combat swim, in a wide variety of circumstances. Also, during an actual campaign, SOF are likely to adopt innovative concepts that were not anticipated prior to the beginning of operations. SOF may use any suitable

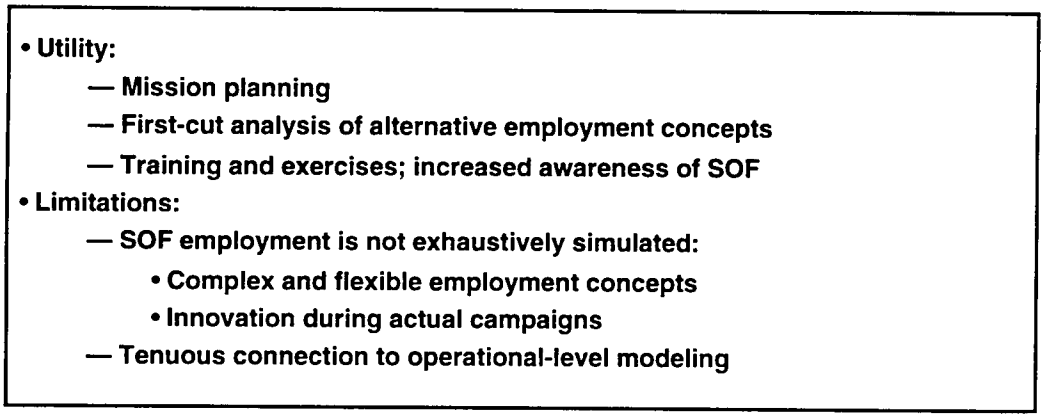

Figure 4.7—Utility and Limitations: Detailed Tactical-Level Models

military or civilian equipment and employ any methods that are in accordance with U.S. law and policy. Their use of innovative tactics makes it unlikely that tactical modeling will ever become exhaustive.

Current tactical-level modeling has a tenuous connection to operational-level modeling. This connection is made during exercises and wargames by applying human intelligence through the players, who make operational decisions. These decisions are highly situational and difficult to analyze. They are also intuitive and depend on the personal experiences of the players. Different players make different decisions even in identical situations. As a result, their decisions are of limited utility in devising decision logic. This lack of connection poses a dilemma for modeling that could support analysis of SOF contributions. For example, the intervention of human players is needed to evaluate the impact of reconnaissance against conventional forces. But this intervention precludes development of an automated model that could be used iteratively. Instead, it generates a limited number of unique outcomes that are not exhaustive and may not even be representative.

Current Operational-Level Modeling

Figure 4.8 summarizes the utility and limitations of current detailed modeling at the operational level from a SOF perspective. Operational-level models currently support exercises, wargames, and theater-level analysis.[6] They are useful in raising awareness of SOF, but they offer only limited support to analysis of SOF contributions. Such support is limited to selected examples of reconnaissance and combat in the context of major regional contingencies. Even for these selected examples, the current models fail to adequately reflect the effect of SOF in such key areas as intelligence, command and control, maneuver, and forced entry.

Only an embryonic decision logic is available to control operational-level models. As a result, combat is either simulated very crudely (for example, by piston-style movement) or decisions are left to expert judgments of human players. Mechanistic simulations ignore important U.S. advantages and negate important effects of SOF, especially in performing reconnaissance. The interaction of human players allows more realistic play at the expense of iterative analysis.

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[6]For example, CBS at the National Simulation Center, JCM and JTLS at the Joint Warfare Center, RSAS-ITM at the Army War College, Air University, and National Defense University support exercises and wargaming. TACWAR supports theater-level analysis by TRADOC Analysis Center, USCENTCOM, and the Joint Staff.

- **Utility:**
  - **— Exercises, wargames, some theater-level analysis**
  - **— Limited support to analysis of SOF contribution (SR and DA in MRC)**
- **Limitations:**
  - **— Embryonic decision logic available**
  - **— Wide ranges of possible outcomes:**
    - **With partial exception of Korea, scenarios are speculative**
    - **Uncertain values of key parameters**
  - **— No direct aggregation to resourcing level**

Figure 4.8—Utility and Limitations: Aggregated Operational-Level Models

Operational-level modeling produces wide ranges of outcomes because scenarios are speculative and values of key parameters are uncertain. With the partial exception of the Korean peninsula, scenarios are speculative. For example, gross uncertainties surround a future conflict in the Persian Gulf region. Prior to Desert Storm, the Coalition conducted a protracted buildup of overwhelming force and Saddam Hussein released his potential hostages—scenario elements that tended to minimize SOF contributions to the campaign. In some future conflict, the United States might have less time to deploy and hostage rescue might play a crucial role. The opponent is also speculative: It might be Iraq or Iran, with a consequent threat to the Strait of Hormuz. The conflict might be conventional or involve weapons of mass destruction. Moreover, the values of key parameters are highly uncertain. Prior to Desert Storm, U.S. planners anticipated weeks of combat and thousands of U.S. casualties because they assumed that the Iraqi units would offer considerable resistance. The rapid collapse of resistance came as a welcome surprise. As a consequence of such uncertainties, operational-level modeling (or analysis) can generate outcomes so widely disparate that they do little to support resource-allocation decisions.

Just as tactical-level modeling does not cascade to the operational level, so operational-level modeling does not cascade to the resourcing level. (In other words, results of analysis at the resourcing level are *not* a summation of operational-level outcomes.) Cascading is impossible, because operational-level modeling does not capture the full range of SOF employment across all contexts. Nor does it reflect the acquisition and maintenance costs associated with special equipment and skills, nor the relative cost and effectiveness of forces and mixes by component, all important issues at the resourcing level.

Current Resourcing-Level Modeling

No models currently exist to support SOF analysis at the resourcing level. It might be possible to develop a special-purpose model for such support, perhaps a series of linked spreadsheets.

Modeling Priorities for SOF

Of the four contexts for SOF employment, large-force operations should have priority for modeling because this context:

- Reflects the focus of overall U.S. planning.
- Tends to drive force requirements.
- Demonstrates leverage inherent in special operations.
- Is more amenable to modeling than the other contexts.

Current planning focuses on force projection in major regional contingencies. In such contingencies, SOF actions would be integrated into larger operations to achieve campaign objectives. Large-force operations tend to drive force requirements by defining an upper range for SOF in the achievement of national security objectives viewed across theaters, although some SOF, such as those specializing in counterterrorism, are often employed outside this context. The leverage that SOF provide is particularly evident in the context of large-force operations, where SOF actions may have great influence.

As discussed in Section 3, the remaining three contexts (national-level tasking, guerrilla warfare, and other use) are less amenable than large-force operations to modeling because they have wider ranges of uncertainty and are less well understood. Indeed, no models could adequately assess the requirements to accomplish national-level tasking. Force sizing for this context is a matter of expert judgment within parameters set by policy.

In large-force operations, priority should go to those critical objectives and their associated tasks to which SOF can make important contributions. Examples are

- Destroy and suppress mobile weapons systems:
  —Destroy ground mobile ballistic missile launchers.
  —Destroy ground mobile cruise missile launchers.
- Prevent proliferation of weapons of mass destruction:
  —Interdict shipment of associated technology and materials.
  —Conduct preemptive strikes on related facilities.

- Neutralize existing weapons of mass destruction:
  —Destroy research facilities and kill or recover expert personnel.
  —Destroy factories and storage sites.
  —Locate and destroy fixed and mobile delivery systems.
  —Degrade associated command and control.
- Destroy and degrade opposing command and control.
- Conduct reconnaissance and combat to support forced entry.
- Conduct reconnaissance against targets not well covered by national assets.
- Destroy and suppress opposing air defense.

These priorities reflect areas that will be critical to large-force operations in major regional contingencies at least over the next ten years. It is unlikely that even a very capable antitactical ballistic missile system will obviate the need for active measures against mobile ballistic missile launchers. It is also unlikely that the United States can completely solve the problems in target acquisition posed by mobile launchers without recourse to SOF. In addition, potential adversaries will probably field cruise missiles to circumvent tactical ballistic missile defenses.

Weapons of mass destruction are likely to pose an increasingly severe threat to deployed U.S. forces. Under some circumstances, for example, by intimidating a regional ally, threat alone might have a decisive effect. All aspects of such weapons, including research centers, factories, and unique communications facilities, could be critical targets for SOF. All the services, but particularly the Navy, currently place increased emphasis on forced entry. SOF has traditionally played an especially large role in forced entry, including reconnaissance and limited combat against opposing forces in the objective area. SOF will have general utility in reconnaissance against critical targets that national assets either cannot observe or cannot sufficiently discriminate. SOF traditionally make important contributions toward suppression of air defense, an objective that will remain important, especially in the initial phase of a campaign.

Recommendations

Each of the four contexts differs substantially in its amenability to modeling. In a prudent modeling strategy, therefore, USSOCOM should take a different approach within each context. Figure 4.9 summarizes recommendations.

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Context	Tactical	Operational	Resourcing
National-Level Tasking	Not recommended: rely on historical studies and trend analysis; adduce rationale.		Possible use of spreadsheet models to track interrelationships
Large-Force Operations	Develop broad correlations of effort and results.	Consider sponsorship of aggregated models.	
Guerrilla Warfare	Not recommended: rely on historical studies and trend analysis.		
Other Use	Not recommended: activities cannot be usefully modeled or even forecast.		

Figure 4.9—Recommendations

National-Level Tasking

In national-level tasking, SOF might perform any task, but they usually perform a task associated with counterterrorism (hostage rescue, recovery of materiel, attack on terrorist infrastructure). The National Command Authority usually determines the objective, which is likely to be political or psychological, for example, deterring terrorism by demonstrating the national capability and will to respond. National-level tasking is not amenable to modeling that could support resource-allocation decisions.[7]

USSOCOM should not attempt to develop automated models of national-level tasking. Instead, USSOCOM should conduct or sponsor studies that draw on historical precedents and projections of current trends to identify the broadly defined capabilities that might be required to accomplish national-level tasking anywhere, anytime, under widely disparate conditions. In support of resource requests, USSOCOM should emphasize the unique character of national-level tasking. Figure 4.10 summarizes the rationale for SOF in this context.

[7]Models can be very helpful once a specific action is contemplated, e.g., mission planners can assist in developing flight profiles or shooter-level models can help to plan a specific action. *The problem lies in predicting, even within very wide bounds, what actions may be required.* For example, during the decades of friendly relations between the United States and the Shah of Iran, no one could anticipate that SOF would attempt to cross the eastern desert (Dasht-e Lut) covertly to rescue U.S. Embassy personnel held hostage in Tehran. Such massive uncertainty implies that SOF must be prepared to conduct counterterrorist operations worldwide under conditions that cannot be foreseen.

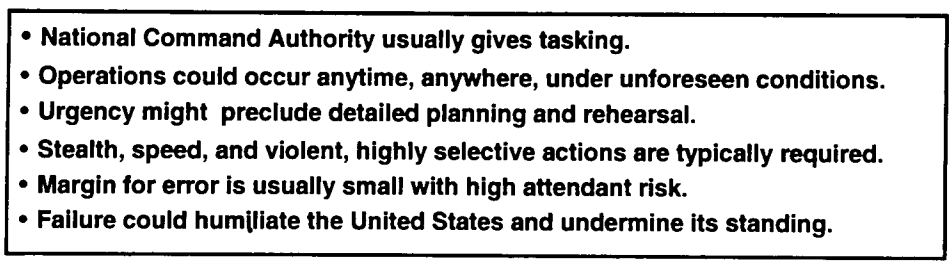

Figure 4.10—Rationale for SOF: National-Level Tasking

This unique character implies that national-level tasking demands the highest professional competence across a range of tasks that can be anticipated only in the broadest terms. The training, equipment, and size of those SOF most closely associated with national-level tasking, especially counterterrorism, are typically kept secret,[8] to prevent prospective opponents from planning against them.

Large-Force Operations

In large-force operations, SOF usually perform a task associated with reconnaissance or combat action. The objectives are normally determined by a joint task force or theater commander. SOF are evaluated as they contribute to attaining those objectives in cooperation with general-purpose forces.

None of the currently used models can adequately support analysis of SOF contributions to large-force operations because they generally fail to adequately handle issues of intrinsic interest to special operations, such as intelligence, command and control, deep fires, maneuver, and forced entry. These are serious omissions for analysis of general-purpose forces and they largely preclude analysis of SOF contributions. In this situation, USSOCOM should adopt a cautious strategy such as that outlined in Figure 4.11.

At the tactical level, USSOCOM should give priority to tasks associated with critical objectives for large-force operations. Insights gained from small field exercises and actual employment, such as Desert Storm, provide the basis for continuing efforts to develop mission planning aids and to ensure that SOF and its characteristic employment concepts are represented in such exercise drivers as

[8]For example, the British Government acknowledges the existence of 22nd Special Air Service Regiment, but protects all else about the unit, including the identities of its members. The public had a glimpse of SAS methods when the SAS freed hostages in the Iranian Embassy on 6 May 1980. Eighteen SAS men conducted three simultaneous assaults, killing five terrorists and capturing one alive with a loss of one hostage. The assault took just 11 minutes. It well illustrates the special capabilities required to conduct counterterrorism.

- **At the tactical level, USSOCOM should:**
  - **— Give priority to tasks associated with critical operational objectives.**
  - **— Gain insights from small field exercises and actual employment.**
  - **— Continue effort to develop and enhance mission planning aids.**
  - **— Continue to sponsor representation of SOF in exercise drivers.**
  - **— Contribute to development of interactive, distributed simulation.**
- **At the operational level, USSOCOM should:**
  - **— Give priority to critical operational objectives.**
  - **— Gain insights from large field exercises, interactive games, and study of historical campaigns.**
  - **— Sponsor development of aggregated models of SOF employment.**

Figure 4.11—Modeling Recommendations: Large-Force Operations

JTLS, JCM, and CBS. In addition, USSOCOM should contribute to the development of interactive, distributed simulations linking trainers, actual forces, and aggregated models. Such models and simulations support training and familiarization with SOF, but they have only limited use for resource-allocation decisions—limited to broad correlations of effort and results that help to provide a basis for aggregated modeling.

At the operational level, USSOCOM should give priority to critical objectives to which SOF can make important contributions. For example, counterproliferation is becoming critical because potential opponents, such as the DPRK, are apparently developing weapons of mass destruction and delivery systems. If, as appears likely, efforts to prevent proliferation should fail, actions to eliminate existing weapons of mass destruction will become essential. Using insights gained from large field exercises, interactive games, and study of historical campaigns, USSOCOM should sponsor development of aggregated models of SOF employment. Aggregated modeling abstracts from tactical detail to examine how SOF, in cooperation with general-purpose forces, contribute to attaining objectives. Rather than attempting to model discrete insertions, for example, an aggregated model might employ parameters to bound the likelihood of successful insertion under sets of assumed conditions.

Guerrilla Warfare

In guerrilla warfare, SOF perform tasks associated with either insurgency or counterinsurgency. The objectives are normally determined by an interagency effort (insurgency) or a country team (counterinsurgency). The tasks associated

with insurgency are not amenable to modeling that could support resource-allocation decisions. Some of the tasks associated with counterinsurgency can be modeled in an aggregated fashion, but even for them, the values of key variables are highly uncertain. USSOCOM should not attempt to develop models of guerrilla warfare to support resource-allocation decisions. Rather, it should rely on historical studies and trend analysis to roughly assess the effort that might be required in a prospective region or theater.

Other Use

Other use captures a variety of collateral activities that SOF may be tasked to perform because of its special capabilities. With few exceptions, such activities cannot be usefully modeled because they cannot even be foreseen in the time required for resource-allocation decisions. [Typically, this time is five years out, but we cannot see five years ahead except in the most general terms.] For example, the most difficult UN peacekeeping operations currently in progress (Bosnia, Cambodia, Somalia) were not foreseen five years ago, nor is it clear even now what SOF commitments may be required in these instances. USSOCOM should not attempt to develop models of other use to support resource-allocation decisions.

5. Conclusions

Challenges to Analysis

Special operations forces present exceptional challenges to analysis because of (1) greater difficulty than for general-purpose forces at the tactical level, (2) more discontinuity than for general-purpose forces between the tactical level and the operational level, and (3) poorly defined contexts for special operations.

Difficulty at Tactical Level

Contributions of SOF are extraordinarily difficult to analyze at the tactical level, owing to flexible employment concepts, unique combat actions, and unforeseen employment opportunities. Flexibility is not merely desirable for SOF, it is the *sine qua non*. Given their low combat power, SOF must have flexibility to be effective and even to survive.

Flexibility implies adopting unorthodox methods, searching for small vulnerabilities, avoiding combat, and escaping detection entirely. Like any military force, SOF train to perfect definite skills, such as clearing a room of terrorists in the presence of hostages, fast roping, or coordinating various types of close air support. But how they exploit these skills depends on their ingenuity and the exigencies of the situation. SOF actions may be one of a kind, never to be repeated, like the Son Tay Raid or Eagle Claw. When actions are repeated, such as SOF teams methodically performing strike reconnaissance, each action is likely to have its own character. Adding the last degree of difficulty, SOF employment opportunities are difficult to forecast and may be unforeseen, such as "Scud hunting" in Desert Storm.

Analysis of general-purpose forces at the tactical level is more straightforward because of doctrinal tactics, repeated actions of a similar type, and expected patterns of employment. Of course, general-purpose forces are also flexible, for example, in devising new breaching tactics during Desert Storm. But they usually adhere to doctrine as elaborated in battle drills and standard operating procedures. Relative inflexibility is an inescapable characteristic of large, standardized forces. It allows such forces to implement a common plan and generate great combat power, while minimizing confusion and fratricide.

(*Fratricide* is the inadvertent destruction of friendly forces.) A commander of SOF enjoys great latitude because he is responsible for only small forces. If tactical-level commanders of general-purpose forces had the same latitude, large formations would become impossibly difficult to control. General-purpose forces usually repeat combat actions that can be usefully analyzed by type, e.g., counter–battery fire by multiple-launch rocket systems (MLRSs) or engagement of SAM by Wild Weasel. Finally, employment of general-purpose forces usually accords with expectations, although there are invariably surprises. Prior to Desert Storm, for example, the tactic of "tank plinking" was unexpected. This tactic involves attack aircraft patrolling designated areas of the battlefield and attacking individual armored vehicles with precision-guided weapons such as Maverick.

Discontinuity Between Levels

Discontinuity between the tactical level and the operational level of warfare causes difficulties for the analysis of general-purpose forces, but much greater difficulties for analysis of special operations forces. Figure 5.1 illustrates this difference graphically.

For both SOF and general-purpose forces, there is discontinuity between the tactical level and the operational level of warfare. *Discontinuity* means that tactical-level outcomes do not sum to operational results. Thresholds are an obvious reason, e.g., a unit suffering a 20-percent loss in 24 hours is doubtless not 80 percent effective; indeed, it may be completely ineffective. Another obvious reason is the advantage of position. A flanking attack or attack from the rear can be many times more effective than a frontal attack with the same force.

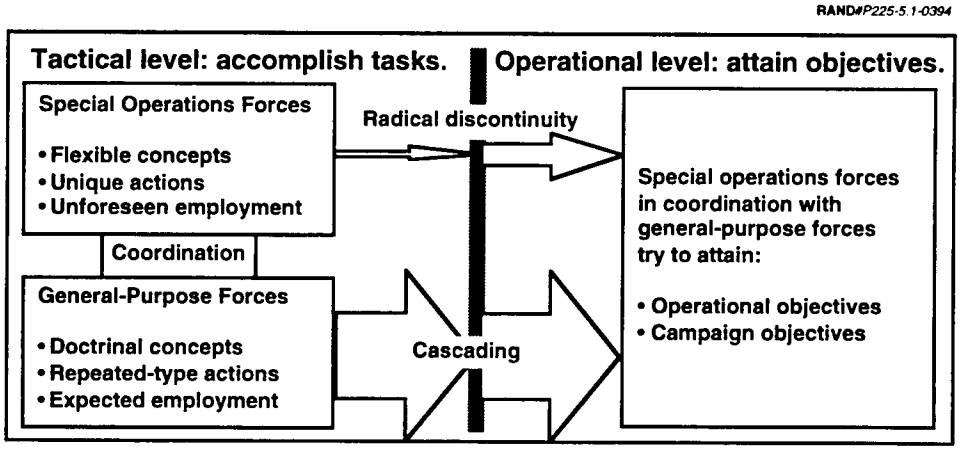

Figure 5.1—Challenge of Discontinuity

Possession or denial of key terrain, such as ports, airfields, straits, or river crossings, can have a decisive effect on an operation or campaign. A more subtle cause of discontinuity is exploitation of relative strengths and weaknesses, well demonstrated in Desert Storm. The Coalition enjoyed almost unchallenged naval and air power, whereas Iraq had large, well-equipped ground forces. Therefore, the Coalition blockaded Iraq and subjected Iraqi forces to protracted air attack before initiating ground combat and even then conducted a vast flanking movement rather than a frontal attack. As a result, Iraq could not realize the combat potential of its ground forces.

Despite this discontinuity, general-purpose forces generate a cascading effect because of their size. When most strike packages deliver munitions on target, an air offensive is usually successful. When most maneuver units defeat their counterparts, a ground operation is usually (but not always) successful. *Cascading* occurs most obviously in wars of attrition, such as the Western Front during World War I or the recent Iran-Iraq War, but it is evident in all large-force operations. Cascading does not occur in special operations, if only because there are no large arrays of SOF to cause it. Instead, commanders employ small SOF in selective ways at the tactical level to gain critical advantages at the operational level. Special operations exhibit *radical discontinuity* from the tactical level to the operational level. Analysis leaps from a tactical action (e.g., destroying a command post) to an operational effect (e.g., degraded control with its consequences).

Poorly Defined Contexts

Special operations can very seldom be analyzed in isolation. They are usually analyzed in the contexts of large-force operations or guerrilla warfare. But currently these contexts are poorly defined.

Large-Force Operations. Prior to 1989, U.S. defense planning was dominated by a commitment to conduct general war against the Warsaw Pact within days to weeks. U.S. forces were developed to defend against immense arrays of heavy maneuver forces well supported by tactical aviation across a broad front. Since the collapse of European Communism, the United States no longer anticipates that general war could occur with such short warning. Instead, planning centers on major regional contingencies. But with the partial exception of the Korean peninsula, such MRCs are poorly defined in terms of likely opponents, scenarios, and U.S. objectives. Unable to project threat, U.S. planners have officially abandoned threat-based analysis. The analyst of SOF faces difficulty piled on

difficulty: how to evaluate SOF contributions and assess SOF requirements in the context of conventional campaigns that are themselves poorly defined?

Guerrilla Warfare. Guerrilla warfare intertwines political, economic, military, social, psychological, and cultural factors in ways that are not well understood, either from the perspective of insurgency or that of counterinsurgency. Moreover, in both activities there is no reliable way to quantify important variables. With few exceptions, the United States has acquired little experience in conducting an insurgency since 1945. World War II provides insights into insurgency, but few firm conclusions about its impact on large-force operations, even in celebrated instances such as the French Resistance or the Yugoslav Partisans. Counterinsurgency, as in the Vietnam War, is no better understood and is still highly controversial. Since the threat of Communist-supported insurgency has receded, it is uncertain how or where the United States will again become strongly involved in counterinsurgency.[1] This great uncertainty makes guerrilla warfare a poorly defined context.

Modeling Opportunities

Given these challenges to analysis, USSOCOM should adopt a cautious approach to modeling. Current modeling offers very limited support to resource-allocation decisions. It inadequately simulates the actions of SOF and does not capture its contributions to attaining operational-level objectives. The deeper problem is not military modeling, but the lack of a systematic, coherent military science that can support modeling. However, there are four promising opportunities: familiarization with SOF, training and mission planning, development of employment concepts, and discovery of operational insights.

Familiarization with SOF

Inclusion of SOF into models that support staff training, exercises, and wargaming enables military officers to become familiar with SOF. Officers outside the SOF community should understand how employment of SOF and general-purpose forces differs, and they should appreciate the leverage that SOF can exert. Familiarization helps to ensure that, in some future contingency, SOF will be successfully integrated into large-force operations.

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[1]The most likely near-term possibility would be a UN–NATO peacekeeping operation in the former Yugoslavia in the event that Croats, Moslems, or Serbs resorted to partisan warfare. But even this example is highly speculative.

Training and Mission Planning

The exponential growth of computing power permits development of increasingly realistic trainers and mission planning aids. In addition, distributed simulation offers the prospect that dissimilar trainers or actual weapon systems can take part in a shared virtual reality, much as flight trainers currently simulate formation flying. These efforts parallel development of digital links that will allow personnel mounted in ground vehicles, helicopters, and fixed-wing aircraft to share situational awareness. Along with general-purpose forces, SOF should benefit from these tactical-level developments.

Development of Employment Concepts

Detailed models and distributed simulations support analysis of employment concepts. They help identify tactical problems and suggest solutions, including choices of weapon systems and development of new systems. However, models and simulations cannot supplant field trials, exercises, and combat experience, particularly for SOF that rely heavily on individual skills.

Discovery of Operational Insights

Aggregated models and computer-supported wargaming, including hybrids of actual and simulated forces, can provide insights into large-force operations that integrate SOF and general-purpose forces. In carefully bounded instances, these techniques can assist in developing and evaluating plans. The validity of these evaluations will depend on the assumptions built into the models and the performance of players, especially those representing opponents of the United States.

Rationale for SOF

Military modeling, often adduced to support resource-allocation decisions for general-purpose forces, fails to support analysis of SOF contributions because SOF and general-purpose forces are fundamentally different. General-purpose forces generate sustained combat power to defeat opposing forces and thus gain control of aerospace, sea, and land. In contrast, SOF cannot gain control because they cannot defeat general-purpose forces, except in brief, localized engagements. Why, therefore, should the United States develop expensive elite forces that generate little sustained combat power? The rationale includes

leverage, unique capabilities, audacity, flexibility, low visibility, and guerrilla warfare.

Leverage

SOF offer good return on investment when they exert leverage: when they avert losses to general-purpose forces by eliminating an opponent's capability or seizing a key objective. During Urgent Fury, for example, the Rangers seized Salines Airport, allowing two brigades of the 82nd Airborne Division to land unopposed.

Unique Capabilities

Sometimes a target is so inaccessible or elusive that only SOF can attack it or even identify it. During World War II, the Norsk hydroelectric plant in Telemark was inaccessible to the weapon systems of the day. During Desert Storm, the Iraqi Scud missiles proved so elusive that only SOF could identify them consistently.

Audacity

U.S. forces may have just one opportunity to accomplish an intricate, risky operation in which even a small mistake can cause failure. Such a situation ensues, for example, when a regional adversary tries to influence U.S. policy by holding Americans hostage and the NCA decides to recover them by force. Eagle Claw and Pacific Wind were operations of this character. To accomplish such risky operations, the United States requires not only SOF but also a command structure that ensures that special operations are well planned, rehearsed, and controlled.[2]

Flexibility

Flexibility allows a commander to confront the opponent with disparate threats, to recover from setbacks, and to make optimal allocations of force. During Desert Storm, USCINCCENT had the option of employing MH-53J Pave Low and AH-64 Apache against radars on the border of Iraq. SOF were an optimal

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[2]"In Iran [Eagle Claw] we had an ad hoc affair. We went out, found bits and pieces, people and equipment, brought them together occasionally and then asked them to perform a highly complex mission. The parts all performed, but they didn't necessarily perform as a team." Charlie A. Beckwith and Donald Knox, *Delta Force*, Harcourt Brace Jovanovich, New York, 1983, p. 295.

choice for this task because they could report with high certainty and in real time that those early-warning radars were destroyed.

Low Visibility

Because SOF are less visible than general-purpose forces, they entail less risk of escalation and may be more acceptable to friendly governments. In an extreme case, the United States may wish to conduct an operation without official involvement; however, covert operations fall outside the scope of this research.

Guerrilla Warfare

Guerrilla forces employ the tactics of special operations, including stealth, surprise, and highly selective combat, although they usually lack the specialized equipment and training that distinguish SOF. General-purpose forces are too ponderous to respond effectively without causing extensive collateral damage, i.e., damage to persons and things other than the intended targets. In any situation that involves unconventional tactics, SOF are the force of choice.

Selected Bibliography

Air Force Command Exercise System (ACES), Functional Description (FD), Air Force Wargaming Center, Maxwell AFB, AL, 3 April 1992.

Air Force Command Exercise System (ACES), STRATWAR User's Manual, Air Force Wargaming Center, Maxwell AFB, AL, 1 November 1992.

Air Force Command Exercise System (ACES), System Specification (SS), Air Force Wargaming Center, Maxwell AFB, AL, 1 November 1992.

Air Force Command Exercise System (ACES), Wargame Engine Analyst Manual, Air Force Wargaming Center, Maxwell AFB, AL, 9 March 1992.

Air Force Wargaming Center Compendium of Exercises, Center for Aerospace Doctrine Research and Education, CADRE/WGO, Maxwell AFB, AL, September 1991.

Allen, Patrick D., and Barry A. Wilson, *The Secondary Land Theater Model,* RAND, N-2625-NA, Santa Monica, CA, July 1987.

ATCAL: An Attrition Model Using Calibrated Parameters, U. S Army Concepts Analysis Agency, CAA-TP-83-3, Bethesda, MD, August 1983.

Atkinson, Rick, Crusade: *The Untold Story of the Persian Gulf War,* Houghton Mifflin Company, Boston, MA, 1993.

Barnett, Frank R., ed., *Special Operations in US Strategy,* National Defense University Press, Washington, DC, 1984.

Beckwith, Charlie A., and Donald Knox, *Delta Force,* Harcourt Brace Jovanovich, New York, 1983.

Booz-Allen & Hamilton, Inc., *Regional Development Simulation System—Single Nation Model (RDSS-SNM), Analyst's Guide* (Preliminary Draft), Arlington, VA, 9 June 1992.

Concepts Evaluation Model VI (CEM VI), Volume I—*Technical Description,* U.S. Army Concepts Analysis Agency, Bethesda, MD, January 1985, revised October 1987, pp. 5-7–5-20 and Appendix B.

Corps Battle Simulation: How to Train with CBS, RDA Logicon, Tacoma, WA, December 1988.

Corps Battle Simulation (CBS), Version 1.3, Analyst's Guide, Volume 1, *Ground,* Jet Propulsion Laboratory, Pasadena, CA, May 1991.

Corps Battle Simulation (CBS), Version 1.3.5, COBRA User's Guide, Jet Propulsion Laboratory, Pasadena, CA, September 1991.

Corps Battle Simulation (CBS), Version 1.3.5, User's Handbook, Jet Propulsion Laboratory, Pasadena, CA, November 1991.

Darilek, Richard E., *Gaming Nonreduction Measures (NoREDs) for Conventional Armed Forces in Europe (CFE),* U.S. Army Concepts Analysis Agency, Bethesda, MD, November 1990, pp. 12–17.

Davis, Paul K., and Donald Blumenthal, *The Base-of-Sand Problem: A White Paper on the State of Military Combat Modeling,* RAND, N-3148-OSD/DARPA, Santa Monica, CA, 1991.

Defense Intelligence Agency, *North Korea: The Foundations for Military Strength,* Washington, DC, October 1991.

Department of Defense, *Conduct of the Persian Gulf War, Final Report to Congress,* Washington, DC, April 1992.

Dewar, J. A., et al., *Non-Monotonicity, Chaos, and Combat Models,* RAND, R-3995-RC, Santa Monica, CA, 1991.

Dockery, Kevin, *SEALS in Action,* Avon Books, New York, 1991.

Downing, Wayne A., "A Force of 'Great Utility' That Cannot Be Mass-Produced," *Army,* April 1992, pp. 25–33.

Enhanced Naval Warfare Gaming System (ENWGS), Development Specification (B1), Computer Sciences Corporation, Moorestown, NJ, October 1985.

Enhanced Naval Warfare Gaming System (ENWGS), User's Manual, Volume 1—*General Operating Instructions,* Computer Sciences Corporation, Moorestown, NJ, April 1991.

Flanagan, E. M., Jr., "Hostile Territory Was Their AO in Desert Storm," *Army,* September 1991.

Hoffman, Bruce, *Commando Raids: 1946–1983,* RAND, N-2316-USDP, Santa Monica, CA, October 1985.

Hollis, Walter W., "Yes, We Can Rely on Computer Combat Simulations," *Armed Forces Journal,* October 1987.

Integrated Theater Engagement Model—ITEM, Wargaming & Simulation Division, Science Applications International Corporation, San Diego, CA, 18 March 1992.

Joint Exercise Support System (JESS)/Corps Battle Simulation (CBS), JESS/CBS-TACSIM Interface Description, Jet Propulsion Laboratory, Pasadena, CA, April 1990.

Joint Test Publication 3-05, Doctrine for Joint Special Operations, The Joint Staff, Washington, DC, 17 October 1990.

Joint Theater Level Simulation (JTLS), JTLS Controller Guide, Joint Warfare Center, Hurlburt Field, FL, March 1992.

Joint Theater Level Simulation (JTLS), JTLS Data Requirements Manual, Joint Warfare Center, Hurlburt Field, FL, March 1992.

Joint Theater Level Simulation (JTLS), JTLS Director Guide, Joint Warfare Center, Hurlburt Field, FL, March 1992.

Joint Theater Level Simulation (JTLS), JTLS Executive Overview, Joint Warfare Center, Hurlburt Field, FL, March 1992.

Joint Theater Level Simulation (JTLS), JTLS Installation Manual, Joint Warfare Center, Hurlburt Field, FL, March 1992.

Joint Theater Level Simulation (JTLS), JTLS Interactive Terrain Process User Guide, Joint Warfare Center, Hurlburt Field, FL, March 1992.

Joint Theater Level Simulation (JTLS), JTLS Lanchester Coefficient Development Tool User Guide, Joint Warfare Center, Hurlburt Field, FL, March 1992.

Joint Theater Level Simulation (JTLS), JTLS Player Guide, Joint Warfare Center, Hurlburt Field, FL, March 1992.

Joint Theater Level Simulation (JTLS), JTLS Scenario Development System User Guide, Joint Warfare Center, Hurlburt Field, FL, March 1992.

Joint Theater Level Simulation (JTLS), JTLS SSP/SVP User Guide, Joint Warfare Center, Hurlburt Field, FL, March 1992.

Joint Theater Level Simulation (JTLS), JTLS Technical Coordinator Guide, Joint Warfare Center, Hurlburt Field, FL, March 1992.

Joint Theater Level Simulation (JTLS), JTLS Version [8.1] *Description Document,* Joint Warfare Center, Hurlburt Field, FL, March 1992.

Joint Theater Level Simulation (JTLS), Version 1.7, Analyst Guide, Modern Aids to Planning Program (MAPP), Joint Staff (J-8), Pentagon, Washington, DC, January 1991.

Kelly, Ross S., *Special Operations and National Purpose,* Lexington Books, Lexington, MA, 1989.

King, Michael J., *Rangers: Selected Combat Operations in World War II,* Combat Studies Institute, Fort Leavenworth, KS, June 1985.

Lennox, Duncan, "Missile Race Continues," *Jane's Defence Weekly,* 23 January 1993, pp. 18–19.

Locher, James R. III, "Low Intensity Conflict, Challenge of the 1990's," *Defense,* July/August 1991.

Locher, James R. III, ASD(SO/LIC), and Carl W. Stiner, USCINCSOC, *United States Special Operations Forces Posture Statement,* U.S. Government Printing Office, Washington, DC, June 1992.

MacKenzie, Richard, "Apache Attack," *Air Force Magazine,* October 1991.

Marcinko, Richard, *Rogue Warrior*, Simon & Schuster, New York, 1992.

Menard, Christian, *The Theatre Analysis Model (TAM), Version 3.10, Documentation of the Campaign Model*, Department of National Defence, Canada, Operational Research and Analysis Establishment, Directorate of Land Operational Research, DLOR Staff Note 91/6, Ottawa, July 1991.

Mountbatten, Lord Louis, *Combined Operations: The Official Story of the Commandos*, Macmillan, New York, 1943.

NATO 2000, Strategy and Plans Directorate, U.S. Army Concepts Analysis Agency, July 1990, Appendix C.

NATO Nuclear Planning System Integrated Theater Engagement Model Software User's Manual (NU), Science Applications International Corporation, San Diego, CA, 10 February 1992.

Paddock, Alfred H., Jr., *US Army Special Warfare: Its Origins*, National Defense University Press, Washington, DC, 1982.

PANTHER, Basic Rules and Supplements Manual (Book I), Combined Arms Command—Training, 91-3810, Fort Leavenworth, KS, 1991.

PANTHER, Computer Operations Manual (Book IV), Combined Arms Command—Training, 91-3809, Fort Leavenworth, KS, 1991.

PANTHER, How to Train Manual (Book II), Combined Arms Command—Training, 91-3807, Fort Leavenworth, KS, 1991.

PANTHER, Organizer's Manual (Book III), Combined Arms Command—Training, 91-3808, Fort Leavenworth, KS, 1991.

PANTHER, User's Guide, Combined Arms Command—Training, 91-3811, Fort Leavenworth, KS, 1991.

Report of Proceedings of the Low Intensity Conflict Analysis Workshop (LICAAWS), U.S. Army Concepts Analysis Agency and Army—Air Force Center for Low Intensity Conflict, Langley Air Force Base, VA, June 1991.

Schemmer, Benjamin F., "8th Special Ops Squadron Nicknamed 8th Bomb Squadron After BLU-82 Missions," *Armed Forces Journal International*, July 1991.

Schemmer, Benjamin F., "Special Ops Teams Found 29 Scuds Ready to Barrage Israel 24 Hours Before Ceasefire," *Armed Forces Journal International*, July 1991.

Schemmer, Benjamin F., "USAF MH-53J Pave Lows Led Army Apaches Knocking Out Iraqi Radars to Open Air War," *Armed Forces Journal International*, July 1991.

Schemmer, Benjamin F., *The Raid*, Harper & Row, New York, 1986.

Shapiro, Norman Z., et al., *The RAND-ABEL Programming Language: Reference Manual*, RAND, N-2367-1-NA, Santa Monica, CA, December 1988.

Simpson, Charles M., III, *Inside the Green Berets*, Berkley Books, New York, 1984.

STRATEXT 92, Air Force Wargaming Center, Maxwell Air Force Base, AL, March 1992.

TAC THUNDER Analyst's Manual Version 5.5, The CACI Products Company, Arlington, VA, June 1991.

TAC THUNDER Programmer's Manual Version 5.5, The CACI Products Company, Arlington, VA, February 1991.

Tactical Warfare Simulation, Evaluation, & Analysis System Employment, Manual, Naval Ocean Systems Center, AN/TSQ-T9(V), Newport, RI, June 1987.

Tactical Warfare Simulation, Evaluation, & Analysis System, User's Overview, Naval Ocean Systems Center, AN/TSQ-T9(V), Newport, RI, November 1986.

TACWAR Air Analyst Guide, USCENTCOM, MacDill AFB, FL, August 1991.

TACWAR Data Dictionary Input, USCENTCOM, MacDill AFB, FL, August 1991.

TACWAR Ground Analyst Guide, USCENTCOM, MacDill AFB, FL, August 1991.

TACWAR Logistics Analyst Guide, USCENTCOM, MacDill AFB, FL, August 1991.

TACWAR Utility (TACUTL) User/Maintenance Manual, USCENTCOM, MacDill AFB, FL, November 1991.

Theater Analysis Model (TAM) AirLand Campaign Model User's Manual, Booz-Allen & Hamilton, Inc., Arlington, VA, October 4, 1990.

U.S. Special Operations Command, *USSOCOM Joint Mission Analysis (JMA) Planning Data and Assumptions Conference—Read Ahead Package*, USSOCOM, MacDill AFB, FL, 1991.

Waller, Douglas, "Secret Warriors," *Newsweek*, New York, June 17, 1991.

Warner, Philip, *Secret Forces of World War II*, Scarborough House Publishers, Chelsea, England, 1991.