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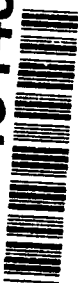
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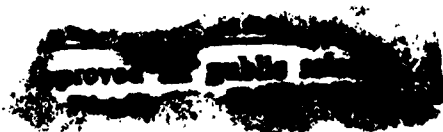
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PREFACE

This document, for Army use only, is a selected bibliography of documents published by the Arroyo Center since its transfer to RAND in 1984. "Documents" here mean documents in RAND's standard publication series (i.e., Administrative Reports, Monographs/Reports, Notes, Drafts, and Working Drafts.) Books and journal articles are excluded. Abstracts are included for Monographs/Reports and Notes and for other documents as available. Those interested in obtaining documents from this bibliography should contact:

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THE ARROYO CENTER

The Arroyo Center is the U.S. Army's federally funded research and development center (FFRDC) for studies and analysis operated by RAND. The Arroyo Center provides the Army with objective, independent analytic research on major policy and organizational concerns, emphasizing mid- and long-term problems. Its research is carried out in four programs: Strategy and Doctrine; Force Development and Technology; Military Logistics; and Manpower and Training.

Army Regulation 5-21 contains basic policy for the conduct of the Arroyo Center. The Army provides continuing guidance and oversight through the Arroyo Center Policy Committee (ACPC), which is co-chaired by the Vice Chief of Staff and by the Assistant Secretary for Research, Development, and Acquisition. Arroyo Center work is performed under contract MDA903-91-C-0006.

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ABSTRACTS

MONOGRAPH/REPORTS

MR-104-A **USAREUR Force Structure.** R. D. Howe, W. D. O'Malley. 1993.

This report describes an approach to structuring the United States Army Europe (USAREUR) in the middle to late 1990s as a function of the mission of that command. The study finds that as long as it retains forces in Europe, the Army will serve as the ground arm of the United States European Command (USEUCOM), as the visible symbol of U.S. involvement in, and commitment to, European security and stability, and as the counter to the potential power of the Soviet Union (or unified successor). Meeting these functions will require a future USAREUR that is visible, capable, flexible, and expandable. Specifically, USAREUR must have a more balanced and flexible force structure than in the past, with likely missions requiring that a larger fraction of USAREUR have enhanced strategic (theater) mobility. Most importantly, USAREUR requires a clear and complete mission to determine the force levels it will need.

MR-105-A **Quantifying the Battlefield:** RAND Research at the National Training Center. M. Goldsmith, J. Grossman, J. M. Sollinger. 1993.

This report discusses RAND's research approach at the National Training Center (NTC), describes some of the representative studies completed over the past eight years, and illustrates how the Army uses the results. The research process identifies discrepancies among training, doctrine, and practice; constructs hypotheses about causes; and then supports or refutes them by examining data in standard data bases or gathered from focused field collection efforts. One of the two studies addressed in detail in the report estimated the frequency of ground-to-ground fratricide (1 to 3 percent of Blue Force kills) and concluded that improved command and control could prevent most fratricides. Another study focused on tactical reconnaissance and found that although a clear correlation exists between success in battle and reconnaissance, essential reconnaissance tasks were accomplished in only half the battles, and Blue Force scouts were frequently engaged by the enemy. The document also shows how such studies have contributed to Army decisions affecting doctrine, training, and equipment.

MR-113-OSD/AF/A **Data Rearrangement and Real-Time Computation.** P. N. Armstrong. 1993.

This report displays special switching networks and memory systems that permit simultaneous storage and rearrangement of data so that the required difference between input and output data sequences can be accommodated without expenditure of time. The document begins by discussing elements of several self-sorting machines (SSMs) of current interest and describes their relation to machines that perform the tasks of self-rearranging memory (SRM). Then, the document outlines five computing systems, including programmable arithmetic processors and SRMs, and describes a few potential applications of SRMs that display the advantages such systems provide generally, and particularly in military defense systems (e.g., target missile assignment problems). The document concludes with several conclusions about multiple-string rearranging memory (MSRM) and single-string rearranging memory (SSRM) machines and includes suggestions for future research, such as programming, the advantages to be gained from MSRM, and the class of computations for which an SSRM/processor is adequate.

MR-114-A **Assumption-Based Planning: A Planning Tool for Very Uncertain Times.** J. A. Dewar, C. H. Builder, W. M. Hix, M. H. Levin. 1993.

This report documents the five steps of a strategic planning methodology (assumption-based planning) RAND has developed over the last four years, provides examples of the methodology (showing its application in an end-to-end exemplar of the Army's long-range planning exercise-Army 21), and suggests some lessons learned from the applications. The five steps of the methodology are (1) identifying important assumptions underlying an organization's operations and plans; (2) identifying assumption vulnerabilities within the planning horizon; (3) conceiving organizational responses to the vulnerabilities; (4) defining signposts (i.e., indicators or warning signals that a vulnerable assumption may be breaking); and (5) defining shaping and hedging actions (i.e., actions taken to avert or cause the vulnerability of an assumption and actions taken to better prepare for the failure of an assumption). The document argues that the methodology provides a systematic way of thinking about and dealing with a future containing fundamental uncertainties about an organization's ends.

MR-118-A **Distributed Training of Armor Officers.** J. D. Winkler, S. Way-Smith, G. A. Moody, H. Farris, J. P. Kahan, C. Donnell. 1993.

Using the Armor Officer Advanced Course (AOAC) as a case study, this report identifies alternative approaches for individual training and analyzes their cost implications.

The study shows that 5 percent of the material in the AOAC is unrelated to job performance and could be considered for elimination from resident training. The study also finds that distributed training can provide some savings; however, its potential is limited because the amount of the distributable material is smaller than initial expectations—on the order of 25 percent, not the 40 to 60 percent called for in initial planning. Cost savings from distributed training depend on the mix of training media and technologies to conduct it (the higher tech the mix, the greater the start-up costs and the smaller the recurring savings) and on whether sufficient capacity exists to conduct it at soldiers' home stations. Ultimately, the study argues for a modest role for distributed training, involving in-place technologies such as paper, videotape, and personal computers, and only as much material as can be absorbed by soldiers and field units without interfering with daily operations and readiness.

MR-119-A Device-Based Training of Armor Crewmen. G. A. Moody, S. Way-Smith, H. Farris, J. D. Winkler, J. P. Kahan, C. Donnell. 1993.

Using the Abrams Tank Crewman One-Step Unit Training as a case study, this study identifies alternative approaches for individual training and analyzes their cost implications. It suggests that although the current course's content and length is consistent with job requirements in the initial duty assignment, more efficient training techniques can be used in resident instruction. The analysis shows that many armor-specific tasks currently taught using tanks can be taught using training aids, devices, simulators, and simulations (TADSS). In addition, the amount of computer-based training (CBT) can be increased in basic training. Expanded use of TADSS to replace training on vehicles can provide substantial savings in operating and support costs, but the level of costs and savings depends on how the devices and course changes are implemented. If new trainers and simulators must be developed and procured, savings will be cut. The study also found that savings differ across devices. Although substituting TADSS for tanks appears cost effective, the evidence for CBT is mixed.

MR-120-A Computer-Based Training of Cannon Fire Direction Specialists. H. Farris, W. L. Spencer, J. D. Winkler, J. P. Kahan. 1993.

Using the advanced individual training of Cannon Fire Direction Specialists as a case study, this report identifies alternative approaches for individual training and analyzes their cost implications. The study suggests that the current course can be reorganized to reduce course length and conserve resources while meeting fundamental training objectives. Specifically, 20 percent of the current training time contains tasks that may not be performed in the subsequent duty assignment. The analysis further

identifies tasks well-suited for computer-based training (CBT). These tasks, which cover fire detection center and fire mission operations, require complex computational and diagnostic skills that are hard to train and, thus, lend themselves to individualized CBT instruction. If CBT were implemented along with other steps to realign the course, additional savings in training manpower and costs could be realized. Although the cost of courseware development will affect the savings, a payback period of three years should prove economically justified given the continuing battlefield requirement for technical support to fire missions.

MR-123-A Planning Reserve Mobilization: Inferences from Operation Desert Shield. R. E. Sortor, T. Lippiatt, J. M. Polich. 1993.

This report identifies problems and issues raised by Operation Desert Shield (ODS) that could affect the Army's use of reserves in future contingencies and summarizes issues that deserve further analysis. It argues that ODS departed from past reserve planning because there was little warning and no specific deployment plan for using the reserves in such a contingency. Based on the ODS experience, issues relevant for future operations include reviewing the 200K call-up mechanism, taking measures to reduce assembly and movement time, developing guidelines to specify post-mobilization training activities, examining the role of reserves in sustaining an extended deployment, preparing active and reserve units for a range of scenarios, and conveying the idea that training and unit relationships in peacetime may be changed abruptly in a contingency.

MR-124-A Post-Mobilization Training of Army Reserve Component Combat Units. T. Lippiatt, J. M. Polich, R. E. Sortor. 1992.

This report investigates how long it takes Reserve Component (RC) combat units to mobilize and prepare for deployment. It is based on data from Operation Desert Shield training of combat brigades, data from the Army Inspector General, Active unit training programs, and RAND observations of RC Annual Training. The analysis first defines twelve post-mobilization activities that RC combat units must complete before they are ready to load equipment for overseas shipment. It then estimates the time needed for the twelve activities under three scenarios (optimistic, intermediate, and pessimistic), which vary in assumptions about future RC peacetime training proficiency. The report finds that the optimistic case will require 79 days; the intermediate case, 104 days; and the pessimistic case, 128 days. These estimates assume that leadership can complete its command and control training in parallel with troop training and that adequate training support from the Active Component will

be available. If either assumption does not hold, then more time would be required.

MR-125-A Mobilization and Train-Up Times for Army Reserve Component Support Units. T. Lippiatt, J. M. Polich, R. E. Sortor, P. K. Dey. 1992.

This report documents research into the time it takes Reserve Component (RC) support units (such as transportation, engineers, military police, or artillery) to mobilize and prepare for deployment. Using data from 606 units called to duty during Operation Desert Shield, the analysis shows that the times depend on the unit's branch, size (weight of equipment), and mode of transportation (air or sea). Units deploying by air can be ready very quickly (8 to 25 days from call-up to the point when they are ready to load equipment for overseas shipment). Units deploying by sea take longer to prepare (typically 30 days, but up to 10 days more for heavy artillery units), but have more flexibility because they can continue some training while their equipment is in transit to the theater. The report illustrates how the results can make large differences in Active-Reserve allocation decisions. The methodology, which was applied here to a notional Southwest Asia scenario, will allow defense planners to determine whether particular types of RC units can be available in time to respond to future contingencies.

MR-127-AF/A New Political Realities and the Gulf: Egypt, Syria and Jordan. M. E. Morris. 1993.

This report highlights points of vulnerability in Egypt, Syria, and Jordan that could lead to future internal and regional instability. The study finds that while there is little evidence of immediate instability in Egypt, the ingredients for it-massive economic and bureaucratic problems, along with a growing number of fundamentalists-exist. Syria's currently pro-Western mode is a pragmatic rather than ideological change; a reversal of course, if coupled with an Iranian alliance, could alter the regional balance of power. And the potential for internal instability in Jordan is high, extending to Palestinians throughout the region and affecting all Middle Eastern states, including the Gulf. The study concludes that the internal stability of the three states is integral to U.S. Middle East objectives and that by addressing regional problems with a multiplicity of approaches, by understanding the problems in context, and by choosing issues on which it can have the greatest impact, the United States can address causes of instability rather than symptoms.

MR-158-A/AF Measuring the Leverage: Assessing Military Contributions to Drug Interdiction. C. H. Builder. 1993.

This report analyzes the problems of measuring the effectiveness of military operations in support of drug interdiction from several perspectives: from the military's extensive historical experience with interdiction campaigns, from the military's traditional means for assigning responsibility and granting authority, and from the changing relationship between the military and public through the news media. In sum, these perspectives suggest that any interdiction campaign devoted to controlling illegal drugs will be both difficult to assess and controversial. It will be difficult not just because of the fractionation of tasks and responsibilities or because of restrictive rules of engagement, but mostly because of the complex and dynamic nature of interdiction campaigns. It will be controversial not just because drug control or use of the military is controversial, but mostly because of the changing nature of a society with an abundance of public information. The concerns should not be with the difficulties of assessment or the controversy that may attend assessments, but with ensuring clear lines of military responsibility and authority and with the validity of the overall strategy that has led to military operations in support of drug interdiction.

MR-160-AF/A MapView User's Guide. L. McDonough, S. Bailey, A. Koehler. 1993.

This document is a user's guide for MapView, a general-purpose, object-oriented graphics program that was developed as part of the Theater Level Campaign/Nonlinear Combat project at RAND. It is written in the C programming language and runs under the X11 Release 5 windowing environment with Sun Microsystems' OPEN LOOK Toolkit. The program allows scenarios to be generated through a flexible, user-friendly interface that defines graphic objects, places them on an underlying image, and modifies or queries them as desired. In addition, MapView can process a file of commands that define and modify graphic objects and create animated simulation output. MapView has proven useful in checking database validity, generating scenarios, constructing runtime animation frames, and providing post-processing analysis.

MR-164-A/OSD Army Experiences with Deployment Planning in Operation Desert Shield. J. P. Stucker, I. Kameny. 1993.

This report documents the Army's experiences with deployment planning and with deployment-planning systems during Operation Desert Shield (ODS). Analysis of ODS experiences suggests that although Army deployments were planned and executed reasonably quickly and smoothly, there were areas in need of improvement. First, ODS experiences suggest that procedures for deployment planning should be repackaged to emphasize flexibility and adaptability. Second, after contingency-

planning and execution procedures have been improved, computerized deployment support systems need to be refocused and updated. At the highest level, planners need automated tools for planning and gaming as aids in decisionmaking; as the planning proceeds, several levels of data need to be linked so that planning and deployments can be conducted effectively by the operating and transportation commands and simultaneously monitored and coordinated by the higher-level commands. Finally, personnel skills should also be refocused and upgraded by strengthening career paths for planning personnel, increasing the training and practice of those personnel in realistic, no-plan, and unexpectedly stressful scenarios, and creating ways to use crisis-planning tools in day-to-day peacetime operations.

MR-167-AF/A Political Dynamics and Security in the Arabian Peninsula Through the 1990s. J. A. Kechichian. 1993.

This report argues that the Persian Gulf war rapidly accelerated an ongoing polarization of the Arab world. The result has been an Arab community split into two distinct camps: aspiring non-autocratic states arrayed against more countries that embrace traditional political values and processes. From the tangled skein that characterizes Mideast politics, four major threads can be identified: (1) the re-establishment of the authority of Baathist Iraq and its rebuilding of ties to the Arab world; (2) the political and military awakening of Saudi Arabia; (3) the intractable internal dilemmas of the Gulf shaykhdoms; and (4) the continuing challenge to the ruling establishments to introduce true political reform. Political and military relations between the United States and the Gulf Cooperation Council will continue to grow for the foreseeable future. But growing internal dissatisfaction in the Gulf states may spark anti-American sentiments, and these issues need to be better understood.

MR-175-OSD/AF/A Military Applications of Microelectromechanical Systems. K. W. Brendley, R. Steeb. 1993.

Microelectromechanical systems (MEMS) are small devices on the scale of a few millimeters or less. This monograph reports the results of discussions with U.S. researchers about potential military applications. To indicate the range of possibilities, the authors describe five applications: chemical sensors for soldiers, devices to identify other soldiers as friends or foes, active surfaces, distributed sensor nets, and microrobotic electronic disabling systems. Since planned U.S. investments in MEMS lag an order of magnitude behind investments in Japan, Germany and the Netherlands, the authors recommend that the U.S. develop and pursue reasonable target applications for demonstration in three to five years. This would allow assessment of the military potential of

the technology and enable the U.S. to capitalize on breakthroughs elsewhere and to develop countermeasures as necessary.

MR-176-A Advanced Technology for Theater Ballistic Missile Defense (U). D. C. McGarvey, S. W. Levinson, R. Y. Pei. Aug 1993. SECRET

(U) This report emphasizes advanced technologies whose application could alleviate shortfalls generated by responses by tactical ballistic missile (TBM) developers to near-term theater missile defense (TMD) systems. The study defines a "Baseline TMD" that represents the best judgment of the study participants on the basic elements of a near-term TMD architecture. Potential threats responsive to this architecture are identified, the impact of these potential threats on the baseline TMD performance is evaluated, and the resulting desired improvements in TMD capabilities are identified. The study concludes that Hyper Velocity Guns and Projectiles (HVG&P) should not be pursued for boost-phase interception, since rocket-propelled interceptors can perform as well and present much less technical risk; however, for cluster kills, both HVG&P and multi-kill vehicle (KV) interception are potential candidates. The study recommends that (1) feasibility studies be carried out for multi-KV concepts and cost-effectiveness comparisons of rocket and gun kinetic kill vehicle (KKV) concepts for midcourse cluster kills; and (2) that airborne laser radar technology development be focused on airborne TMD applications.

MR-177-ACQ/A/AF Army Organic Close Support Systems Analysis: Attack Helicopters and Advanced Artillery (U). M. Callero, C. T. Veit. Dec 1993. SECRET LIMITED: US GOV'T AGENCIES

(U) This report provides high-level decisionmakers with an understanding of operational concepts for supporting engaged ground forces on the modern battlefield and the relative effectiveness of systems capable of providing close support for ground forces. Two types of advanced weapon systems are organic to the Army: attack helicopters, and advanced rocket and missile artillery. The attack helicopters include AH-64 Apaches and RAH-66 Comanches that carry either laser-guided or fire-and-forget anti-armor missiles as well as rockets and machine guns. The advanced rocket and missile artillery could include multiple launch rocket systems (MLRS) armed with anti-armor terminally guided weapons (TGW) and remotely controlled non-line-of-sight (NLOS) missiles with on-board optical systems. The authors' conclude that significant improvement of artillery and helicopter aviation close support capability requires developing and acquiring new technology armament/munitions. In addition, current programs to develop and field the Longbow missile system and the RAH-66 Comanche will result in significant

improvements to attack helicopter close support operations in both kills and attrition.

MR-178-AF/A/OSD The Independent European Force: Costs of Independence. M. B. Berman, G. M. Carter, R. W. Robinson, D. Kassing, R. Bueneke, R. W. Hess, M. Hura, M. Nelson, P. S. Steinberg. 1993.

This report examines the costs associated with acquiring and operating two key components of an independent European force—force projection and surveillance/C2I systems. The study examines three levels of capability for these components and generates "back of the envelope" cost analyses, providing a gross estimate of the trade-offs available between capability and cost. The study finds that force projection dominates the low-capability case (around two-thirds of the cost), but in the medium- and high-capability cases, the two components contribute roughly equally to the cost for an independent European force. In terms of trade-offs, the modest systems of the low case provide some independent capability, but for many uses, they will require the aid of robust U.S. systems to minimize risk. The high case will provide more robustness, but even this will not match U.S. capabilities in force projection. Moreover, the study argues that beyond the cost considerations are the inevitable command and control problems of trying to set up and operate an independent European force.

MR-195-A Overview of the Total Army Design and Cost System. R. L. Petruschell, J. H. Bigelow, J. G. Bolten. 1993.

This report describes an integrated collection of models, procedures, and databases called the Total Army Design and Cost System, which is designed to address a broad range of force structure and resource allocations issues and to determine the resource implications of narrower but more detailed proposed changes within the framework of the Total Army. Starting with the results of combat analysis, the first element of the system—the Theater Support Model—estimates the number of support units needed for the combat forces. The total force requirement is then passed to the Transition to War Model, which determines the future peacetime Army, including active and reserve components, needed to provide the necessary forces given a desired deployment schedule. The Path Model then compares the present force with the desired future forces and provides a road map—a series of inventories of Army units, beginning with the present force and ending with the desired future force—to follow in achieving the future force. The Total Army Cost Model completes the final step of translating the inventories into annual cost and resource requirements.

MR-198-A Light Helicopter Trade-off Assessments. M. Callero, C. T. Veit, H. Ory. 1993.

This report assesses the potential impact on operational effectiveness of tailoring four features on the Army's RAH-66 Comanche. Analyses show that for the first feature—targeting system sensor location—locating the targeting system sensors on a mast above the rotor afford significant operational advantages over locating it in the nose. For the second feature—speed and maneuverability reductions—the analyses conclude that a 10 percent reduction in flight performance would not result in significant changes in effectiveness in common operational situations. For the third feature—crashworthiness—there is clear evidence that reduced deaths and permanently disabling injuries (PDIs) resulted when the aircraft met Army standards for vertical velocity attenuation (VVA); however, since bodily impact with an object played a much larger role than deceleration in causing deaths and PDIs, standards for retaining both occupants and objects in the cabin play a substantially larger direct role than VVA features. For the fourth feature—radio frequency interferometer (RFI) inclusion—the assessment indicates that RFI emitter location has utility for both avoiding and suppressing air defenses that warrants its inclusion in the Comanche avionics suite.

MR-221-AF/A From Eastern Europe to Western China: The Growing Role of Turkey in the World and Its Implications for Western Interests. G. E. Fuller. 1993.

This report summarizes many of the broad findings of the project's previous regional papers and reviews those findings from the point of view of Western and American interests. Turkey has been among those states most sharply affected by the changing international environment. Long isolated on the periphery of Europe in geopolitical terms, Turkey now lies at the center of a rapidly evolving Turkic region stretching from the Adriatic to western China, a region in which Ankara is likely to be a key factor. The resulting challenges and opportunities for Turkish foreign and security policy will have an important influence on the way Turkey sees itself and deals with others, including the European Community. Against this background, bilateral relations with the United States will take on increased significance. At the same time, the potential for bilateral friction on regional security issues may expand.

MR-228-A Estimating the Army's Intelligence Requirements and Capabilities for 1997-2001: Analytic Support to the Military Intelligence Relook Task Force. J. R. Bondanella, E. M. Cesar, P. D. Allen, P. Propper, C. L. Shipbaugh. 1993.

This report documents both the process and results of analytic support provided to the Army's Military Intelligence (MI) Relook Task Force. Applying methodology derived from an Arroyo Center project on the operational value of intelligence, electronic warfare, and

target acquisition (IEW/TA), the study evaluates the relative contributions of IEW/TA system types across a range of scenarios and missions. It finds that the Army intelligence system needs to be more flexible, that the recent military operations worked because of ad hoc actions and not because of the normal functioning of the organization within the system. Such ad hoc arrangements demonstrate the need for designing modular entities with a flexible and rapidly deployable support package. To reduce the impact in future crisis situations, the Department of Defense, not just the Army, must establish standards and connectivity architectures for new IEW/TA systems. Frequent field trials should be conducted to increase the likelihood that systems will be compatible during future contingency operations.

MR-240-A The New U.S. Strategic Debate. R. D. Asmus. 1993.

This Monograph assesses the process and the multiple and growing pressures for a reexamination of U.S. global strategy and America's role in the world. The document argues that a new broad-ranging debate over future American strategy is both likely and desirable. It clearly behooves a smart defense planner to seek to better understand the pressures pushing for such a debate, the fault lines emerging, and the key drivers of elite and public opinion. Until the debate over future U.S. strategy is clarified, it will be difficult for military planners to proceed with clear guidance on future strategic and defense planning—or at least until the issue of the political sustainability of such guidance is established in clear elite and public support. This should not be read as a recipe for inaction, but rather as an appeal for strategists and military planners to try to pay closer attention to issues of domestic political consensus, legitimation, and sustainability, and to how these factors are likely to affect future U.S. strategy.

MR-245-A Department of Defense Assistance to the Former Soviet Republics : Potential Applications of Existing Army Capabilities. S. Hinckley. 1993.

This report explores the feasibility of U.S. Army roles in twelve former Soviet republics and assesses the costs, benefits, and risks of potential Army missions. It focuses on roles that replicate or build on existing Army and DoD assistance programs, especially "dual-purpose" missions that would serve both Army and host-nation interests. The study concludes that although few roles would fully meet key "dual-purpose" criteria, the Army could undertake some modest aid actions in the twelve republics—swiftly and at relatively low cost—that it routinely performs in other countries for largely self-interested reasons. The most promising could be built around small-scale nation assistance actions, primarily involving Reserve Component medical and engineer units, which the Army

regularly conducts throughout the developing world, typically in conjunction with scheduled training activity. While the study findings do support a modest Army aid role,

MR-303-A The Army's Role in Domestic Disaster Support: An Assessment of Policy Choices. J. Y. Schrader. 1993.

This report begins identifying the central issues for determining the appropriate Army role in disaster relief. The study finds three potential options for an expanded Army role in civil emergency response: (1) continue to support the Federal Emergency Management Administration's (FEMA's) leadership of disaster response planning; (2) expand the Director of Military Support office to include formal state liaison offices; and (3) designate civil disaster support as a fifth pillar of national defense strategy and incorporate disaster-support missions into the Army's primary missions. The last two options expand the Army's current role and will require both internal changes and outside actions. While weighing these options and examining the issues surrounding them, the Army should take three steps to make its force ready to meet the current expectations of the American people in the event of a disaster at home: (1) transfer executive authority for military support from the Secretary of the Army to the Chairman of the Joint Chiefs; (2) support formal acceptance of civil disaster response as a mission for both active and reserve forces; and (3) review legal constraints on military participation in civil disaster relief.

MR-311-A/USN Using Value to Manage Repair Parts: A Documented Briefing. M. K. Brauner, J. S. Hodges, D. A. Relles. 1993.

This report documents a briefing that presents a method for examining the effect that various stockage policies have on the length of time weapon replaceable assemblies (WRAs) spend waiting for parts. The authors argue that the current stockage policies—which emphasize descriptors of parts and rarely include information about the end-item that needs them—likely contribute to the simultaneous problems of long repair turn-around times (TATs) and excesses of repair parts. The report discusses an algorithm which incorporates both parts descriptors and output measures, that minimizes the expected length of time an end-item spends in repair. The authors' research suggests that through effective stockage of repair parts, the Services may be able to achieve large savings from shortening the TAT at depot, which allows more end-items to be in circulation. Further—more, the authors' evaluations suggest that their calculations can identify weapons systems where it would make sense to stock parts and those where it would not. The calculations can be used to balance investment strategies between spending money on parts and spending it on other segments of the repair pipeline.

MR-314-A/USN Models and Algorithms for Repair Parts Investment and Management. J. S. Hodges. 1993.

This report proposes a way to think about the investments and operating decisions service maintenance depots must make, distinguishing between a long-run (investment) problem and a short-run (operating) problem. The basis of the authors' approach to both problems involves defining the value of each part or supply action so the costs of parts or supply actions can be related to their effects, thereby permitting managers to select courses of action that maximize value given the cost of the actions. For the long-term problem, the approach attributes value to the units of authorized stock in terms of the effect they have on the value of the repair pipeline: efficient choices yield a cheap repair pipeline. For the short-run problem, the approach attributes value to supply actions (e.g., speedup of delivery of due-in items) in terms of the effect they have on the availability of aircraft at the end of a specific time horizon. For each problem, the authors provide the relevant definition of value, an algorithm to maximize value for a given cost, and methods for computing value.

REPORTS

R-1589/3-HEW (Appendix A) Federal Programs Supporting Educational Change: Vol. III, The Process of Change. Appendix A, Innovations in Classroom Organization and Staff Development. D. Mann, M. W. McLaughlin, M. Baer, P. W. Greenwood, L. Mccluskey, L. L. Prusoff, J. G. Wirt, G. Zellman. April 1975.

Appendix A to Vol. III in a series of reports, sponsored by the U.S. Office of Education (USOE), on federally funded (change agent) programs designed to introduce and spread innovative practices in public schools. This appendix deals with Title III of the Elementary and Secondary Education Act, which funds innovative projects proposed by local school districts. It describes USOE planning strategies for Title III and the role of state education agencies in Title III. The focus of this appendix is on projects that were reputed to be successful in one of two particularly difficult aspects of reform: classroom organization, which implies a shift in classroom practice toward concepts of open education, and staff development, which aims at important changes in teacher behavior. The syntheses of the fieldwork case studies (ten are included) describe the similarities and differences found in project planning, implementation, and adaptation for both types of projects.

R-2518-A Performance of Tactical Millimeter-Wave Radio Links: Vol. I: Executive Summary (U). J. R. Clark, W. Sollfrey, S. Katz. June 1980. CONFIDENTIAL LIMITED: US GOV'T OR REFER TO CLIENT

(U) This report summarizes an investigation of propagation effects on terrestrial millimeter-wave radio links. The objective of the study was to investigate the environmental performance of short-range millimeter-wave transceivers with voice, video, and data communication capabilities. The emphasis was on the two frequency bands 35-40 GHz and 50-70 GHz, and on the propagation phenomena important in these bands. Two key conclusions are (1) rain attenuation in the 37-70 GHz region is significantly less serious than is commonly believed and (2) the advantages of operating in the 60 GHz oxygen absorption band far outweigh the disadvantages. The key benefit that oxygen absorption offers is overshoot control (control of transmitted radiation that is subject to interception by an unintended listener). See also N-1461. 18 pp. (Author)

R-2805-A Spatial Learning and Reasoning Skill. S. E. Goldin, P. W. Thorndyke. July 1981.

A series of studies undertaken to identify skills required for successful spatial performance. A study of requirements for distance estimation, self-orientation, and object location tasks supported the assumption that the type of spatial knowledge acquired depends on the learner's information source. A second study showed that filmed traversal of an unfamiliar route provides as much knowledge about landmarks, landmark sequence, and distances as a live tour, but not sufficient information about angles of turns to allow accurate self-orientation. Studies of cognitive mapping skill showed that good mappers excel at acquiring knowledge from navigation or maps, at manipulating information in memory, and in visual memory, visualization, and spatial orientation ability. Good and poor mappers do not differ in map reading, map interpretation, or navigation skill. Examination of two different strategies for learning a new environment from navigation indicated potential benefits from training strategies compatible with the learner's abilities.

R-3115-A Forecasting the Wages of Young Men: The Effects of Cohort Size. H. W. Tan, M. P. Ward. May 1985.

In this study, the authors develop forecasts of the civilian wage structure over the next two decades for a variety of different scenarios. They focus on how the wage structure will change as the demographic trend reverses itself, i.e., as the smaller post-baby-boom birth cohorts enter the labor market in the 1980s and 1990s. Section II of the

report describes the survey data used to create a working file for the analysis. Based on this file, the authors paint a broad overview of how cohort size and relative wages have changed over the 1967-1980 period. Section III discusses the wage model used and highlights the main empirical results. The assumptions and approach used to forecast wages are detailed in Sec. IV. Section V extends the wage model to investigate two alternative explanations for the observed decline in youth wages. The last section concludes with a summary of the main findings and their implications for military compensation policy.

R-3382-A F/A Joint Air Defense: An Assessment of the Planned Patriot/F-16 Mix in Central Europe (U). P. M. Dadant. July 1987. SECRET NOFORN WNI TEL LIMITED: US GOV'T OR REFER TO CLIENT NO DTIC

(U) This study assisted an Army/Air Force Joint Working Group charged with performing a net sensitivity analysis of the preferred mix of area-defense surface-to-air missiles and air defense aircraft. It used RAND-developed models to investigate the sensitivity of the 1993 U.S. Patriot/F-16 mix in Central Europe to changes in estimates of the air defense effectiveness of these two systems and of some other parameters (e.g., aircraft sortie rates and effectiveness in other missions). Given the uncertainties inherent in these estimates, the programmed mix of these weapons appeared to be a well-balanced compromise. The programmed mix was found to perform comparably to the preferred mix except in cases where the air defense effectiveness estimates of the two systems were highly optimistic or highly skewed. If these estimates are highly optimistic, the preferred mix should be heavier than the programmed mix in the more flexible weapon, the F-16. If the estimates are skewed, the preferred mix should be heavier in the more effective weapon. However, the war's progress would be more sensitive to other factors than to changes in the Patriot/F-16 mix.

R-3388-A Space Systems and Army Missions: A RAND Assessment (U). R. E. Darilek, E. M. Cesar, C. M. Crain, R. A. Eden, G. Gould, J. Hiland, K. P. Horn, M. F. Lawrence, K. E. Phillips, P. J. Romero, J. H. Rosen, K. Watman. October 1986. SECRET LIMITED: US GOV'T OR REFER TO CLIENT NO DTIC

(U) This report documents the results of the first phase (through December 1985) of a project whose chief task was to provide an independent assessment of the Army's future role in space. The report treats a wide variety of potential applications of space to Army missions and presents a methodology for managing their conceptual development, analysis, and assessment. The most promising applications are: (1) battlefield probe surveillance beyond the forward line of own troops; (2)

monitoring transportation assets and cargo; (3) attacking fixed ground targets; and (4) counterfire and warning against tactical ballistic missile transporter-erector-launchers. The analysis suggests some initiatives that the Army can undertake now to build toward the realization of space systems in the near, mid, and far terms. Such initiatives include system definition, experimentation, demonstration, tradeoff analysis, and participation in joint efforts.

R-3436-A F/A Intrepid Falcon: An Experiment in Contingency Gaming (U). M. E. Morris, C. H. Builder, W. M. Jones, D. A. Shlapak, R. A. Levine. August 1987. SECRET NOFORN LIMITED: US GOV'T OR REFER TO CLIENT NO DTIC

(U) In 1985, RAND researchers developed a political/military seminar-type game called "Intrepid Falcon," which was subsequently played in a foreign country by senior military officials from the United States and the host country. This report records the history of the game, from the preliminary agreements under which it was commissioned, to the design, testing, and actual play in the host country. Appendixes contain documentation such as scenarios, move papers, and background information used in the game.

R-3513-A The Army in the Strategic Planning Process: Who Shall Bell the Cat? C. H. Builder. April 1987.

This report documents individual research undertaken by the author during a one-year assignment to the Army's Concepts Analysis Agency as their Distinguished Visiting Analyst. The research explored the definition and significance of strategy, comparative analysis of the three services on various aspects (particularly their approaches to strategy), and a close study of the Army's unique problems and opportunities regarding strategic planning. The author suggests that the Army is in a special position to participate in the strategic planning process—through the "daring deed" of determining price tags for our explicit national commitments to use military force. Those price tags include the military (as opposed to the political) objectives of our forces if they must fight, the adequacy and composition of our forces, and the risks the national leadership must accept in making or withdrawing those commitments. The risks of interservice strife of course pose a cost to the Army.

R-3553-A The French Army and Combined Operations in NATO's Central Region (U). M. A. Lorell. April 1988. SECRET

(U) This report assesses the employment concepts, doctrine, force structure, and capabilities of the French Army within the overall context of current French security

policy and strategic doctrine. It is part of a larger effort aimed at improving understanding and cooperation between NATO armies and the U.S. Army by identifying national differences that might impair combined operations in wartime and recommending ways of reducing these differences. Though superficially similar to other NATO armies, the French Army—and its use in NATO contingencies—differs considerably from other armies in the Alliance. French Army organization, equipment, and unit capabilities and configurations differ considerably from those of most other NATO armies in ways that may impede smooth integration of French forces into combined operations in the Central Region. French security policy and strategic doctrine place special conditions and constraints on the participation of French forces in NATO scenarios. Highly detailed agreements and plans govern NATO employment of French Army forces. Organizational and doctrinal changes currently under way may ultimately lead to new NATO roles for French forces.

R-3564-A Surveying Relevant Emerging Technologies for the Army of the Future: Lessons from Forecast II. R. E. Darilek, E. M. Cesar, J. A. Dewar, G. Gould, E. D. Harris, J. Hiland, K. P. Horn, M. M. Nelsen, K. E. Phillips, J. H. Rosen. July 1988.

This study evaluated the U.S. Air Force's survey of emerging technologies of the future, Project Forecast II, for its relevance to the Army's potential requirements for the future, as indicated by the Army 21 Interim Operational Concept. The study concluded that there is a high correlation between the Army's needs and the technologies identified in Forecast II, although the Army could benefit from a poll of its contractors to uncover more Army-relevant technologies. In addition, by using systems as the bridge between projected technologies and specified military capability requirements, as the Air Force did in Forecast II, the Army could take advantage of a valuable means of establishing and gauging the relevance of emerging technologies to future requirements.

R-3579-A Support for the Army Intelligence, Electronic Warfare, and Target Acquisition Master Plan (U). E. M. Cesar, M. G. Kroger, A. J. Alexander, T. B. Garber, E. D. Harris, R. E. Huschke, M. M. Nelsen, P. J. Romero, J. H. Rosen. December 1988. SECRET LIMITED: US GOVT OR REFER TO CLIENT

(U) This report documents analyses performed in support of an Army formulation of a new Intelligence Electronic Warfare Master Plan (AIMP). It analyzes technology areas pertinent to Army intelligence and electronic warfare (IEW) programs and suggests research and development initiatives for both near- and longer-term investments. A compendium of some of the key technologies and their relevant characteristics is provided with annotations concerning implications for IEW systems using the

technologies. A methodology for the requirements-based derivation of technology needs and the identification of potential technical solutions are presented, along with a set of aggregation and filtering tools. The report discusses decisionmaking methods, such as focus groups and the analytical hierarchy process, that might be used in future budget decision processes to aid in reaching consensus and to capture expert judgments and decision rationales for IEW resource allocations.

R-3589-A Deep Operations at NATO's Central Army Group (U). J. P. Kahan, L. M. Jamison. July 1988. SECRET

(U) This report describes and clarifies the decisions of the Commander of the NATO Central Army Group (CENTAG) regarding deep operations as part of his overall plan in a conventional (nonnuclear) war. The authors examine these decisions, particularly as they relate to the U.S. Army's AirLand Battle doctrine, NATO's subconcept of follow-on forces attack, and the current implementations of deep operations at CENTAG. They relate the doctrinal aspects of those decisions to the evolution of their implementation as observed in a number of 1986 and 1987 command post exercises. The observations focus on four points: (1) deep operations are increasingly joint air and ground operations; (2) deep operations decisions are made at the Army Group level, not at the corps level, as some doctrine would indicate; (3) both CENTAG and its subordinate corps have roles in the detection of significant enemy events and in planning the attack of deep targets; and (4) although AirLand Battle doctrine provides a general framework for understanding command decisionmaking, it cannot by itself specify a commander's information needs for prosecuting deep operations. Finally, the authors comment on differences between formal doctrine and practice, and outline observations that guide their underlying study of commanders' information needs.

R-3615-A Army 21 as the U.S. Army's Future Warfighting Concept: A Critical Review of Approach and Assumptions. Y. Ben-Horin, B. C. Schwarz. July 1988.

This report discusses an attempt to identify the major problems with the existing Army 21 Interim Operational Concept and suggests an alternative framework for the Army's study of future warfighting concepts. With the current Army doctrine—AirLand Battle—as the baseline, the plausible variations in implementation should be made over the next 10 to 15 years. The objective would be to project an estimate of Army needs and preferences. A long-term exploration effort would extend 30 to 40 years, where projections are necessarily highly speculative. Essentially deductive, this effort would consider a range of visions and would highlight generic developments. The purpose would be to stimulate conceptual thinking by

contrasting different concepts, profiting from comparisons and choices between and among them.

R-3617-A LHX Helicopter and Tilt Rotor Flight Simulator Experiment. C. T. Veit, M. Callero, B. J. Rose, L. M. Jamison. August 1989.

The LHX (Light Helicopter Experimental) flight simulator experiment was designed to identify differences between an LHX helicopter and tilt rotor in performance, target engagement, and evasion of an enemy air-defense threat. Ten experienced helicopter pilots flew 17 mission tasks in both aircraft simulators. The helicopter significantly outperformed the tilt rotor in the four tasks requiring primary bob-down and lateral-mask evasion tactics. The tilt rotor significantly outperformed the helicopter in eight tasks; pilots accelerated and decelerated faster with less severe pitch attitudes, and the tilt rotor's pitch-pointing capability reduced engagement and evasion times against elevated and depressed targets. Four Army pilots completed a questionnaire in which they judged the tilt rotor to be more operationally effective than the helicopter in eight of the ten combat situations presented. The authors recommend that the Army further investigate the tilt rotor's potential, regardless of its LHX decision.

R-3621-A Engineering Survivability Analysis of LHX Aircraft Alternatives (U). E. C. Gritton, H. H. Bailey, L. G. Mundie, C. M. Crain, H. Ory. October 1989. SECRET LIMITED: US GOV'T OR REFER TO CLIENT NO DTIC

(U) This report describes the engineering methods used to estimate the survivability performance of alternative helicopter and tilt rotor configurations, as well as an upgraded AH-64 Apache that might be developed for the Army LHX (Light Helicopter Experimental) mission. The report develops radar, infrared, visual signature levels, and Detection algorithms and estimates performance for representative Soviet sensor and weapon systems operating against LHX aircraft configurations.

R-3625-A Design, Performance, and Cost of Alternative LHX Configurations. G. K. Smith, G. F. Acker, J. H. Bigelow, D. Dreyfuss, S. V. LaForge, R. Y. Pei, S. A. Resetar, R. L. Petruschell. November 1988.

This report describes the methods used to compare alternative designs of helicopter and tilt rotor configurations, and alternative versions of an upgraded AH-64 Apache, that might be developed for the Army LHX (Light Helicopter Experimental) mission. It presents vehicle configuration, performance, and cost characteristics for several alternative LHX options.

R-3627-A Inside the Soviet Army in Afghanistan. A. Alexiev. May 1988.

This report on the Soviet army in Afghanistan focuses on morale, discipline, motivation, and cohesion. It is based on interviews with former members of the Soviet armed forces in Afghanistan, interviews with Afghan resistance leaders and former officers, and a literature search. The report examines major factors that negatively affect morale and discipline: indoctrination, personnel relations, drugs and alcohol, quality of life, atrocities and looting, and theft and corruption. Such factors have led to infractions ranging from insubordination to fragging. The author finds their operational significance difficult to assess but believes that the relevance of possible systemic vulnerabilities to an East-West conflict should be explored. The report concludes that Soviet war conduct is not motivated by ethical considerations; thus, the Soviets can be expected to disregard conventions.

R-3634-A Gorbachev and the New Soviet Agenda in the Third World. Y. F. Fukuyama. June 1989.

This report, part of a study of the types of threats that Army planners might encounter in the Third World, evaluates the impact that Mikhail Gorbachev has had thus far on Soviet Third World policy, as well as prospects for future evolution. The study evaluates new Soviet thinking on foreign policy and measures the changes in rhetoric against actual Soviet behavior. It analyzes the new Soviet emphasis on the large states of the Third World. As an example of this new Soviet diplomacy, it presents a detailed case study of Soviet policy toward the Persian gulf in 1986-1987.

R-3643-A A New Approach for the Design and Evaluation of Land Defense Concepts. P. J. Romero. 1991.

The U.S. Army has made the development of new concepts for land warfare a priority since the early 1980s. Unfortunately, few techniques have been available to help design or evaluate concepts in a rigorous, objective way. This report contains the results of a two-year effort to develop an intellectual framework for thinking about, designing, and evaluating land defense concepts. It is aimed at making the process by which the Army develops and evaluates concepts more rigorous and more efficient. The suggested improvements are of three types: (1) a typology—drawn from Army doctrine, NATO defense plans, and unofficial NATO defense concepts since the late 1940s—that allows different concepts to be described concretely and compared using a common vocabulary; (2) a review of the strengths and weaknesses of the Army's current approach for developing and evaluating concepts (the Concept-Based Requirements System, or CBRS) and a proposed analytic framework to ameliorate some of the shortcomings; and (3) a microcomputer-based, low-resolution Method of Screening Concepts of Warfare

(MOSCOW), which can be used to refine and compare concept ideas in a systematic, quantitative way.

R-3673-A Evaluating the Combat Payoff of Alternative Logistics Structures for High-Technology Subsystems. M. B. Berman, D. W. McIver, M. L. Robbins, J. Schank. October 1988.

This report identifies and evaluates alternative logistics structures that better support high-technology subsystems used by major U.S. Army weapon systems. It uses a new methodology to examine combat logistics structures. The report begins with a base case in which one set of M-1 tank test equipment is located in each Forward Support Battalion. It uses RAND's Dyna-METRIC model to assess the costs and benefits of alternative logistics structures relative to this base case. The alternative logistics structures were selected to examine the influence of different structural characteristics: (1) consolidating test equipment and personnel at higher echelons to increase responsiveness to variations in demand at lower echelons; (2) decentralizing test equipment and personnel to maneuver battalions to increase battalion unity of command; (3) varying the amounts of test equipment and personnel to examine the effect on repair queues; and (4) increasing the spare parts distribution system's responsiveness. The authors conclude that the Army must either increase the responsiveness of its logistics structures or invest inordinate amounts in inventories to prevent losses in combat capability.

R-3678-OSD/AF/A/RC The Nicaraguan Resistance and U.S. Policy: Report on a May 1987 Conference. D. F. Ronfeldt, B. Jenkins. June 1989.

This report presents the results of a 1987 RAND conference on the Nicaraguan Resistance and U.S. Policy Implications. The conference, part of RAND's Western Hemisphere Forum, included presentations on (1) background of the resistance and U.S. support for it, (2) the strategic poverty of the Reagan Administration's vision regarding Nicaragua, (3) the Nicaraguan resistance in transition, (4) Sandinista strategy, and (5) diplomatic-political options in Nicaragua. The conference participants had varied backgrounds in official diplomatic and military capacities and in political activism, policy analysis, or policy-oriented research.

R-3691-A Families in the Army: Looking Ahead. P. A. Morrison, G. Vernez, D. W. Grissmer, K. McCarthy. June 1989.

This study considers how aggregate demand for Army family services will change in the future and identifies long-range issues posed by the changes in Army families. The Army will be drawn further into the realm of family concerns that Army personnel themselves face because (1)

the "early" pattern of Army family formation and growth will continue to compress family-related needs into the early years of Army service; (2) the changing division of labor within families will generate competing obligations to the Army and to one's family members; and (3) the growing orientation toward paid employment among younger generations of Army spouses foreshadows a growing demand for day care, Army assistance in lining up jobs, and diminished flexibility in traditional volunteer activities. The number of Army family dependents will likely decline, not increase, between 1985 and 2000, although Army actions and policies could potentially modify that future. Four long-range issues deserve closer study and continued monitoring: (1) employment opportunities for Army spouses, (2) the growing proportion of women among single parents, (3) readiness, and (4) potential "hidden" effects of Army practices and policies.

R-3702-A The Concept of Operations for a U.S. Army Combat-Oriented Logistics Execution System with VISION (Visibility of Support Options). R. Tripp, M. B. Berman, C. L. Tsai. March 1990.

This report describes a concept of operations for a decision support system intended to assist field- and wholesale-level logisticians to prioritize repair and distribution actions for high-technology reparable items. The system recognizes that uncertainties will cause imbalances between requirements for high-tech components and their availability in both peacetime and wartime and enables logisticians to adjust their actions to compensate for unanticipated events. The system maximizes the probability of achieving specific weapon system availability goals over a given short-term horizon with available resources. Initial investigations have shown that a logistics system that couples responsive repair and distribution capabilities with such a decision support system could significantly improve weapon system availability over the current system using the same amount of stock and repair resources. The Army has developed plans to field-test the concept, which it refers to as the Readiness-Based Maintenance System (RBMS). RBMS has been incorporated as an element of the Strategic Logistics Program, which is aimed at modernizing the Army's Logistics Information Systems.

R-3726-A East Germany's Contribution to the Warsaw Pact (U). K. Crane. October 1989. SECRET NOFORN WNINTEL LIMITED: US GOV'T OR REFER TO CLIENT NO DTIC

(U) This report assesses the current and future contribution of the East German armed forces to the Warsaw Pact and attempts to determine whether their role in the Pact has changed in recent years. The study assesses the veracity of East German military spending figures and estimates costs

of personnel, procurement of military durables, and arms trade. It compares East German military capabilities with those of the Group of Soviet Forces—Germany, Czechoslovakia, and Poland—and finds that, with the exception of the East German navy, rates of modernization in these forces have either exceeded or kept pace with those in East Germany. The report also estimates military manpower needs and compares them with demographic projections of 18-year-old cohorts. The study finds that East Germany will be unable to sustain current force levels with present terms of enlistment. The study also assesses East Germany's ability to sustain or increase current military expenditure levels in the 1990s and finds that the East Germans will have difficulty in increasing expenditure levels at past rates. The study concludes with a set of policy recommendations for conventional arms negotiations.

R-3726/1-A East Germany's Military: Forces and Expenditures. K. Crane. October 1989.

This report assesses the current and future contribution of the East German armed forces to the Warsaw Pact and attempts to determine whether their role in the Pact has changed in recent years. The study assesses the veracity of East German military spending figures and estimates costs of personnel, procurement of military durables, and arms trade. It compares East German military capabilities with those of Czechoslovakia, Poland, and the Group of Soviet Forces Germany, and finds that with the exception of the East German navy, rates of modernization in these forces have either exceeded or kept pace with those in East Germany. The report also estimates military manpower needs and compares them with demographic projections of 18-year-old cohorts. The study finds that East Germany will be unable to sustain current force levels with present terms of enlistment. The study also assesses East Germany's ability to sustain or increase current military expenditure levels in the 1990s and finds that the East Germans will have difficulty in increasing expenditure levels at past rates. The study concludes with a set of policy recommendations for conventional arms negotiations.

R-3734-A/AF British Military Requirements, Resources, and Conventional Arms Control. J. E. Nation. January 1990.

British military leaders face a formidable challenge in the next 15 years as they modernize their forces. The financial requirements of modernization efforts will be large, especially since replacement equipment is almost always more expensive than its predecessors. Modernization requirements will be substantial, even with conventional force reduction agreements that cut forces deeply. Other factors complicate Britain's military modernization efforts: Demographic pressures will probably make recruiting

Britain's all-volunteer force both more difficult and more costly. In turn, increasing personnel costs may reduce defense resources available for investment and jeopardize the acquisition of replacement equipment. A reduced Warsaw Pact threat will also probably reduce defense resources. This report compares the financial requirements of achieving British modernization goals with a range of projected budgetary resources. The financial requirements of major equipment production with projected resources are estimated in two cases: in the absence of conventional arms control in Europe, and following a Conventional Forces in Europe (CFE) agreement.

R-3760-AF/A/OSD Onward Through the Fog: Uncertainty and Management Adaptation in Systems Analysis and Design. J. S. Hodges, R. A. Pyles. July 1990.

Policy analysis has always involved great uncertainty. Tools have been available for handling some of that uncertainty, but policy analysis work in many fields has fallen into stereotyped problem formulations and analytical approaches. In particular, treatments of uncertainty are typically incomplete and often conceptually wrong. This report argues that these shortcomings produce pervasive systematic biases in analyses. It describes and discusses the common mode of policy analysis and identifies its two main shortcomings—omission of crucial sources of uncertainty and neglect of systems' ability to respond to the unexpected. It categorizes some varieties of uncertainty relevant to policy analysis and presents examples of ways they are commonly represented. Finally, it discusses designing and evaluating systems, and presents a collection of generic strategies for uncertain situations.

R-3761-A Understanding Commanders' Information Needs. J. P. Kahan, D. R. Worley, C. M. Stasz. June 1989.

Based on observations of Army Group, corps, and division command posts in action over 12 different exercises and on interviews with a variety of military experts (including doctrine writers and former commanders), this report discusses the information needs of commanders of higher-echelon Army units. The authors attempted to determine the reasons commanders and staff communicated information and to clarify the intended uses of that information. They identified three different modes of command-post-level communication—pipeline, alarm, and tree. Each mode is indicative of a different communication relationship between a commander and his staff, and each places different demands on the command-and-control operating system. To fulfill commanders' information needs, the authors recommend a number of education and training measures: (1) institutionalize back-briefing, (2) teach process as well as procedures, and (3) train unit

command staffs to share images. As for the design of information systems, they recommend that the Army (1) identify means of more direct image sharing, (2) build a hybrid information system, and (3) establish an end-user to end-user communications orientation.

R-3768-A Developing Robust Support Structures for High-Technology Subsystems: The AH-64 Apache Helicopter. M. L. Robbins, M. B. Berman, D. W. McIver, W. E. Mooz, J. Schank. 1991.

Using data on the high-technology subsystems of the AH-64 Apache attack helicopter, this report hypothesizes five alternative logistics structures (two traditional ones that rely on conventional depot support of intermediate repair and three that focus on more responsive support) and evaluates them in terms of comparative cost-effectiveness and robustness. The study found that the responsive support alternatives featuring Special Repair Activity (SRA) support of critical items or fast-turnaround continental U.S. (CONUS) depots tied to the theater by assured rapid transportation offer a means for providing cost-effective support of the Apache in a variety of conditions. The research substantiates previous RAND research on the M-1 tank that argued that the Army must increase the responsiveness in its logistics structures or face a loss in combat capability. (See also R-3673, R-3793)

R-3771-AFMIC Terrorists and the Potential Use of Biological Weapons: A Discussion of Possibilities. J. Simon. December 1989.

This report considers the potential for terrorists to use biological weapons. It discusses the implications of recent trends in terrorism for the future use of biological agents and the reasons terrorists might be motivated to use them. It then identifies several constraints that inhibit terrorists from venturing into this new type of conflict and the factors that could break down these constraints. Finally, it establishes some broad characteristics that could identify the types of terrorist groups that might be more likely than others to use biological weapons. The findings suggest that, since the technological, logistical, and financial barriers to the use of biological agents are not insurmountable, a key determinant in the potential use of such agents will be the willingness of terrorists to engage in this new type of violence. Therefore, efforts to improve intelligence regarding terrorist group strategies and capabilities will become increasingly critical in the future.

R-3793-A Supporting Combined-Arms Combat Capability with Shared Electronic Maintenance Facilities. W. G. Wild. May 1990.

The U.S. Army shows signs of shifting away from using "weapon-system-specific" test diagnostic equipment and

toward using more broadly capable versions that can isolate faults within subsystems and components from a number of different weapon systems (e.g., the proposed integrated family of test equipment, IFTE). As a result, weapon systems that once had uncontested access to specialized test equipment will now be relying on a common facility, and, hence, their availabilities become linked. This study focuses on two systems—the M1 tank and M2/M3 Bradley fighting vehicle—that are linked through a common reliance on direct support electrical systems test set (DSESTS) test equipment. The author finds that greater weapon system availability and more robust support may be attainable at constant cost by emphasizing resources that are fungible across weapon systems, such as test equipment and improved theater transportation for selected high-priority items. The report also demonstrates a multiple weapon systems methodology that is instrumental in identifying such potential improvements.

R-3794-A Decision Support for the Wartime Theater Ammunition Distribution System: Research Accomplishments and Future Directions. J. Schank, B. Leverich, J. Paul. June 1990.

Flexible and responsive management systems can allocate limited logistic resources in ways that maximize combat capability. This research identified uncertainty and complexity as the key problems facing the management of the wartime theater ammunition distribution system. Early in the study, three research areas were identified: a system data model should be developed, a quantitative evaluation mechanism was required, and narrow-purpose expert systems could improve decision support. A prototype knowledge-based simulation creates models of material management centers, movement control centers, and other ammunition managers. A method was developed to identify decisionmaking problems appropriate for expert system solutions. Questions concern whether a problem is appropriate, whether the development of an expert system is feasible, and whether expert system developments can be justified. The authors noted a need for developing expert systems in domains where knowledge is scarce and building a portable and extensible laboratory environment for training and evaluation purposes.

R-3795-A Evaluating Intelligence Systems That Support Deep Fires. F. A. Camm, N. Z. Shapiro, R. H. Anderson, J. J. Gillogly, J. L. LaCasse, M. LaCasse. October 1989.

Current U.S. Army doctrine emphasizes the importance of extending command emphasis to include not just the close battle but the deep battle. It calls for the use of Deep Fires and maneuver to exploit the deep portion of the battlefield. This report presents an analytic approach that could simulate the development of combat intelligence about the

deep battlefield and compare the performance of alternative intelligence systems to support Deep Fires. It emphasizes the development of intelligence products that the Army could use to support the Army tactical missile system in a Central European war in the mid-1990s. It draws on observations of combat intelligence activities during several U.S. and NATO command-post exercises in Germany from 1986 to 1988 and on Army-approved European scenarios and Army combat and intelligence collection models to provide inputs to the simulation of the intelligence system as a whole. The analytic approach presented here employs a set of new techniques for modeling the quality of information in an intelligence system. It uses simple Bayesian logic to develop a high-level view of intelligence processing and realizes it in a flexible, parameterized, rule-based network model.

R-3814-A Performance-Oriented Logistics Assessment (POLA): Users' Manual for the Logistics Decision Model (LDM), Version IV. J. H. Bigelow. 1992.

This report is a user's manual for the Logistics Decision Model (LDM), which was developed by the Performance-Oriented Logistics Assessment (POLA) project to help build the logistics portion of the Army five-year program. POLA estimates the effects on combat performance of alternative investments in logistics resources. LDM simulates the ways that Red and Blue combat forces are influenced by combat service support capacities (e.g., transportation, ammunition handling, maintenance) and logistics resources (e.g., stocks of ammunition, war reserve equipment, replacement personnel). By itself, LDM cannot do all that is required of the POLA methodology. It can estimate the effect on combat performance of varying the capacities to perform certain logistics functions, such as ammunition handling, but those capacities must be estimated from physical resources. LDM reads data from four different types of input files: the ATTRITION file contains data that relate the outcomes of combat to the numbers and kinds of weapons engaged; the SUPPORT files describe the structure and activities that support the combat forces; the TIME PHASE file specifies the amount of each resource that enters the simulation; and the OUT SPEC files specify what variables appear in the output files. LDM contains two modules that perform computations: the support module computes the rates of all activities performed by the theater support structure to make weapons available for combat, and the combat module computes the outcomes of combat between the available Blue and Red weapons. Activities (and many combat outcomes) are defined by their effects on resources, such as consumption, production, or transport. (See also R-3823, N-3354, N-3393.)

R-3816-A Implementing the Battle Command Training Program. J. P. Kahan, D. R. Worley, S. M. Holroyd, L. C. Pleger, C. M. Stasz. August 1989.

This report presents the results of a RAND study examining the implementation of the U.S. Army's Battle Command Training Program (BCTP), which consists of three phases: a five-day Battle Seminar of workshops and decision exercises, a week-long computer-driven command post exercise (called the WarFighter Exercise) three to six months after the seminar, and a take-home Sustainment Exercise four to six months after the WarFighter Exercise. The report examines the BCTP based on the common understanding between the BCTP and its clients about its purposes, methods, and evaluation criteria, and on the data collection and analysis strategies required of the BCTP to provide feedback to client units and to higher-echelon doctrinal and readiness agencies. The authors make recommendations designed to increase the BCTP's ability to improve Army training both in terms of short-term issues of individual division readiness and long-term issues of higher-echelon command and control.

R-3823-A Performance-Oriented Logistics Assessment (POLA): Executive Summary. J. H. Bigelow. 1992.

Performance-Oriented Logistics Assessment (POLA) has developed a prototype methodology to help build the logistics portion of the Army five-year program. The POLA methodology estimates both the costs and the effects on combat performance of alternative logistics improvements. By comparing their costs and effects on combat performance, one can arrive at a balanced program that provides greater combat effectiveness for each logistics dollar spent. This report briefly reviews the POLA methodology and its uses. (See also R-3814, N-3354, N-3393.)

R-3841-A / A F West German Military Modernization Goals, Resources, and Conventional Arms Control. J. E. Nation. 1991.

This report compares the financial requirements of modernizing West German military forces with a range of budgetary resources both with and without negotiated conventional force reductions in Europe. The analysis focuses on the evolution of economic and demographic constraints on long-term West German defense planning, projects resource-requirement imbalances, and examines potential reactions to imbalances. The author concludes that reactions by Ministry of Defense (MoD) planners will vary depending on the emerging security environment and the results of West Germany's security debate. If substantial shortfalls appear likely, planners may be forced to make difficult choices, ranging from stretching out procurement purchases to making large personnel

reductions and abandoning specific missions. However, MoD plans will probably be influenced more by changes in Soviet and Warsaw Pact member defense efforts.

R-3882-A The Army in a Changing World: The Role of Organizational Vision. J. K. Setear, C. H. Builder, M. D. Baccus, E. W. Madewell. June 1990.

This report is about the Army's future and the role an organizational vision for the Army can play in that future. The authors suggest that for an Army that wishes to adapt to the changing national security planning environment, the key element is the Army's vision of itself, its sense of identity and purpose, of what it is and what it is about. While the Army's essential institutional planning problem over the past 40 years has largely been one of managing budget, personnel, and technological resources, the problem for the future may involve reconceiving the Army to meet new threats to the nation's security or to minimize institutional damage. Although the Army has no explicitly acknowledged current organizational vision, its institutional thoughts and actions do reflect a widely shared sense of identity and purpose as the ready armored defender of Central Europe. If the authors' projections of planning trends materialize, this current vision puts the Army on a collision course with what is perceived as its post-Cold War future. A fundamental choice may have to be made between the Army's current combat role and its former historical role as a provider of noncombat military services to the nation. Of the eight alternative visions of the Army that the authors pose, they believe the most relevant and realistic ones call for a U.S.-based Army performing general military service that may rely on either active or reserve forces.

R-3884-A Army Families and Soldier Readiness. M. A. Burnam, L. S. Meredith, C. D. Sherbourne, R. B. Valdez, G. Vernez. 1992.

During the 1980s, Army families became more diverse and complex, paralleling trends in the civilian world. As these changes have developed, Army families have called for improved family and quality-of-life programs. The Army leadership has expressed concern that family needs, if unmet, could reduce soldiers' readiness, retention, and overall well-being. To determine how extensive such needs are, and how much they are affected by family characteristics and Army policies, this study collected quantitative data relevant to Army family policy, focusing on three key areas: soldiers' individual readiness, their use of family services, and their overall well-being. The analyses confirm that long working hours, frequent rotations, frequent separations from family, overseas location, and assignment to a nonpreferred location have negative impacts on individual readiness and well-being. The authors found a strong relationship between favorable perceptions of Army leadership and practices on the one

hand, and readiness and individual well-being on the other. Perceptions of Army support and of the necessity of Army requirements are also associated with retention for officers and with Army commitment and job performance for all soldiers. (See also R-3691, N-2624)

R-3899-A/DARPA Terminally Guided Submunition Technology and Countermeasure Issues (U). M. B. Schaffer. Oct 1991. SECRET NOFORN WNINTEL LIMITED: US GOV'T AGENCIES INTEL OTHER REQUESTS MUST BE REFERRED TO DARPA/TIO

R-3901-A Effect of Personnel Quality on the Performance of Patriot Air Defense System Operators. B. R. Orvis, M. T. Childress, J. M. Polich. 1992.

This report examines the linkage between the quality of enlisted personnel (in terms of aptitude score) and their ability to operate the Patriot air defense missile system. The intent was to help the Army set appropriate performance standards and estimate the effects of personnel quality on operational performance. The study finds that the Armed Forces Qualification Test (AFQT) score has a direct, consistent effect on the outcomes of air battles, both in terms of knowledge assessed by written tests and in actual performance simulations. Specifically, soldiers with higher AFQT scores can be expected to suffer significantly less asset damage, destroy more hostile aircraft, and be more effective in missile conservation. The study also finds that a one-level change in AFQT category equaled or surpassed the effect of a year of operator experience or of frequent training, a finding that has significant readiness and cost implications, since higher quality soldiers require less training and operator experience. Finally, the study finds that next to AFQT, operator and unit experience are the factors that most consistently affect performance.

R-3914-A Contributions of Laser Weapons to the Survivability/BMD Potential of Strategic Defense Systems (U). M. D. Miller, H. G. Hoover, S. M. S. Everingham. Jan 1992. SECRET LIMITED: US GOV'T & CONTRACTORS OR REFER TO CLIENT

R-3947-A The Army's Role in Counterinsurgency and Insurgency. S. T. Hosmer. November 1990.

This report identifies potential initiatives for improving Army doctrine and capabilities for counterinsurgency and insurgency warfare. These include recommendations that the Army (1) build and maintain small cadres of counterinsurgency and insurgency experts; (2) create, along

with the other services, a counterinsurgency institute to train U.S. and foreign nationals; and (3) ensure more appropriate and effective U.S. arms and equipment transfers to countries facing insurgent threats. The author also examines the reasons insurgency is likely to continue to be a frequent form of conflict; describes the threat of insurgency to important U.S. interests in the Third World; explores the potential for U.S. Army noncombat support to Third World countries fighting insurgency; describes the impediments to U.S. influence and assistance; outlines the potential situations that might lead to U.S. involvement in counterinsurgency combat; and discusses the Army's role in support of friendly insurgency.

R-3951-A Gorbachev's First Five Years in the Soviet Leadership: The Clash of Personalities and the Remaking of Institutions. H. Gelman. May 1990.

This report provides an overview of the dilemmas that arose from Gorbachev's efforts to change the Soviet Union during his first five years in power. The study seeks to show how the conflicts in various arenas of Soviet life have affected each other. The author reviews the struggle among the Soviet leaders from the spring of 1985 through the spring of 1990. Because the economic dimension is probably the decisive one, the report first traces how and why the Soviet leaders arrived at their present economic predicament. The study then reviews the purely political aspects of the leadership struggle as it evolved and the implications of Gorbachev's emerging political reforms. It discusses the main features of the nationality crisis as they affected Gorbachev. The study then considers the evolution of Gorbachev's relations with the military and their institutional consequences. Finally, it weighs the implications of the political role of the KGB for the Gorbachev leadership.

R-3967-A An Evaluation of the VISION Execution System Demonstration Prototypes. P. Boren, K. Isaacson, J. Payne, M. L. Robbins, R. Tripp. 1991.

This report describes the prototype development for a U.S. Army combat-oriented logistics execution system with VISION (Visibility of Support Options). The Army calls this system the Readiness-Based Maintenance System (RBMS). RBMS prioritizes repair and distribution of spare parts by maximizing the probability of meeting unit-level weapon system availability goals. The report discusses the feasibility, effectiveness, and usability of RBMS through the use of analytic demonstration prototypes. It outlines the methodology behind RBMS and describes the outputs it produces. It then presents findings on RBMS's potential value for the Army, describes the input data requirements and the availability of usable data in present Army data systems, and discusses evaluation results of the demonstration prototypes. Finally, the report presents prospective users' evaluations

of the perceived usefulness of the system and suggestions for its improvement.

R-3968-A The VISION Assessment System: Class IX Sustainment Planning. C. L. Tsai, R. Tripp, M. B. Berman. 1992.

This report describes the underlying motivation, characteristics, and possible applications of the VISION (Visibility of Support Options) Assessment System, a decision support system designed to improve the ability of Army logisticians to address three issues that are fundamental to Class IX (spare parts) sustainment planning: (1) assessing whether the logistics system can support operational needs and objectives throughout the course of a planned conflict, (2) determining where and when problems are likely to emerge and how serious they are likely to be, and (3) identifying what can be done beforehand to avoid or mitigate those potential problems. Among the potential uses of the VISION Assessment System, the authors identify (1) assessing and improving the supportability of existing operation plans (OPLANs), (2) evaluating and choosing among alternative courses of action during OPLAN development, (3) identifying effective peacetime strategies for overcoming potential wartime problems, (4) examining new concepts and establishing new doctrine, (5) exploring cost-reduction strategies and weighing tradeoffs among different resources, and (6) reporting unit sustainability.

R-3997-DR&E/A/AF Joint Close Support Study: Final Report (U). M. Callero, B. W. Don, F. L. Frostic. Apr 1993. SECRET LIMITED: US GOV'T AGENCIES & CONTRACTORS

This report provides high-level decisionmakers with a framework for analyzing and addressing close support issues from a combined arms perspective at all levels of combat. The report's key finding is that because the situations that require support for engaged land forces extend beyond the limits of close support and because the demands of the battlefield require that forces and systems be applied in a variety of ways, force enhancements to improve the close support capability should be viewed as enhancements to the general-purpose forces. The report concludes with some specific recommendations for the Army and the Air Force and argues that for these recommendations to be carried out, the nation's investment would best be managed by making improvements on a "package" basis, rather than to the systems separately. The report also argues that the changing nature of the battlefield, the increasing employment range and flexibility of close support systems, and the ability to jointly share information about enemy force and logistics movements over great distances require that the doctrine and employment concepts for the support of engaged ground forces be modified to reflect these changes.

R-3998-A **Lessons for Contemporary Counterinsurgencies: The Rhodesian Experience.** B. Hoffman, J. M. Taw, D. W. Arnold. 1991.

This report examines the counterinsurgency campaign waged by Rhodesia between 1965 and 1980. Its purpose is to analyze the lessons learned from the Rhodesian conflict and assess the relevance of these lessons both to United States low-intensity-conflict training and doctrine and to the insurgencies occurring at this time in Central America. The research concentrated on the four areas common to most insurgencies: (1) security force organization and attendant command-control-communication issues; (2) countermeasures to suppress urban terrorism; (3) rural pacification and security; and (4) intelligence collection, collation, and dissemination. The greatest challenge facing the U.S. Army in evolving a credible and coherent low-intensity-conflict doctrine today is overcoming the institutional barriers that inhibit change and adaptation. The Army must adjust its dominant conventional war-fighting mindset to the vagaries and complexities of warfare at the low end of the conflict spectrum.

R-4001-A **The Fate of the Party Apparatus Under Gorbachev.** M. Rush. 1991.

For most of its history, the Soviet political system has been dominated by the Communist Party's permanent staff—the party apparatus, or apparat. The apparat has been charged with executing such vital functions as managing the party apparatus itself, and recruiting persons with the requisite skills and political loyalties; controlling other institutions of the regime, choosing their leaders, and checking on their performance; servicing the Politburo, alerting it to the need for policy decisions, and drafting the directives required to activate the relevant institutions; and monitoring these massive and recalcitrant bureaucracies and ensuring that the party's directives are implemented. The apparat's performance in carrying out these functions is indicated by the sad state of the Soviet Union when Gorbachev became head of the party apparatus, the General Secretary, in 1985. In the following five years, Gorbachev moved from a concern with revitalizing the apparat to enable it to perform its traditional functions more effectively to a concern with emancipating the legislative and executive "branches" of the Soviet government from heavy-handed party control. This report traces Gorbachev's effort and assesses its consequences.

R-4002-A **The Ethnic Factor in the Soviet Armed Forces: The Muslim Dimension.** T. S. Szayna. 1991.

Open ethnic conflict has swept the entire Soviet Union during the last few years. The Muslims already have had a powerful negative impact on the efficiency of the Soviet military. This report examines the Muslim dimension of

the ongoing ethnonational ferment affecting the Soviet armed forces. In particular, it analyzes the impact of the rapidly increasing Muslim cohort on the cohesion of the Soviet military by focusing on factors affecting the ability and reliability of Muslim servicemen today. Problems such as language deficiencies, trainability, and socialization are discussed in detail, as are efforts by the military leadership to ameliorate them. The author critiques some earlier methods for dealing with the subject and considers the implications of the ethnic ferment for armed forces reform.

R-4015-A **Defense Policy and Low-Intensity Conflict: The Development of Britain's 'Small Wars' Doctrine During the 1950s.** B. Hoffman, J. M. Taw. 1991.

This report examines the planning and conduct of three counterinsurgency campaigns waged by Great Britain in Malaya, Kenya, and Cyprus during the 1950s. Certain mistakes were repeated in each conflict, from which the following lessons can be drawn: (1) the administration, police, and military should be coordinated under a single individual; (2) intelligence gathering and collation should be coordinated under a single authority; (3) late recognition of an insurgency is costly; (4) large-scale formal operations should not be emphasized in lieu of special forces operations; (5) routine police work should continue; and (6) without sufficient low-intensity-conflict training for troops and appropriate materiel, the conflict will last longer and cost more. The authors point out that situational factors must be considered in an insurgency; also critical is the nature of the insurgency, especially the broadness of its appeal.

R-4021-A **German Unification and Its Ramifications.** R. D. Asmus. 1991.

This report assesses the political, economic, foreign, and security policy implications of German unification and draws the central conclusion that unification has fundamentally transformed Germany's position and role in Europe. The author identifies four dangers facing German policymakers: (1) residual uncertainties of German domestic politics in the wake of unification; (2) the possibility that Germany will not engineer its political and economic integration into the European Community as quickly or as comprehensively as it hopes; (3) the chance that Germany will be overwhelmed by the problems of political and economic reconstruction farther to the east; and (4) Germany's need to develop and sustain a satisfactory relationship with the Soviet Union when the Soviet state is fragmented. The U.S. role in Germany and Europe will not be one of a controller or mentor, but rather one of a key leadership partner in the Western world; the United States will be a key interlocutor with the Soviet Union on security issues.

R-4071-A Arms Control Regimes and Ballistic Missile Defense. M. D. Miller, H. L. Weisberg, W. R. Harris, S. M. S. Everingham, K. J. Hoffmayer, H. G. Hoover, B. Wolf. 1991.

This study (1) examines arms control agendas that include substantial roles for ballistic missile defense (BMD) and (2) arms control architectures that would support such agendas. It reviews the national security objectives that pertain to strategic offensive and defensive forces and then describes a spectrum of six candidate arms control/BMD agendas, two of which—thin-area BMD and defense dominance—are identified as having enhanced potential to fulfill national security objectives without significantly degrading strategic stability. The report also determines, for ground- and spaced-based thin-area BMD architectures and a base case set of threats, the weapon deployment levels required to provide various degrees of threat negation capability. It also considers the role of arms control treaties in achieving a thin-area BMD within the framework of U.S.-Soviet cooperation. Finally, it discusses cooperative deployment of thin-area BMD within a broad context of goals for a structured strategic defense program.

R-4074-A Strategic Planning for the United States Army Personnel Function. W. M. Hix, R. E. Sontor. 1991.

This report reviews and evaluates how much strategic planning concepts used in private industry can be applied to the Army and provides recommendations for improving the Army's ability to do effective strategic planning for a changing and uncertain future. The study recommends that the Army adopt a process patterned on the private industry model because, unlike the Army process, the latter process explicitly considers future uncertainty and evaluates strategy alternatives to deal with it. The process for the proposed strategic planning concept should start by defining and prioritizing goals and objectives. It should then define relevant dimensions of the operating environment and explore alternative future environments. Finally, the process should develop strategies (shaping, operating, and hedging) and define the resulting environment within which the Army plans to operate. The study further recommends that the revised process be implemented incrementally over the next two-year planning cycle.

R-4084-A NATO's Future Conventional Defense Strategy in Central Europe: Theater Employment Doctrine for the Post-Cold War Era. R. L. Kugler. 1992.

This report provides a political-military analysis for thinking about how NATO's conventional defense strategy can be adjusted to contribute to stability in Central Europe in the coming post-Cold War era. The report (which was

assembled in early 1991) concludes that NATO will need to employ a new "theater employment doctrine"—the way NATO uses military force on the battlefield to attain its goals—one that defends further eastward and more flexibly than linear defense contemplated. All viable alternatives for such a doctrine will require NATO to uproot long-established defense practices. Changes will have to be made not only in NATO's force posture, but also in how coalition defense is conducted. Having a concerted planning effort that forges a coherent relationship among NATO's future defense strategy, employment doctrine, and force posture can ensure these changes are well-managed, thus leaving NATO with a viable conventional defense strategy even if forces are smaller than they are now.

R-4097-A Enlistment Effects of the 2 + 2 + 4 Recruiting Experiment. R. J. Buddin. 1991.

This report describes the enlistment effects of the Army's 2+2+4 recruiting experiment, which was aimed at attracting high-quality personnel into the active Army and encouraging their later participation in the reserves. These effects were estimated through a job-offer experiment that estimated how the program affected the recruits' choices among skills and terms of service and through a geographic experiment that assessed whether the program led to a "market expansion"—i.e., an increase in the total number of high-quality persons entering the active Army. Overall, the program seems to have accomplished its objectives for active-duty recruiting. The 2+2+4 option sold readily and benefited virtually all the occupational specialties for which it was tested. During the test, about 7 percent of all male high-quality enlistments contracts were written under the program. Moreover, the analysis indicates that the program attracted high-quality recruits into the Army and caused only a small number to change from a longer term of service to a shorter one. (See also R-2935, R-3353, N-3187.)

R-4108-DARPA/A/DR&E The Relevance of Deep Fires and Associated Countermeasures in Regional Conflict (U). M. B. Schaffer, K. A. Solomon, G. I. Taylor. Jun 1992. SECRET NOFORN WNINTEL LIMITED: US GOV'T & CONTRACTORS OR REFER TO CLIENT NO DTIC INTEL

R-4114-AF/A/OSD Is It You or Your Model Talking?: A Framework for Model Validation. J. S. Hodges, J. A. Dewar. 1992.

This report lays out a conceptual framework for validation, arguing that some models can be validated and used to predict, while others cannot be validated and may only be put to nonpredictive uses. To be validatable, a model must be observable and measurable, must exhibit constancy of

structure in time, must exhibit constancy across variations in conditions not specified in the model, and must permit the collection of ample data. Nonvalidatable models can be used as a bookkeeping device, as an aid in selling an idea of which the model is but an illustration, as a training aid to induce a particular behavior, as part of an automatic management system whose efficacy is not evaluated by using the model as if it were a true representation, as an aid to communication, as a vehicle for a fortiori arguments, and as an aid to thinking and hypothesizing. The report shows that the appropriate form of model quality assurance depends fundamentally on how the model is used.

R-4133-A/USN Improving Naval Aviation Depot Responsiveness. M. K. Brauner, D. A. Relles, L. A. Galway. 1992.

This report examines the consequences of increasing the Navy depot's role in the logistics system by directing its resources toward the day-to-day needs of the fleet. Using a simulation that examined whether mission capability could be improved during a 90-day war through some combination of responsive stock management, proactive use of depot repair capabilities, and shortened transportation pipelines between carriers and depots, we found that priority repair at the depot can make an important difference in mission capability, that shortened pipelines can have large effects on mission capability, and that constructing an aviation consolidated allowance list (AVCAL) based on aircraft availability goals may offer promise for maximizing aircraft availability per dollar spent. The study also concluded that data synthesis is a missing ingredient in the Naval aviation logistics management system that inhibits the depot's ability to react quickly in support of sudden demand peaks.

R-4143-A Effect of Aptitude on the Performance of Army Communications Operators. J. D. Winkler, J. C. Fernandez, J. M. Polich. 1992.

This report examines duty tasks performed by military occupational specialty 31M, Multichannel Communications Equipment Operator, whose members operate communications systems providing division- and corps-level command and control. The intent was to develop quantitative analyses based on objective measurement of soldier and unit performance aimed at improving the Army's ability to set appropriate performance standards and to develop quantitative estimates of the link between personnel aptitude and Army operational performance. The study finds that the Armed Forces Qualification Test (AFQT) score has a direct, consistent effect on the ability of communications personnel to provide effective battlefield communications to Army units. The evidence suggests that AFQT scores have a sizable effect on group performance. Groups that

are on average "smarter" outperform other groups. The study concludes that a lowering of accession standards will substantially reduce the probability of operator success in operating and troubleshooting communications systems.

R-4155-AF/A Evolution of Models at the Warrior Preparation Center: Problems and Solutions for Higher-Echelon Exercises. P. D. Allen. 1993.

This report describes the evolution of the suite of models at the Warrior Preparation Center (WPC), a training and support facility in Europe. The study points out that the WPC faced a sudden change in its customer base, which meant that underlying assumptions and exercise designs well suited for that earlier customer base had to be reevaluated. This reevaluation yielded two results: (1) the WPC should strive to reduce in-house model development and model modification and should focus instead on improved training support activities; and (2) the WPC should initiate a new investigation of alternative models and exercise designs without the old institutional assumptions. This result led to the decision that the WPC should have two sets of models—one for Army Group and above and another for Army Group and below. The project staff recommended the Corps Battle Simulation (CBS) model to replace WPC's ground war simulation (GRWSIM) model for lower echelon exercises and the joint theater-level simulation (JTLS) model for higher-echelon training.

R-4156-A Simulation Support of Large-Scale Exercises: A REFORGER Case Study. P. D. Allen. 1992.

This report describes an analysis of the Caravan Guard (CG) 89 and Centurion Shield (CS) 90 exercises. The study examines four different exercise training modes (both live and simulated) employed in CG 89 and CS 90 exercises: field training exercise, command field exercise, command post exercise; and computer-assisted exercise. The analysis leads to three recommendations for future large-scale multi-echelon exercises. First, exercises should consist of a single training mode and that should be simulation. Second, if simulations become the primary mode, a number of limitations affecting the current family of simulations must be overcome. Broad areas needing improvement include the representation of the effect of combined arms, the types of battles, aspects of how the operational level of war is depicted, the "fog and friction of war," and intelligence functions and products. Third, whenever possible, exercises should include both Active and Reserve component units and forces and other services and nations.

R-4172-A Assumption-Based Planning for Army 21. J. A. Dewar, M. H. Levin. 1992.

This report describes a long-range planning methodology developed for Army 21-an Army planning exercise designed to envision how the Army will fight between 15 and 30 years in the future-and demonstrates a partial implementation of the methodology by generating a set of alternative futures. In applying the methodology to the AirLand Battle-Future (ALB-F) concept, we found that the scenarios generated can be properly used to do two things: think about actions that should be taken in current planning to begin preparing for the eventuation of any of the scenarios, and identify "signposts"-events or trends that would suggest the world had taken an important turn toward one of the challenges to the ALB-F concept. We also found the methodology could be improved by developing a rudimentary theory of assumptions to guide their discovery and formulation. Finally, we found the ALB-F concept to be robust because it was difficult to come up with assumptions underlying it that might be violated; such a finding implies that doctrine writers will be challenged to develop the concept into a compelling guide to force structure development, training, etc.

R-4177-A "An Ever Closer Union": European Integration and Its Implications for the Future of U.S.-European Relations. J. B. Steinberg. 1993.

This report examines the process of European integration and assesses its implications for U.S. policy. The study finds that changes in the European Community (EC) will be evolutionary, with the economic and financial dimension moving more quickly and the foreign policy and defense dimension moving more slowly. It also concludes that U.S. influence over European policy will diminish as Europeans become more preoccupied with developing intra-EC consensus, that conflicts in the economic realm will continue and could worsen if the United States and the EC move away from an open trading and financial system to a bloc economic approach, and that NATO will play a diminished role in transatlantic policy consultation and coordination, but will remain an important element of the European security structure. The document recommends that the United States adopt a policy of supporting the general thrust of the integrative process, develop more extensive bilateral working relationships with EC institutions on both economic and security policy, support NATO reform to enhance the complementarity of the EC and NATO, and advocate broadening the EC to include Central European and East European countries.

R-4182-A An Initial Evaluation of the VISION Assessment System: Its Relevance and Application to National-Level Sustainment Planning. C. L. Tsai, P. Boren, R. Tripp. 1992.

This report documents the demonstration of a prototype decision support system for logisticians called the VISION Assessment System, or VAS. The system aims at

helping logistics planners evaluate and improve equipment sustainability. To demonstrate the prototype, we developed a scenario involving M1 tanks similar to one that occurred during the buildup phase of Operation Desert Shield. In addition to the standard support concept, we evaluated three other strategies designed to improve tank availability: expedited requisitions, forward-deployed depot repair, and asset prioritization. The evaluation indicated that under the standard support concept the number of operational tanks would decline to unacceptably low levels and that each enhancement strategy improved things, albeit not always to the extent anticipated. Beyond demonstrating that the prototype could address logistical questions, the project illuminated some data and usability issues. A fair amount of the data needed by VAS resides in Army standard systems, but they are not always accessible. Other elements do not exist. Also, although VAS functions, it would require additional work to make it a helpful tool at the everyday working level.

R-4195-OSD/A/AF Civil-Military Relations and National Security Thinking in Czechoslovakia: A Conference Report. T. S. Szayna, J. B. Steinberg. 1992.

This report summarizes the results of a workshop entitled "Civil-Military Relations and the Development of National Security Policy in the United States and Czech and Slovak Federal Republic," held in Prague on May 5-7, 1991. The central conclusion from the workshop is that the Czechoslovak military has evolved greatly toward a genuine state institution since the political changes in late 1989. However, Czechoslovak officials look to the United States (as well as other Western countries) for help in training personnel, both uniformed military and civilian security experts. Such help would ensure the continued successful transformation of the Czechoslovak military. The workshop occurred before the August 1991 coup that marked the end of Communist dictatorship in the former USSR. As a result, the sense of unease about instability and potential spillover of ethnic strife from the Ukraine into Slovakia has probably increased. The disintegration of Yugoslavia and the potential for the spread of the conflict have also emerged as real threats to stability in the region. These developments are bound to motivate Czechoslovak officials to continue to further institutionalize the Conference on Security and Cooperation in Europe (CSCE) and to attain security guarantees through membership in Western security organizations.

R-4200-A The Rise and Fall of National Security Decisionmaking in the Former USSR: Implications for Russia and the Commonwealth. H. Gelman. 1992.

This report examines the Soviet political-military mechanisms used in the Gorbachev era for national security decisionmaking and explains how the struggle

over control of those mechanisms contributed to the events that led to the failed August 1991 coup. The report argues that during the months leading up to the August coup, the leaders of the military-industrial complex discovered that the centrifugal process in the USSR steadily whittled away at their traditional ability to use central institutions to carry out unilateral decisions affecting the republics, and that a prominent motive for the coup was the hope of halting that process by preventing the imminent signing of a union treaty that would formalize a vast further reduction in the degree of influence those leaders enjoyed. The critical issue of the ideological leanings of the actors involved in whatever new supreme institutions for national security coordinating and decisionmaking eventually reemerge in Russia was underscored in the spring of 1992 by disturbing signs that Yeltsin was coming under increasing pressure to make concessions to the traditionally dominant forces in the military institution.

R-4201-A The New World Order and Army Doctrine: The Doctrinal Renaissance of Operations Short of War? J. M. Taw, R. C. Leicht. 1992.

This report examines the development of Army doctrine relevant to military operations short of war and noncombat operations and how doctrinal treatment of nonconventional operations affects the Army's capabilities in low intensity conflict (LIC) environments. The report concludes that progress toward a workable, integrated LIC doctrine has been slow, but is occurring. Doctrinal manuals currently in draft should be published without fundamental changes, enabling the Army to move toward a better doctrine for guiding its efforts in this area. It also concludes that the Army cannot continue to maintain its focus on conventional conflict as the primary ingredient of success to the exclusion of nonconventional capabilities. For the U.S. military to play a successful supporting role in peacetime or in conflict-whether through training of international military students, civil affairs, or various forms of civic action-U.S. troops themselves must be adequately versed in the precepts of internal defense and development, LIC and sensitive political environments, civil-military relations, and respect for human rights.

R-4204-AF/A Bridge or Barrier?: Turkey and the West After the Cold War. I. O. Lesser. 1992.

This report explores the roots of Turkey's western orientation and the prospects for Turkish relations with Europe and the United States after the Cold War. The study indicates that Turkey's basic western orientation will almost certainly hold and that the prospects for Turkey formally joining the European Community have not improved despite Turkish support in the Gulf War. Turkey's prospects for inclusion in new European security arrangements will remain poor, and Turkey will become

increasingly distinctive and perhaps isolated within the NATO alliance. It also finds that if Europe excludes Turkey, then the significance of the bilateral relationship with the United States will grow and that U.S. and Turkish interests are likely to remain broadly congruent. Given these findings, the United States should strive to promote Turkey's strategic importance in Europe and the Middle East, avoid pressing Ankara for a formal expansion of defense cooperation, consider the potential role of Turkey as a conduit for western aid to the southern republics of the former Soviet Union, seek the development of a more mature and diversified relationship mixing traditional security assistance with expansion of political and economic ties, and continue playing an active role in promoting a Cyprus settlement.

R-4220-A Two Shades of Green: Environmental Protection and Combat Training. D. S. Rubenson, J. Aroesty, C. Thompson. 1992.

This report discusses the implications of environmental restrictions on combat training. Of the two types of environmental challenges the Army faces-rule-based legislation, generally associated with EPA-implemented regulation, and planning or procedural law related to conservation, preservation, and land management practice-the latter has greater potential to influence the military mission and is harder for the Army to deal with. This is clear for Fort Bragg, where the Army initially failed to grasp the elements of a suitable response to enforcing the Endangered Species Act (ESA) by the U.S. Fish and Wildlife Service (FSW) over the Red Cockaded Woodpeckers (RCW), a federally listed endangered species. As a result, Fort Bragg was forced to implement a plan that may degrade its military mission over time, something it might have avoided if it had early on offered a plan that protected RCWs while seeking to minimize restrictions on training. Although installations vary, the study argues that the lessons of Fort Bragg can be generalized to form the foundation for a broad proactive Army strategy.

R-4224-A How to Estimate the Costs of Changes in Army Individual Skill Training. S. Way-Smith. 1993.

This report describes a method to estimate costs of changes in Army courses that result from changes in training strategies. The methodology, called TRAM (Training Resource Analysis Method), employs a five-step procedure that begins with a baseline analysis, determines changes, estimates cost, and analyzes trade-offs and risks. Applying the methodology to four variations of the Army's Armor Officer Advanced Course that include different lengths, approaches (e.g., centralized vs. dispersed), and mediums (e.g., paper vs. computer-assisted) reveals potentially substantial savings. But the savings depend directly on the

choice of media and how training is implemented in the field. Distributed training saves money only if capacity already exists, development and support costs remain low, and the course uses "low-tech" media. The analysis suggests three significant conclusions. First, savings normally result from trading off other factors such as effectiveness or capability. Detailing changes in activities allows decisionmakers to apply experience and judgment to determine if the savings justify the tradeoffs. Second, a significant part of training costs stems from support and base operations functions that are relatively insensitive to changes in course length and method. Without other major changes such as facilities consolidation, savings in training costs will only occur at the margin. Finally, distributing more training than field units can readily absorb drives training costs up significantly.

R-4228-A Linking Future Training Concepts to Army Individual Training Programs. J. D. Winkler, S. J. Kirin, J. S. Uebersax. 1992.

This report presents the results of research seeking to link new Army training concepts for changing institutional training programs to specific occupations and courses. It analyzes, across a range of occupations, alternative training approaches that may be more affordable and flexible than current techniques for individual skill training. The report examines training-related characteristics of Army occupations and identifies general training-related dimensions that characterize Army entry-level enlisted military occupational specialties (MOS). The authors find the principal training-related dimensions include ability requirements, dominant task characteristics (procedural or verbal), similarity to civilian occupations, and resource intensity. The dimensions can be linked to new training concepts under consideration by the Army (i.e., distributed training; use of training aids, devices, simulators, and simulations; use of civilian training sources). The authors find these results useful in suggesting MOS in which particular training concepts and strategies may prove most feasible and cost-effective.

R-4229-A French Security Policy After the Cold War: Continuity, Change, and Implications for the United States. P. H. Gordon. 1992.

This report examines contemporary French security policies and finds that despite momentous geopolitical changes in Europe since late 1989, the basic elements of French security policy have not changed much, as revealed both in France's relations with Europe and NATO and in France's response to the Gulf War. Looking ahead, the study finds that a major reorientation of security policy is unlikely in the near term. For U.S. policy, the study finds that it is not in America's interest to "marginalize" or "isolate" France by focusing solely on our "Atlantic" allies in Europe. While the study shows evidence that

immobilism is more likely than major change in French-U.S. relations, it still argues that the United States should not oppose attempts to create a European security and defense identity and that it should do more to show France that the rejuvenation of NATO is not meant to exclude and replace everything else.

R-4232-A F/A Turkey Faces East: New Orientations Toward the Middle East and the Old Soviet Union. G. E. Fuller. 1992.

This report explores the roots of Turkey's eastern orientation and the prospects for Turkish relations with the Middle East and former Soviet Union. The study finds that although Turkey has for years been at the geopolitical tail-end of Europe, it is now in the center of a newly emerging world. New relations to the south, east, and north are becoming increasingly vital to Ankara's interests. The study also finds that because U.S. interests in the region are less important with the end of the Cold War, U.S. influence over Turkey will probably be less. Still, the study recommends that because of the constructive role Turkey can play in the region, Turkey should be tied closely to the European Community and that effort should be taken to prevent a wall from emerging between "Christian" Europe and a Muslim Middle East—a wall that could intensify a North-South struggle in the decades ahead.

R-4238-A Linear Programming Methodology for Evaluating Conventional Munitions Mixes (U). R. E. Stanton, M. B. Schaffer, G. Gould, K. P. Horn, G. E. Dolbear, J. Hiland, D. Orletsky, H. Ory, G. I. Taylor. May 1993. CONFIDENTIAL LIMITED: US GOV'T AGENCIES & CONTRACTORS

R-4242-A Design of Field-Based Crosstraining Programs and Implications for Readiness. W. G. Wild, B. R. Orvis, R. M. Mazel, I. MacLennan, R. D. Bender. 1993

As part of a broad effort to reduce defense expenditures, the Army is exploring a number of new approaches to training individual soldiers. Prominent among these approaches is "field-based crosstraining (FBCT)," which involves combining two or more occupational specialties and shifting initial skill training from Army schools to on-the-job training in field units. This report describes a method for analyzing the features, advantages, and disadvantages of field-based crosstraining programs in the Army. Focusing on the specific case of helicopter maintenance, the report analyzes data from field units and recommends alternative field-based crosstraining strategies for the Army. An assessment of the Army's Apprentice Mechanic Initiative

(AMI) for helicopter maintenance is included in the analysis.

R-4268-AF/A Post-Cold War U.S. Security Strategies for the Persian Gulf. M. Agmon. 1993.

The end of the Cold War has presented the United States with an opportunity to adopt a different strategy toward the Persian Gulf region. In the past, the policy has been one of close and enduring political, military, and personal ties with friendly regimes. An opportunity for a more distant, "insulating" policy now presents itself. This report analyzes the potential costs and benefits of such a strategy. It posits four possible strategies—two traditional and two insulating—and evaluates them against five criteria. All strategies have different degrees of risk and benefit. Analyzing all factors leads to three major conclusions. First, whatever strategy is pursued, the United States needs to maintain sufficient military resources to serve as a balancing force in the region. Second, the two alternatives that emphasize either all-Arab or Saudi defense of the region pose the highest risk in terms of political instability. Finally, regional arms control makes all alternatives less costly and more beneficial.

NOTES

N-1157-A Nomograms for the Calculation of Propagation Effects on Tactical Millimeter-Wave Radio Links. W. Sollfrey. June 1979.

Description of the development and use of nomograms for calculating propagation effects on tactical millimeter-wave radio links. The principal causes of attenuation in the millimeter-wave band (35–75 GHz) are oxygen absorption, which depends on radio frequency, and rain scattering, which depends on frequency and rain rate. The nomograms display these dependencies and the range equation, and may be used to calculate communication system performance as a function of range, frequency, and rain rate by simply drawing straight lines between scales. Use of the nomograms is illustrated by several worked examples. By following the techniques demonstrated in the examples, the user should be able to solve link performance problems speedily and simply. 27 pp. Ref. (JDD)

N-1461-A Performance of Tactical Millimeter-Wave Radio Links--Vol. II: Technical Results (U). J. R. Clark, W. Sollfrey, S. Katz. June 1980. CONFIDENTIAL LIMITED: US GOV'T OR REFER TO CLIENT

(U) A detailed technical assessment of the feasibility of using millimeter waves for short-hop tactical

communications. The environmental performance of short-range (less than 10 km; mm-wave transceivers with voice, video, and data capabilities) is investigated and modeled. Emphasis is on two frequency bands and the propagation phenomena important in these bands. See also R-2518. 179 pp. Ref. (Author)

N-1664-A An Analysis of Cognitive Mapping Skill. S. E. Goldin, P. W. Thorndyke. March 1981.

Compares the performance of good and poor cognitive mappers on a variety of spatial knowledge acquisition and judgment tasks. Cognitive mapping skill was assessed by measuring subjects' knowledge of a highly overlearned environment, their home community. Subjects categorized as good or poor cognitive mappers participated in a series of experiments that examined learning a novel environment from navigation experience, map learning, map using and map interpretation, spatial judgments based on a memorized map, and navigation in a novel environment based on a memorized map. Good mappers performed more accurately than poor mappers in learning a novel environment, learning maps, and making spatial judgments based on a memorized map. Map using, map interpretation, and navigation tasks did not distinguish good from poor mappers. The authors conclude that, relative to poor mappers, good cognitive mappers are better able to encode and retain spatial information in memory and to mentally transform or manipulate spatial information in order to make spatial judgments, and they hypothesize that differences in spatial visualization and visual memory abilities may underlie these variations in task performance. 57 pp. Bibliog. (Author)

N-1667-A Ability Differences and Cognitive Mapping Skill. P. W. Thorndyke, S. E. Goldin. March 1981.

Compares good and poor cognitive mappers on a number of individual difference variables potentially related to cognitive mapping skill: spatial abilities, visual/verbal processing style, motivation, and experience. Good and poor mapper groups were given several assessment tests for each of these categories. Comparisons of good and poor mappers' performance on these tests indicated that only spatial abilities reliably distinguished good mappers from poor mappers. Good cognitive mappers showed greater visualization ability, spatial orientation ability, visual memory, and field independence. Other measures showed no between-group differences. It is concluded that spatial ability is a major determinant of cognitive mapping skill and that spatial ability tests can be used to select personnel for tasks requiring navigation, orientation, and spatial judgment skills. 55 pp. Bibliog. (Author)

N-1675-A Simulating Navigation for Spatial Knowledge Acquisition. S. E. Goldin, P. W. Thorndyke. May 1981.

Compares actual and simulated navigation as alternative sources of environmental knowledge. Subjects experienced a 5.15-mile tour through an unfamiliar environment through either a bus ride or a film taken from an automobile driving along the route. In addition, subjects received either a map to be studied prior to navigation, a verbal narrative giving angle and distance information during navigation, or no supplementary information. Film (simulated navigation) groups performed as well as or better than tour groups on landmark and configural knowledge measures. They were inferior to tour groups in route sequence knowledge only on turning angles. Supplementary information affected only film groups. Narration tended to depress performance; map study enhanced configural knowledge but depressed route knowledge. The authors conclude that simulated navigation can substitute for actual navigation under some circumstances, and that map supplements can enhance abstraction of configural relations from simulated navigation.

N-2317-A Conceptual Design for an Army Logistics Assessment-Extended (ALA-X) Methodology. J. H. Bigelow. July 1985.

This Note describes a conceptual design for Army Logistics Assessment—Extended (ALA-X), a methodology for assessing the readiness and sustainability of the U.S. Army. The methodology is intended for use in the Planning, Programming, and Budgeting process, so that those parts of the Army program dealing with logistics functions and resources can be better prepared and justified. The ALA-X methodology will relate resources among 38 categories of logistics resources to specific measures of combat capability and will treat them simultaneously so that tradeoffs and substitutions can be performed.

N-2403-A Combat Identification and Fratricide: SHORAD Preliminary Findings (U). M. Callero, C. T. Veit, B. J. Rose. May 1986. CONFIDENTIAL NO DTIC RELEASABLE TO NATO

(U) This Note documents a briefing on RAND Arroyo Center research into aspects of ground-to-air fratricide—the engagement of friendly aircraft by Army Air Defense systems—in the event of a Central European war. It considers (1) how bad the current combat identification and fratricide situation is, measured in combat effectiveness terms; (2) what the major causes are; (3) what achievable means would improve the situation; and (4) what impact the improvements would have.

N-2410-A Military Space Systems and Space Technology Applications: An Annotated Briefing (U). C. M. Crain, G. Gould, J. Hiland, J. H. Rosen, K. E. Phillips. June 1986. SECRET NO DTIC LIMITED: US GOV'T OR REFER TO CLIENT

The title of this document describes its content.

N-2413-AF/A On the Adapting of Political-Military Games for Various Purposes. W. M. Jones. March 1986.

Political-military gaming has long been used to study international confrontations and conflicts, to provide a means of interchange for groups of scholars and operators interested in the interplay of political and military factors in area confrontations, and to educate and train people who may actually become involved in dealing with such confrontations. The basic structure and procedures of this type of gaming are subject to considerable variation. This Note attempts to describe these structures and processes, and is designed as a primer on the subject.

N-2430-A Soviet Political Perspectives on Power Projection. Y. F. Fukuyama, S. Bruckner, S. W. Stoecker. March 1987.

This Note analyzes the views of Soviet non-military writers and political leaders on the question of power projection in the Third World. Although Soviet writers do not broach the subject directly, they touch on power projection indirectly when writing on the themes of (1) the local political basis of revolutionary power, (2) external (Soviet Union) aid and assistance to Third World clients vs. competing domestic and military claims, (3) the role of "armed struggle" in promoting revolutionary change, and (4) the risky effects of Third World activism on relations with the United States. Each of these themes is examined in some detail. The authors find that only in discussions of armed struggle as a revolutionary strategy do the Soviets recognize greater opportunities for power projection, and this is restricted to Central America. Possible future Soviet policy is discussed.

N-2438-A Applying the National Training Center Experience: Incidence of Ground-to-Ground Fratricide. M. Goldsmith. February 1986.

This Note uses data from the National Training Center instrumentation and observer systems to measure the frequency of fratricidal ground-to-ground engagements, to make some estimate of their importance to battle outcome, and to gain insights into the cases. Because the available data do not include infantry weapons, this study covers only vehicle system engagements and simulated artillery engagements. The study found that 1 to 3 percent of Blue vehicle kills were fratricidal, most fratricides were isolated, and multiple fratricides occurred mostly at night. For

indirect fire, an average of 26.7 artillery missions were fired per battle. Of these, 3.1 percent resulted in fratricide, while 33 percent struck the enemy.

N-2461-A Utilizing the Data from the Army's National Training Center: Analytical Plan. R. A. Levine, J. S. Hodges, M. Goldsmith. June 1986.

This Note describes the Army's operations at its National Training Center (NTC) at Fort Irwin, California, and ways in which the data collected during those operations can be used to derive lessons about Army doctrine, training, and weapon systems. The discussion of operations at the NTC includes descriptions of the training conducted there, the facilities for training and data collection, and the types of data actually or potentially available. As a laboratory for deriving lessons, the NTC has unique advantages and disadvantages. These have implications for using the NTC experience to formulate and test hypotheses. In particular, the authors emphasize the importance of testing the results of formal analytic procedures against the experience and intuition of NTC and other military personnel. (See also N-2384.)

N-2515-A Divergent Warsaw Pact Interests with Respect to East European Trade with the West (U). B. Zycher. December 1987. SECRET NOFORN LIMITED: US GOV'T OR REFER TO CLIENT NO DTIC

(U) This Note examines divergent Soviet and East European preferences with respect to the latter nations' trade relations with the West. The author reviews (1) Warsaw Pact vulnerabilities and economic policy, (2) Soviet economic policy in Eastern Europe, (3) recent trade behavior within the Council for Mutual Economic Assistance (CMEA), (4) non-Soviet Warsaw Pact/Western trade in light of the stated preferences of the Soviets and East Europeans, and (5) economic development and the CMEA science and technology agreement. Finally, he outlines the points that will have to be considered in formulating Western policy options.

N-2594-A Studies in Defense Organization: A Guide to Title III of the Department of Defense Reorganization Act of 1986. J. L. Lacy. April 1987.

Title III of the Goldwater-Nichols Department of Defense Reorganization Act of 1986 directs the Secretary of Defense, the Chairman of the Joint Chiefs of Staff, and the Secretaries of the military departments to conduct separate studies ("reassessments") of the defense agencies and Department of Defense field activities. This Note, prepared at the request of the Army Reorganization Commission, examines the terms and the legislative background of the study requirement. It reviews the factors that animated the Congress to act as it did, and suggests

the kind of study most appropriate to respond to the evident Congressional intent.

N-2624-A Families and Mission: A Review of the Effects of Family Factors on Army Attrition, Retention, and Readiness. G. Vernez, G. Zellman. August 1987.

This Note (1) reviews the Army's rationales for provision of quality-of-life and family support services; (2) presents an analytic framework for analyzing the influence of family factors and support programs on Army families and on the Army; and (3) organizes and evaluates findings of previous research about the effects of Army policies and services on both families and specific Army outcomes—attrition, retention, and readiness. In addition, it identifies gaps in knowledge about Army-family interactions, discusses the implications of research findings for Army family policy formulation, and suggests directions for future research.

N-2628-A Applying the National Training Center Experience: Tactical Reconnaissance. M. Goldsmith, J. S. Hodges. October 1987.

Many observers have noted shortcomings in tactical reconnaissance during battles at the National Training Center. This study systematically examines battle data from two sources: take-home packages prepared for unit remedial training, and field data specifically collected for the present study. The author finds a clear correlation between success in offensive missions and reconnaissance. However, data indicate that essential reconnaissance tasks are accomplished in only half the battles studied. Generally, units do not exploit all the assets potentially available for reconnaissance. Task forces do not seem to give emphasis to the reconnaissance task. Review of doctrinal literature and courses of instruction indicate that added emphasis needs to be placed on reconnaissance in the Army training system. The author makes specific recommendations for changes in doctrine and for additional instruction. He also suggests several equipment changes and additions, as well as courses of action for task force commanders and staffs.

N-2630-A Developing and Assessing Concepts for Future U.S. Army Warfighting: A Progress Report. P. J. Romero. April 1988.

The U.S. Army's concept-based requirements system stipulates that future materiel requirements should be based on a concept of warfighting that has undergone extensive analysis and refinement. This Note reports on the progress of an ongoing RAND effort to develop a method to help systematize and streamline the process of designing concepts. RAND's model will provide a first-order estimate of the forces and resources needed to meet

specified theater success goals for alternative concept designs. The model is meant to be flexible and fast-running, in order to serve as a tool for the exploration of new concept ideas. Analysts using the model will be able to experiment with variations in operational policy, examine the payoffs of improved technical performance, and conduct sensitivity analysis to identify robust concepts.

N-2716-A/DR&E Counterforce Responses to Tactical Ballistic Missiles (U). A. Slomovic, K. P. Horn. Nov 1991. SECRET NOFORN WNINTEL LIMITED: US GOV'T & CONTRACTORS NO DTIC INTEL

N-2718-A Reducing Risks Associated with Developing the LHX Mission Equipment Package. M. B. Berman, D. W. McIver, B. R. Orvis, M. L. Robbins, H. L. Shulman, R. H. Ruth. January 1989.

This Note describes RAND research into logistics supportability of the Mission Equipment Package (MEP) for the Army's proposed Light Helicopter Experimental (LHX). The LHX MEP specifications set a very advanced technological goal that poses several challenges to reliability, availability, and maintainability (RAM). The authors suggest a strategy by which the Army can ensure they meet these RAM challenges and attain the associated benefits in MEP performance and cost savings.

N-2719-A Automatic and Aided Target Recognition for LHX. H. H. Bailey, H. Ory, M. B. Schaffer. January 1989.

Automatic or aided target recognition (ATR) involves an imaging sensor (preferably more than one) plus a rather large amount of data processing. Such systems, by shortening the exposure times of aircraft during targeting, can be very helpful and may be essential to the survivability of the LHX (Light Helicopter Experimental). These systems are just now evolving to a useful level of capability. It is anticipated that these levels will approach 0.9 detection probability, 0.8 recognition probability, and 0.02 false alarms per square degree under favorable conditions. Tests to date have been promising, but they have involved only a limited variety of backgrounds and environments and have not included adequate representation of countermeasures. These conditions must be included in the continuing evolution and tests of ATR, but it appears probable that useful goals will be accomplished in time for the LHX program.

N-2720-A Reactive Threats to LHX (U). J. Hiland, C. M. Crain, L. G. Mundie. April 1990. SECRET NOFORN WNINTEL LIMITED: US GOV'T &

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(U) This Note describes a component of RAND's LHX (Light Helicopter Experimental) research that considers potential Soviet responses to LHX deployment—responses that might attempt to exploit LHX design and operational vulnerabilities. Based on an earlier assessment of the reactive threat to LHX, the Note summarizes an illustrative LHX operational deployment and the menu of survivability techniques currently planned for implementation. It discusses several potential reactive threat concepts and relates them to the survivability techniques. The authors conclude that the subject of reactive threats and U.S. countermeasures warrants serious and continuing attention. They recommend that the LHX program adopt a responsive threat strategy that considers a broad spectrum of reactive threats from the design stage and identifies design options for countermeasures that can be implemented if and when a specific Soviet response becomes evident.

N-2721-A LHX Mission Equipment Package Tradeoffs. M. B. Schaffer, H. Ory. April 1990.

This Note addresses technologies and issues associated with the mission equipment package (MEP) of the LHX (Light Helicopter Experimental). The study considers communications, navigation, target acquisition, and air survivability equipment, as well as cockpit displays in terms of their importance to the LHX missions, and their prospects of meeting performance requirements. The Note also compares weight allocations with those for similar equipment in Apache. Based on an extensive information base that includes the Army's cost and operational effectiveness analyses reports, briefings and reports generated during the LHX study, and first-order analyses performed to clarify particular issues, the authors conclude that the LHX Program Management Office generic selection of MEP systems, and the functions they represent, are well matched to the extensive set of missions for which LHX is intended. With the exception of the doppler velocity sensor, each system is necessary for some aspect of mission accomplishment, so that deletion of any to save weight and cost would result in loss of mission capability.

N-2724-A Armament for LHX (U). M. B. Schaffer, W. R. Benson. August 1989. SECRET NOFORN WNINTEL LIMITED: US GOV'T OR REFER TO CLIENT NO DTIC INTEL

(U) This Note discusses LHX (Light Helicopter Experimental) armament issues in terms of initial operational capability (around the year 1996) and from a second-generation perspective (around the years 2000–2020). It analyzes munitions capabilities relative to the

evolving threat, identifies the shortcomings of the current weapons suite, and outlines the characteristics of more desirable and effective systems. The authors' recommendations include replacements for the first-generation systems and a set of broad specifications for the SCAT, or Scout Attack, gun.

N-2725-A LHX Communications Issues (U). E. M. Cesar, H. Ory, M. B. Schaffer. April 1990. SECRET NO DTIC LIMITED: US GOV'T AGENCIES & CONTRACTORS OR REFER TO CLIENT

(U) This Note addresses issues related to the communication equipment and operating modes currently planned for the LHX (Light Helicopter Experimental), and their effects on the capability and performance of the LHX in accomplishing the approved missions, especially those in support of combined arms operations. The authors conclude that the communications suite planned for LHX satisfies the extensive mission requirements. However, a few minor deficiencies remain, and further improvements in simplification of operation, efficiency, and performance in difficult situations is desirable.

N-2727-1-AF/A/DARPA/DR&E RJARS: RAND's Version of the Jamming Aircraft and Radar Simulation. W. Sollfrey. 1991.

This Note describes an updated version of RJARS (RAND's version of the Jamming Aircraft and Radar Simulation). The present RJARS is a many-on-many computer simulation in the C language involving aircraft, radars, jamming systems, offensive and defensive missiles, infrared and optical systems, and a command-control-communications system for the defense. It can operate in conjunction with the RAND programs JANUS and CAGIS. RJARS treats sortie operations and evaluates jamming effectiveness and mission attrition at a level of detail that includes reasonable refinements of equipment operation without excessive calculational complexity. This Note describes RJARS and its sequence of operations, shows how to prepare input files and operate RJARS, gives programming details, and provides a glossary of the approximately 1,100 variables used in RJARS.

N-2737-A Clients and Commitments: Soviet-Vietnamese Relations, 1978-1988. S. W. Stoecker. December 1989.

This Note examines the evolution of the Soviet-Vietnamese relationship over the past decade in three contexts: (1) Soviet behavior in supporting the Vietnamese troops during the invasion of Cambodia in late 1978 and in defending them during the Chinese incursion of Vietnam in early 1979, (2) the level of Soviet economic and military aid, and (3) the impact of General Secretary Gorbachev's "new thinking" on Soviet-Vietnamese

relations. The record shows a Soviet disinclination to take risks in this region of the world, chiefly because of the proximity to China, even in the late 1970s during the height of Brezhnev's interventionism. Under Gorbachev, not only does interventionism appear remote, but tangible results in reducing tensions in Southeast Asia already have been achieved. Specifically, by September of 1989, thousands of Vietnamese troops left Cambodia, thus fulfilling the third "precondition" set by China on the path to improved Sino-Soviet relations.

N-2742-A Near-Term Options for Active Defense Against Tactical Missiles (U). J. Bonomo, J. G. Bolten, D. Dreyfuss, T. B. Garber. December 1989. SECRET

N-2760-A LHX Mission Analysis Using MOSF SUN Terrain Procedures: An Overview of System Logic. A. L. Zobrist, L. J. Marcelino. May 1989.

The mission analysis element of the RAND LHX (Light Helicopter Experimental) study is concerned with comparative analysis of helicopter/tilt rotor configurations in a mission context. Complex mission contexts are simulated with the standard JANUS system. This Note describes a RAND-developed system that supports and enhances the JANUS results by applying higher data resolution and greater engineering detail to selected parts of the JANUS cases.

N-2765-A Relating Selected Army Logistics Resources to Combat Performance Measures. J. H. Bigelow. August 1988.

This Note describes ALA-X (Army Logistics Assessment—Extended), a project to develop a prototype methodology to build the logistics portion of the Army five-year program. In particular, it describes the central model, the logistics decision model (LDM), among the many small models that are used in the ALA-X methodology. LDM is a highly aggregate, two-sided, deterministic simulation of a theater campaign. Once LDM is calibrated, a user can vary stocks of resources and capacities, and observe their effects on combat performance measures. An additional set of models, the logistics functional models, make it possible to bridge the gap between the physical resources of the Army program and the capacities measured by ALA-X. (Presented at the 56th Military Operations Research Society Symposium, held at the Naval Postgraduate School in Monterey, California, June 28-30, 1988.)

N-2776-AFMIC Potential Use of Agents of Biological Origin by Terrorists (U). K. A. Solomon, M. L. Juncosa, C. G. McWright, J. Simon, M. S. Colen, K.

Gardela. July 1989. CONFIDENTIAL LIMITED: US GOVT & CONTRACTORS OR REFER TO CLIENT

(U) This Note identifies and discusses potential technological and political threats to U.S. citizens and military, both within and outside the continental United States, from terrorist use of biological weapons. It also evaluates whether the potential threat warrants specific countermeasures. The authors present, in tabular form, synoptic profiles of the characteristics, spheres of activity, personalities, and weapons employed by 26 terrorist groups. They also outline a matrix of possible attacks with different weapons on different targets, and they conjecture about relative likelihoods of occurrence. The authors conclude that the extent and intensity of a biological weapon attack can be substantially reduced if appropriate measures are taken, including the establishment of a Federal Biological Emergency Response Team and development of medical readiness.

N-2863-AF/A NATO Conventional Defense: Force Augmentation with European Reservists. R. F. Phillips. January 1989.

NATO could enhance a capability for successful forward defense in several ways. One, the reserve option, would create additional NATO forces from the pool of unused or underused European reservists. To assess the feasibility of the reserve option, this study examines one technical and two policy issues: (1) the factors important to reserve unit effectiveness, (2) the number and type of reserve units required to provide NATO with a capability for successful forward defense, and (3) the manpower and budgetary costs of acquiring that security. The analysis shows that approximately 12 division equivalents of reserve forces, costing \$50 billion over 15 years (representing a 1.7 percent increase in the defense expenditures of those nations contributing to NATO's Central European defense), could mount the necessary defense. The least expensive alternative, at a cost of \$41.2 billion, would purchase one U.S.-based heavy division with a companion POMCUS set (prepositioned materiel configured in unit sets) in Europe. The addition of a single division, however, would not enable NATO to mount a successful forward defense.

N-2869-A Space Elements of Theater Missile Defense (U). K. P. Horn, G. Gould. September 1990. SECRET NOFORN WNINTEL LIMITED: US GOVT & CONTRACTORS OR REFER TO CLIENT NO DTIC INTEL

(U) This Note investigates the utility of using space assets to provide warning of enemy missile launch to aid tactical missile defense. Three potential Army applications for this warning were evaluated: (1) passive defense measures, such as seeking shelter, donning protective clothing

against chemical weapon attack, dispersing mobile vehicles, and flushing aircraft and helicopters; (2) counterfire attacks against enemy missile launchers and launch support facilities; and (3) cueing terminal defense against incoming missiles. The Note compared the utility of space assets vs. non-space alternatives using ground-based systems and found that although using space-based assets was promising, certain technical aspects need to be resolved before such a system could be deployed. As a result, the Note recommended conducting a space demonstration experiment to resolve such technical problems as data processing, connectivity, and decision aids requirements.

N-2890-A Assessment of Communications Operator Proficiency: Design Issues. J. D. Winkler, J. C. Fernandez, J. M. Polich. August 1989.

The U.S. Army Signal Corps provides the means for establishing essential communications between units on the battlefield. Within the various Signal Military Occupational Specialties (MOSs), a key role is played by MOS 31M, which is responsible for operating the tactical communications equipment used in units. This Note describes a design for research to assess the ability of such Signal Corps communications operators to perform their principal duties: (1) installing and operating communications equipment needed for a division or corps to communicate, (2) isolating "bugs" and identifying corrective steps in troubleshooting communications systems, and (3) installing antennas effectively and safely. The study uses the Reactive Electronic Equipment Simulator (REES), a high-fidelity computer-controlled simulation facility consisting of four signal nodes and 28 training positions. The REES tabulates all of the actions taken by each operator on each piece of equipment and records these data for later analysis of individual and team performance.

N-2891-A Assessment of PATRIOT Air Defense System Operator Proficiency: Design Issues. B. R. Orvis, M. T. Childress, J. M. Polich. August 1989.

The PATRIOT (Phased Array Tracking to Intercept of Target) missile system, the most modern and automated of the Army's Air Defense Artillery systems, protects U.S. and NATO assets from the high- to medium-altitude enemy air threat. This Note describes a research design to assess the performance of PATRIOT enlisted operators and to link that performance to the outcomes of simulated air battles. The research will examine the efficiency and effectiveness of the tactical control assistant and the tactical director assistant in (1) protecting valuable assets, engaging enemy aircraft, and assisting in the protection of friendly aircraft as is required for success during air battles; and (2) directing fire units to engage specific aircraft in order to protect assets and destroy enemy aircraft.

N-2916-A U.S. and Soviet Relations with Argentina: Obstacles and Opportunities for the U.S. Army. R. Schmidt. November 1989.

Over the last two decades, Argentina has become the Soviet Union's largest trading partner in Latin America, a fact that some analysts fear signifies growing Soviet leverage in the so-called Southern Cone region of South America. This analysis suggests that Soviet-Argentine economic relations are likely to remain strong, but that the Soviet Union's strategic interests in Argentina are limited. Meanwhile, the United States is cultivating its own influence in Argentina, although it must operate in an environment with strong anti-U.S. sentiment. The U.S. Army can best enhance U.S. influence in the region by strengthening its military education and exchange programs with the Argentine Army. These exchange programs provide the opportunity to transfer the U.S. Army's professional skills. As compared with other U.S. Army policy options, education and exchange programs are also of low visibility—an important factor, since many Argentine people perceive a threat to their democracy from their own armed forces.

N-2917-A Patterns in American Intellectual Frontiers. C. H. Builder. August 1990.

This Note examines the notion that a pattern exists in the ideas that have captured and dominated American society. Specifically, over the past 200 years, four such ideas have risen and been widely perceived as the most exciting way to shape the American future, persisting for about 50 years and then giving way to the next idea. Based on that pattern, five earlier ideas can be recognized, going back to the sixteenth century. Having defined a pattern of nine ideas extending over nearly half a millenium, the author suggests three more ideas that might fulfill the pattern for the next hundred years. Looking backward and then forward based on ideas rather than events provides a different kind of projection into the future. Specifically, the events of the past take on a different shading in the context of the ebb and flow of ideas; moreover, the trends may now appear to be in decline or ascendancy. Although understanding the intellectual patterns of the past may not tell us the answer to what is next, it does provide a clearer sense of the domains where new developments should be expected.

N-2975-A/OSD Potential Vulnerabilities of NATO Assets to Conventional Tactical Ballistic Missile Attacks and the Effectiveness of Passive Responses (U). J. C. Wendt, P. A. Wilson, S. Glennan. 1991. SECRET FORMERLY RESTRICTED DATA NOFORN WNINTEL LIMITED: US GOV'T & CONTRACTORS OR REFER TO CLIENT NO DTIC INTEL

(U) This Note, based on research completed in April 1988, documents an analysis of the potential vulnerabilities of some NATO assets to attacks by Soviet tactical ballistic missiles (TBMs) and the effectiveness of passive responses to those attacks. It describes the components of a Soviet "deep operations" system that include both reconnaissance, surveillance, tracking, and acquisition systems as well as the TBMs. Based on an analysis of various missile attacks against a number of representative NATO assets without passive measures and those same missile attacks against the same assets with passive measures, the authors suggest measures to reduce the potential vulnerability of some NATO assets.

N-2984-A Applying the National Training Center Experience: Artillery Targeting Accuracy. M. Goldsmith, J. S. Hodges, M. L. Burn. April 1990.

This Note describes a study that examined the accuracy of simulated artillery fires during force-on-force engagements at the National Training Center (NTC). The authors found that only about one-third of artillery missions were either effective or suppressive. Available data show that artillery observers using only map, compass, and binoculars cannot consistently achieve accurate first-round fire-for-effect. NTC data show that initial fire plans are likewise insufficiently accurate. The authors make recommendations for doctrinal and procedural improvements and for added training equipment.

N-2985-A/OSD The Impact of Missile Proliferation on U.S. Power Projection Capabilities. D. S. Rubenson, A. Slomovic. June 1990.

The growth in the numbers and capabilities of ballistic missiles outside Central Europe implies that non-nuclear ballistic missile threats, especially in combination with the growing capacity to produce chemical weapons, may pose an increasing threat to fixed U.S. overseas facilities and U.S. forces on rapid deployment missions. This Note addresses the proliferation of ballistic missiles with conventional warheads, including chemical warheads. Examining current ballistic missile arsenals reveals that they consist largely of inaccurate, short-range missiles, located mostly in North Africa and the Middle East. However, a geographically diverse set of countries are developing new missiles with improved ranges and capabilities, and this Note discusses the damage that can be inflicted by ballistic missiles armed with conventional munitions. Finally, the Note considers the chemical threat, demonstrating a correlation between countries that own ballistic missiles and countries seeking to develop a chemical weapons capability. The analysis shows that using even today's ballistic missile systems with chemical weapons could represent a major military threat for which the United States is relatively unprepared. Furthermore, the approaches for counteracting the chemical threat that are

effective in Central Europe must be reevaluated and adjusted for the environment faced by U.S. forces in other areas of the world.

N-2994-A Corps and Division Command Staff Turnover in the 1980s. J. P. Kahan. October 1989.

This Note presents the results of a survey of all active component U.S. Army corps and division headquarters requesting the names and times of service of their commanders, deputy commanders, chiefs of staff, and assistant chiefs of staff during the 1980s. It examines command staff turnover with respect to two contrasting models of team composition. The first model, a "unit team" one, assumes that a team is constructed from scratch and stays together over a period of time. The second model, a "steady state" one, assumes that the staff is a continuous social entity that people enter and leave at regular intervals. Analysis of turbulence data showed that the steady-state model is far more descriptive of current corps and division staffs than the unit composition model. The findings suggest that (1) team-building training should emphasize the rapid socialization of new staff members as a constant task for a unit, and (2) exercises should be designed to test and reinforce the mutual understanding among staff members as well as the performance of standard operating procedures. The Army may wish to consider whether it should implement a division and corps command staff assignment procedure that would result in more stable, cohesive teams.

N-3045-A Verifying Conventional Stability in Europe: An Overview. T. J. Hirschfeld. April 1990.

Verifying the obligations in the prospective Conventional Forces in Europe (CFE) treaty will be far harder and more expensive than verifying those in the Intermediate-Range Nuclear Forces (INF) treaty, or in other previous arms control agreements. This Note presents a qualitative overview of conventional arms control verification issues, including (1) monitoring force levels calibrated in major items of equipment and personnel, in a large production area that makes concealment possible; (2) watching force withdrawals, restructuring, or disbandments involving removal, reexport, or destruction of thousands of heavy equipment items; (3) monitoring the post-agreement stasis of the largest and most complex force concentration in peacetime history; and (4) meshing these observations with the concurrent need to monitor unilateral Warsaw Pact force reductions and force changes on a massive scale.

N-3061-A Preliminary Assessments for Employing Selected Army Pacing IEW Systems in Central Europe (U). E. M. Cesar, J. R. Bondanella, D. Gonzales, C. Shipbaugh, R. Howe. August 1990.
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(U) Army decisionmakers require in-depth analysis on which to base requirements for new intelligence and electronic warfare (IEW) systems. Essential to the justification process is having a credible way to reach consensus about the potential contributions these systems can make to combat outcomes. This study attempts to aid decisionmakers in their task of reaching consensus on the types of systems and appropriate mixes and quantities of IEW systems to select. The authors find that the Pacing system-of-systems inherently depends on having appropriate sets of manned airborne and ground-based standoff systems to cue unmanned aerial penetrators that can fly close to target areas and obtain high-resolution details for target identification, tracking, and acquisition for corps and division weapons. Each system can make important but different contributions to the family of systems and can provide different responsiveness, accuracy, and survivability factors. The optimum mix for all operational systems has yet to be determined, but the most important factors and a methodology for finding them have been identified.

N-3077-A A Multiprocessor Execution Profiler. C. D. Burdorf, J. P. Fitch, J. Marti, J. A. Padget. December 1989.

Existing profiling tools generally have crude interfaces, are clumsy to use, and monitor only accumulated CPU (central processing unit) time and function calls. After examining these programs, the authors concluded that they are insufficient aids for profiling a large-scale multiprocessing system even if they are adequate for manual analysis of a single processor system. The authors developed a tool that collects the following information: where CPU time is expended, quality and quantity of data passed between functions, how much global data is referenced and modified, and how these characteristics differ among processors on the network. To simplify data inspection, the profiler has a mouse-driven graphical interface. The authors used the system on a number of single- and multiprocessor Lisp programs. The profiler proved its usefulness in performance improvement and problem identification. This Note, reprinted from *Proceedings of the Twenty-Second Annual Hawaii International Conference on System Science* Kailua-Kona, Hawaii, January 3-6, 1989, describes the design of the profiler and gives examples of its utilization.

N-3087-DR&E/A/AF Suggested Modifications to Optical Sensor Algorithms in JANUS. H. H. Bailey, L. G. Mundie, H. Ory. November 1990.

Optical sensor algorithms in the JANUS(T) ground combat simulation do not include a repeated detection criterion for target acquisition and weapon firing, nor do they provide for the effects of false detections. As a result, targets detected with very low probability, such as those at

ranges near the performance limit of the sensor, will often give rise to acquisition and weapon-firing decisions when rare single detections result from coverage by many sensors and time cycles. This Note reviews the detection algorithms for optical sensors implemented in JANUS(T), identifies some approximations that can lead to overoptimistic estimates of target acquisition probabilities when the calculated detection probability is small, and suggests an acquisition criterion that alleviates the problem.

N-3093-A Exploratory Modeling and the Use of Simulation for Policy Analysis. S. C. Bankes. 1992.

This Note describes how "exploratory modeling" provides a rationale for how computer models can be fruitfully employed in support of policy studies. The goal of exploratory modeling is to construct a compelling argument illuminating the choices among policy options. Three innovations in the methodology of model construction can help exploit exploratory modeling's potential: (1) model design driven by the question being asked rather than by details of the system being studied; (2) use of multiple models rather than a single "monolithic" model; and (3) model development by a process of "selective resolution." The Note also suggests improvements to computer technology that taken together would provide support for interactive and adaptive modeling; assistance in managing the complexity of numerous models, cases, and relationships between them; and a means for portraying the results of exploratory modeling. Exploratory modeling can motivate better use of computers in support of policy analysis, provide for a better allocation of resources in dealing with the real problems, and afford some protection against fooling ourselves.

N-3099-A Non-Preemptive Time Warp Scheduling Algorithms. C. D. Burdorf, J. Marti. June 1990.

The Time Warp multiprocessing scheme promises speed-up for object-oriented discrete-event simulation. The Concurrent Processing for Advanced Simulation project has constructed a LISP-based Time Warp system for implementing simulations with many large, complex objects. Since object events are not preempted, the authors are scheduling which objects have events process rather than CPU time per object. They developed approaches to scheduling, ranging from a simple round-robin mechanism to complex ones involving queue length. The authors developed ten different scheduling algorithms which they named Worst Case, Conventional Round Robin, Lowest Local Virtual Time (LVT) First, Priority LVT, Largest Queue Priority, Bradford/Fitch, Anti-Penalty, Queue Anti-Penalty, Queue Cycle, and Positive Infinity. Results show that LVT, anti-messages,

rollbacks, returned messages, and anti-reminders are good parameters for scheduling of system resources. Input queue size is also an important factor, but when taken with or without LVT, it does not produce results as good as using LVT alone. The round-robin scheduler was one of the worst performers. The poor performance of the simple round-robin scheduler indicates the advantages of using state information to determine the scheduling order in the Time Warp system. Benchmarks of the schedulers showed that the Anti-Penalty scheduler performed better than the others. The Anti-Penalty algorithm is based on a composite measure of simulation advance rate, flow control, and the appearance of specific message types. The benchmark simulation executed on a five-processor Time Warp system.

N-3101-A Methodological Considerations in Using Simulation to Assess the Combat Value of Intelligence and Electronic Warfare. S. C. Bankes. 1991.

The relative value of systems for intelligence and electronic warfare/target acquisition (IEW/TA) may be determined in a variety of ways, including the comparison of technical characteristics, ability to provide estimations of commanders' information needs, or subjective judgment by experts. The OPVIEW (operational value of intelligence and electronic warfare) project aims to develop means for evaluating IEW/TA systems in terms of their contribution to combat outcomes. Such an evaluation would permit comparisons between diverse systems and force components and evaluation of the combined value of groups of systems. Simulation could be a powerful analytic tool for determining the contribution to combat outcomes of IEW/TA systems, since it allows us to represent our understanding of the complex effects and relationships that characterize warfare and to observe the implications of our beliefs for different cases under varied assumptions. Unfortunately, existing combat simulations do not adequately represent intelligence and electronic warfare. There are fundamental technical reasons for this, and there are technical challenges that must be addressed to support the analysis of the combat value of IEW/TA with simulation models. This Note describes these challenges and considers ways to meet them.

N-3103-A Apogee, Perigee, and Recovery: Chronology of Army Exploitation of Space. E. Mitchell. 1991.

Since the mid-1980s, a debate has gone on within the Department of Defense (DOD) on whether it is appropriate for the Army to be increasingly involved in space and, if so, how the Army should exploit space. This Note (1) describes the evolution of the Army's exploitation of space in response to an emerging post-World War II Soviet threat while complying with national policy and organizational directives; (2) informs the current Army,

DOD, students, and others of the full spectrum of the Army's past and current exploitation of space; and (3) provides a chronology of policy decisions and events, from 1907 through mid-1989, which have shaped the Army's exploitation in the technological areas of ballistic missiles, satellites, early-warning radars, ground stations, anti-satellite defenses, anti-ballistic missile defenses, theater missile defenses, and tactical missiles.

N-3137-A TOW Missile System Utilization at the National Training Center. M. Goldsmith. October 1990.

This Note reports on one phase of an ongoing project, the goal of which is to apply the experience and information gained at the National Training Center (NTC) at Fort Irwin, California, to problems beyond the NTC's mission of training. The problem examined here is the use of the tube-launched, optically tracked, wire-guided (TOW) missile system in Echo company of the mechanized infantry battalion task forces at the NTC. The study team examined the relative effectiveness of the TOW missile and tank main guns and compared the result with the experience of the opposing force (OPFOR) antitank guided-missile (ATGM) unit. Differences are clear, and the team analyzed both OPFOR and U.S. Army tactics for the use of ATGM and the characteristics of the equipment to explain the differences. To exploit the TOW weapon systems in the attack, AirLand Battle doctrine requires speed and agility of the carrier that matches that of the other maneuver elements. As the improved TOW vehicle (ITV) carrier cannot meet this requirement, the author suggests that the U.S. Army consider replacing its ITV carriers with M3 Bradley vehicles to provide greater speed and maneuverability to the antitank company. At the same time, doctrine must be rewritten so these characteristics can be exploited and aligned with AirLand Battle.

N-3143-A Restructuring and the Polarization of Soviet Politics. J. R. Azrael. June 1990.

This Note examines the economic and political changes that have taken place in the Soviet Union since Mikhail Gorbachev's accession to power, and assesses the longer-term implications of those changes. Following an evaluation of Gorbachev's "first-term" performance as a crisis manager, the Note examines the current situation and concludes with speculation on future prospects. The study concludes that (1) Gorbachev has presided over, and contributed to, a deepening systemic crisis; (2) militant opposition to Gorbachev has been building on both the right and left; (3) while Gorbachev may be able to use his new presidential powers to keep things under control, the Soviet Union may be on the verge of a civil war; and (4) the existence of a clear and present danger of a violent

implosion in the Soviet Union has significant implications for U.S. policy.

N-3151-A Observations of the Caravan Guard 89 Exercise. P. D. Allen, T. Lippiatt, L. Pleger, T. Polsley. 1992.

N-3152-A Observations on the Centurion Shield 90 Exercise. P. D. Allen, J. P. Kahan, T. F. Lippiatt, T. Polsley, D. R. Worley. 1992.

Given the end of the Cold War, the necessity of continued military exercises in Central Europe has been questioned. Large-scale field exercises are economically and politically costly, causing, among other things, damage to civilian crops and property as units maneuver over private and public property during training. This Note presents recommendations on issues emerging from observations of Centurion Shield 90, a field training exercise conducted January 15-26, 1990, combining live and simulated units in a single exercise. The authors' focus is on the simulation interfaces, including simulations linked with each other and with units on the ground. The most important issues involve exercise design, exercise manning, scenario-related issues, threat representation, and simulation calibration. Preliminary results indicate that using simulations probably improves the quality of training in several functional areas, but this improvement is difficult to measure. There are reduced operational and maneuver damage costs, but increased costs of simulation support.

N-3180-A U.S. Grand Strategy for the 1990s and Beyond. T. J. Hirschfeld. November 1990.

The profound global changes foreshadowed by the events of 1989 suggest the need for new strategies and different forces for the United States. This Note shows how the changed global environment could permit the evolution of different kinds of U.S. forces to support four alternative future U.S. strategies suitable for different situations: (1) retain the full range of mission capabilities as the last remaining global power, (2) rely mainly on collective security by preparing to engage in combat operations only in cooperation with others, (3) confine U.S. military cooperation with others primarily to logistic and technical support, and (4) maintain a mobilization base against the worst contingencies. The author concludes that all postulated strategies assume the U.S. need for a healthy mobilization base, some requirement for rescue missions, and a permanent capability to inflict punishment at a distance. Strategic nuclear weapons remain necessary under all strategies, as does the need to continue honoring those alliance commitments that remain. Finally, these strategies imply different investment priorities.

N-3187-A The 2 + 2 + 4 Recruiting Experiment: Design and Initial Results. R. J. Buddin, J. M. Polich. October 1990.

This Note describes the design and first six months of experience for a national experiment on a proposed new recruiting program for the U.S. Army. The program, called the "2 + 2 + 4" recruiting option, is one of the tools the Army believes could help sustain its ability to attract high-quality young people during difficult recruiting periods in the future. The authors present RAND's design for the test as a controlled experiment, similar to earlier enlistment incentive tests, and present preliminary tabulations of results during the first six months of the test. The test established a framework for systematic assessment of the 2 + 2 + 4 program and set up a precise mechanism for possible future tests of other enlistment options through individually randomized assignment in the REQUEST system. The test showed that a substantial number of recruits are willing to commit for two years in the Selected Reserve to obtain an Army College Fund benefit. It also showed that offering the 2 + 2 + 4 option has led relatively few recruits to choose a short term of service in place of a longer term or to move from a combat to a noncombat skill. It is too soon to determine whether the program led to a significant increase in the total number of high-quality recruits entering the Army.

N-3261-A When the Weak Attack the Strong: Failures of Deterrence. B. Wolf. 1991.

One potential justification for a thin area missile defense is the increasing proliferation of ballistic missiles and weapons of mass destruction. However, it has been argued that states possessing such weapons would not attack much stronger states such as the United States and the Soviet Union. This Note examines historical instances of attacks by states against much stronger counterparts. A taxonomy of such deterrence failures is formulated and illustrated with examples. Conclusions are drawn about the applicability of various types of deterrence failure to potential attacks by states possessing weapons of mass destruction against stronger states.

N-3263-A/RC Sizing Relationships for Ballistic Missile Defense Constellations of Kinetic Energy Weapons. S. M. S. Everingham. 1991.

This Note examines the effects of satellite constellation sizing, orbit inclination, orbit altitude, and kill vehicle velocity-added capability on the boost and post-boost phase ballistic missile defense capability of a space-based interceptor system. In particular, it compares the geometric coverage and missile negation potentials of a large number of interceptor deployment options, options that range from concentrated deployments of many interceptors on relatively few satellite platforms to a

dispersed deployment of many platforms, each carrying a single interceptor, which characterizes the "brilliant pebbles" concept.

N-3275-A/AF The Military's Entry into Air Interdiction of Drug Trafficking from South America. J. L. Ahart, G. J. Stiles. 1991.

This Note examines the military's participation in the air interdiction of international drug traffic. On the larger question of the effectiveness of drug interdiction efforts, the research indicates that interdiction efforts are having an impact on the drug market by diverting drug smugglers from the easier routes. The research also indicates that although the interfaces between the agencies involved in the civilian interdiction forces are highly complicated and not clearly defined, the effort is well established, experienced, and (apparently) working. Finally, the research indicates that the military's contributions to the air interdiction of drug traffic are significant, are providing positive benefits to the overall effort, and are growing in importance. Nonetheless, inserting the military forces into the established domain of civilian law enforcement agencies has produced problems, such as the inherent tension between the military philosophy of action and the civilian need for building evidence and the precise observance of procedures; civilian/military equipment mismatches; turf wars; and realization that increasing civilian/military integration could undercut the effort if the military has to pull out to deal with a national defense need.

N-3277-A Differences over Economics in the Soviet Leadership, 1988-1990. A. Aslund. 1991.

This Note discusses the most important differences among key Soviet leaders between the summer of 1988 and December 1990 on four central issues: agricultural policy, the Soviet financial crisis, pricing policy, and economic reform. In addition to examining Gorbachev's views, the Note also considers the views of the main actors dealing with economic concerns—Central Committee Secretary Yegor Ligachev, Prime Minister Nikolai Ryzhkov, Gosplan Chairman Yuri Maslyukov, Central Committee Secretary Nikolai Slyunkov, and Deputy Prime Minister Leonid Abalkin. The study of the views of these main actors on the four economic issues revealed that the Soviet leaders were so divided on the issues that they were virtually splintered. The communist leadership as a whole had fallen behind the development of public opinion, thus rendering itself increasingly irrelevant to Soviet society. The outstanding feature of the period 1988-1990 seems to be that it was the time when Soviet communist leaders failed to act and therefore lost the power to affect economic trends.

N-3300-A Extracting Tactical Data from Operation Orders. J. R. Kipps, J. Marti. 1992.

This Note describes an approach to automating the extraction of operation orders (OPORDs) and describes an application of the approach to the task of generating the OPORD translation system, which extracts task organization data from input OPORDs. This approach is one of the tools being developed to assist Division Ammunition Officers (DAOs) in anticipating ammunition consumption before battle, a capability that is a vital component of logistics operations in the Army's emerging AirLand Operations doctrine. Described here is a machine-translation approach that takes advantage of the prescribed five-paragraph format of OPORDs to identify and isolate pertinent information. This approach uses concise and clear rules to automatically generate programs that take as input textual OPORDs such as those transmitted through the Maneuver Control System (MCS), extract the desired data, and send them to other computer systems. The techniques described here are generally applicable to extracting and checking data from a wide range of highly structured but not "machine-readable" documents.

N-3313-A Organizational Analysis and Resource Management Planning: Annotated Briefing. L. K. Lewis, C. R. Roll, R. E. Sortor, B. Rostker. 1993.

This Note analyzes ways in which the Army might alter its organizational structure and program-building processes to better respond to OSD guidelines and the Army's resource needs. The Note discusses three alternative concepts of operation: Centralized Control (CC), whereby a neutral integrator (NI) owns all the relevant data and models; Structured Response (SR), which would allow staff proponents to function as intermediaries between the NI and the Major Commands (MACOMs); and Structured Dialogue (SD), in which the NI retains responsibility for all aggregate data bases and models, but the staff proponents and MACOMs own the data bases and develop options that are then presented to the NI. In terms of three selection criteria—effectiveness, efficiency, and implementation—the authors conclude that the SR option was the most beneficial to the Army. The Note recommends immediately establishing the Office of the NI, transferring functions to the new NI organization (e.g., integration, management of key program-building data bases), reorganizing the data base structure to support Planning, Programming, and Budgeting, and Execution System (PPBES), and developing planning and programming models.

N-3324-A U.S. Army Advanced Munitions: High Payoff Targets-Illustrative Cases (U). G. I. Taylor, D. Orletsky, R. E. Stanton. Feb 1993. SECRET NOFORN WNINTEL NO DTIC LIMITED: DOD INTEL

This Note contains the targeting information needed to analyze advanced munitions requirements and to develop an investment strategy for future procurement. The Note describes a base case focused on a conventional war between NATO and the Soviet Union in the post-CFE environment. It provides a basis for determining the high end of advanced munitions requirements for future investment strategies. It also describes a second case that portrays Iraqi forces in an offensive role invading Saudi Arabia in late September 1990. They are opposed by the initial elements of U.S. forces in concert with Saudi and possibly other coalition forces. The case provides insights for future contingency operations involving U.S. and allied forces. The Note also contains the types of targets for each case across three different zones, as well as estimates of the number of targets in these zones that can be attacked. Future iterations of this targeting information may describe the reduced levels of threat for low-intensity conflict and guerrilla operations in Third-World environments.

N-3348-A F/A Historical Roots of Contemporary Debates on Soviet Military Doctrine and Defense. S. W. Stoecker. 1991.

This Note examines the themes of, and historical context for, the writings of Soviet strategists of the 1920s, such as Alexander Svechin and Leon Trotsky, who emphasized the importance of defensive operations. It discusses early Soviet debates about the "operational-political" and "operational-strategic" aspects of doctrine, wars of destruction vs. wars of attrition, and strategic offense vs. strategic defense, as well as related arguments about the organization and missions of infantry and the use of fortifications. Finally, it suggests some parallels between the strategic circumstances facing Soviet military theorists in the 1920s and those confronting planners today.

N-3354-A Performance-Oriented Logistics Assessment (POLA): Relating Logistics Functional Capacities to Resources and Costs. J. H. Bigelow, T. J. Martin, R. L. Petruschell. 1992.

This Note describes models and procedures other than the Logistics Decision Model (LDM) that are part of POLA methodology—models and procedures used to estimate Combat Service Support (CSS) unit capacities from their equipment inventories, to estimate the costs of increasing those capacities by adding or replacing equipment, and to construct cases for analysis. To estimate the costs of logistics improvements to CSS units, a simple cost model is used that estimates nonrecurring and annual recurring costs of acquiring, maintaining, and operating an active Army unit (or collection of units) in peacetime. The model is then applied to a unit before it receives a logistics improvement and afterwards, with the cost of the improvement being the difference between "before" and

"after" cost estimates. Defining cases for analysis requires first identifying CSS units to be considered, then describing each unit identified, both as it appears initially and as it may appear once it receives a logistics improvement, and finally combining unit descriptions into overall analysis cases. (See also R-3814, R-3823, N-3393.)

N-3358-A Mortar Utilization at the Army's Combat Training Centers. S. J. Kirin, M. Goldsmith. 1992.

Data from take-home packages and field observations suggested that light, medium, and heavy mortar weapons were underutilized or ineffective at three Combat Training Centers (CTCs)—the National Training Center (NTC), Joint Readiness Training Center (JRTC), and Combat Maneuver Training Center (CMTC). Observer/controller data confirmed that mortars caused little damage and mortar ammunition expenditure fell far below that expected and provided for in ammunition stockage. Mortars are underutilized at the CTCs because of perceived limited effects of suppression and, for heavy mortar training, limited dismounted infantry activity observed at NTC and CMTC. In addition to revising field manuals to provide better doctrinal guidance on use of mortars, CTC and home station training need to emphasize the task force commander's responsibility to identify specific mortar missions, the task force fire support officer's responsibility to design the linkage that allows mortars to execute the missions, and the importance of conducting fire support rehearsals with mortar platoon participation. Mortars should be more closely integrated with the lower level maneuver organizations, not with field artillery organizations. Whether to add forward observers to mortar platoons merits further investigation.

N-3386-A U.S. Army Communications Using Commercial Satellites. D. Castleman, S. M. S. Everingham, J. J. Milanese, E. D. Harris, E. Bedrosian. 1992.

This Note documents research evaluating the use of commercial communications satellites (COMSATS) to augment the U.S. military satellite communications (MILSATCOM) system. The study finds that COMSATS can offer attractive advantages, including available capacity, global coverage, interoperability, flexibility, and no user-borne development risk. Several commercial systems now provide (or will soon provide) wideband and multiuser services, with the International Telecommunications Satellite Organization (INTELSAT) and the International Maritime Satellite Organization (INMARSAT) both offering global coverage and available capacity. A combination of such systems could provide uninterrupted communications between the Commander in Chief in the continental United States and others in a

global power projection operation, particularly during the early deployment phase. Such a capability would complement other Army systems used for local tactical communications. In terms of regulatory constraints on using such systems for military purposes, recent interpretations of the charters defining their use reveal that any resistance on the part of INTELSAT or INMARSAT in serving the military customer has faded.

N-3393-A Performance-Oriented Logistics Assessment (POLA): Preparing the Logistics Decision Model for Use in Analyses. J. H. Bigelow, T. J. Martin, R. L. Petruschell. 1992.

This Note explains how to prepare the Logistics Decision Model (LDM) for use in subsequent analyses. The study discusses two main parts of this task: calibrating the representation of combat and preparing a representation of the theater support system. Calibration involves adjusting various LDM inputs so the model behaves "correctly" in a specified reference (or calibration) case. To date, LDM is calibrated to the Concept Evaluation Model (CEM) and to its replacement, the Force Evaluation Model (FORCEM). The calibration process draws from CEM and FORCEM data files such inputs as time-phased schedules for Blue and Red force and resources to enter the theater, comparing LDM simulation results with CEM and FORCEM outputs and then judiciously adjusting LDM inputs until they match CEM and FORCEM outputs. In building the theater support structure, LDM relies on an activity matrix—representing a resource that can be produced, consumed, or otherwise transformed by one or more activities—and a resource matrix—calculating the quantity of each resource available during each time period of an LDM simulation. (See also R-3814, R-3823, N-3354.)

N-3403-DARPA/AF/A New Issues and Tools for Future Military Analysis: A Workshop Summary. R. J. Hillestad, R. Huber, M. G. Weiner. 1992.

This note reports on a workshop held at RAND in May 1991 to discuss the new concerns analysts must face following the changes that have taken place in Central and Eastern Europe and Southwest Asia since 1989. The workshop produced a number of specific recommendations to the military analysis community and its sponsors: 1) continue to discuss issues of military analysis in open forums; 2) develop a quick reaction analysis approach with supporting tools; 3) reinstitute basic principles of systems analysis (attention to uncertainty, multiple scenario analysis, parametric analysis, comparative analysis, etc.), which may have atrophied because of the relatively stable planning scenario of the Cold War era; 4) promote basic research on complex phenomena, such as qualitative factors (training, morale, leadership), behavior of C3I systems, and new types of conflict; 5) promote multiorganization analysis of complex issues as well as

multiple analyses of the same issues; and 6) promote education of analysts in the synthesis and solution of defense problems and education of decisionmakers in the use and limitations of analysis.

N-3405-A Soldiers' Families: Tracking Their Well-Being During Peacetime and War. J. Hawes-Dawson, P. A. Morrison. 1992.

This Note presents a proposal for how to query a representative sample of Army families and obtain timely information on topics that change quickly. Accommodating the Army's growing need for timely information (as exemplified by Operations Desert Shield and Storm) requires a flexible survey plan that can be tailored to a broad spectrum of unforeseeable circumstances in peacetime and wartime contingencies. The study's proposed plan relies on an ongoing panel of families who are recontacted periodically by telephone (to confirm location) and are available for repeated computer-assisted telephone interviewing. The sample is designed so data gathered can be generalized to all Army families and achieves timeliness by narrowing at will the elapsed time from when the policymaker poses a question to the point when the survey delivers a generalizable answer. The plan's feasibility is enhanced because lines of communication are maintained (thus enabling "minisurveys"), workload can be varied to meet needs according to urgency, and postwar surveys can be mounted swiftly given the existing and continuously recontacted sample.

N-3436-A/USN Management Adaptations in Jet Engine Repair at a Naval Aviation Depot in Support of Operation Desert Shield/Storm. L. A. Galway. 1992.

This Note investigates management adaptations taken to speed up the repair of jet engines during Operation Desert Shield/Storm. Most data were gathered from the engine repair shop at the Naval Aviation Depot in San Diego, CA. Management adaptations fell into two general categories: item oriented and process oriented. The former dealt with specific items in the engine repair process, e.g., compressor blades, and the latter addressed the engine repair process. We discovered that material support was a major problem, to include sole suppliers of critical items, failure to stock common commercially available items, poor parts visibility, and slow distribution. The absence of a bill of materials for each engine type inhibited planning. Failure to return inoperative engines and an inability to know what was in the retrograde system point to likely problems for future operations. Finally, both horizontal and vertical communications were particularly helpful in dealing with surge-related problems.

N-3441-A The Declining Threat to U.S. Interests. T. J. Hirschfeld. 1993.

This Note identifies generic global and regional U.S. interests, suggests what threats to those interests remain, and postulates additional future risks the United States might face that might have military implications. The author argues that the world is fundamentally different from the world of the 1890s or the 1920s. For example, while the conquest of nature was still one of the agreed purposes of civilization, now its preservation is an agreed global purpose. He further argues that while military technology was only lethal then, now it threatens to annihilate species. These changes suggest that the most identifiable threats to U.S. interests are not amenable to military solutions (e.g., refugee and migration flows, drug problems, social unrest, unfriendly transnational political movements, ecological disasters, proliferation of weapons of mass destruction, and medical emergencies) and that instability may be a pervasive and unpleasant prospect, but not necessarily one which need involve American armed forces much.

N-3446-A Five Models for European Security: Implications for the United States. N. C. Gantz, J. B. Steinberg. 1992.

This Note assesses five alternative security models that could emerge in the next 5-10 years in terms of how well they meet the U.S. objective of transnational stability in Europe. The Note finds that of the five models proposed, the overlapping security institutions model does best, because it preserves a political and military role for the United States, creates alternative links for U.S. involvement in Europe beyond NATO, demonstrates U.S. willingness to adapt to a stronger European role in security arrangements, and maintains flexibility to move to a number of different security models. The Note recommends that the United States develop a credible rationale for maintaining an integrated military command like NATO, encourage the expansion of the Western European Union's role as a bridge between NATO and the European Community, support the process of European economic and political integration, and encourage the use of the Conference on Security and Cooperation in Europe as a pan-European forum for addressing the security concerns of the newly emerging democracies in the East.

N-3473-A/USN Materiel Problems at a Naval Aviation Depot: A Case Study of the TF-30 Engine. L. A. Galway. 1992.

This Note investigates shortages of repair parts. It uses the TF-30 jet engine as a case study and analyzes the parts shortage using three different measures: delivery time, demand supply profiles, and effect on engine repair. After analyzing data from the Naval Industrial Material Management System (NIMMS) and from three inventory control points, the study draws three major conclusions. First, engine days of delay provides a good indication of

which parts cause the most trouble. Second, although a few parts cause the most problems (56 out of 2000), the remainder of the problems result from a heterogeneous set of parts. Finally, most of the supply problem seems to be in getting parts from the DoD supply system to the depot. Recommendations address the need to reduce delays in moving parts to the depot from the DoD system, improve procurement at the inventory control point, rectify problems with databases, and integrate information at the wholesale level.

N-3480-A North Korea in the 1990s: Implications for the Future of the U.S.-South Korea Security Alliance. K. Oh. 1992.

This Note assesses the implications of change for North Korea, the U.S.-South Korea security alliance, and the stability of Northeast Asia. The Note finds that in dealing with its economic plight, political weakness, and diplomatic isolation, the North Korean regime faces a dilemma: remain in power (at least in the short term) by deflecting or suppressing domestic and international challenges, or engage in reform that could threaten the Kims' hold on power. Although the regime has leaned toward the former, there are signs North Korea is looking abroad for help, which argues for the United States continuing to engage North Korea in dialogue on issues of interest to both governments. The U.S.-South Korea relationship will change in the years ahead, with the United States needing to see and treat South Korea as a more equal partner and needing to continue to reduce its military forces in the South both to reflect a diminishing North Korean threat and to respect South Korean nationalistic sentiments.

N-3497-A Planning for the Future U.S. Army in Europe. R. D. Howe, E. Kleckley. 1992.

This Note describes an approach to structuring the United States Army Europe (USAREUR) in the middle to late 1990s as a function of the mission of that command. The study finds that as long as the Army retains forces in Europe, it will serve as the ground arm of the United States European Command (USEUCOM), as the visible symbol of U.S. involvement in, and commitment to, European security and stability, and as the counter to the potential power of the former Soviet Union (or unified successor). Meeting these functions will require a future USAREUR that is visible, capable, flexible, and expandable. Specifically, USAREUR must have a more balanced and flexible force structure than in the past, with likely missions requiring that a larger fraction of USAREUR have enhanced strategic (theater) mobility. Most important, USAREUR requires a clear and complete mission to determine the force levels it will need.

N-3508-AF/A/OSD Getting U.S. Military Power to the Desert: An Annotated Briefing. D. Kassing. 1992.

This Note describes the main dimensions of U.S. deployments to the Gulf area and reviews the performance of the deployment systems. The Note highlights six deployment and execution issues: (1) for the first month of the Phase I deployments, total transportation requirements were hard to pin down, with much of the uncertainty traceable to varying estimates of Army noncombat unit requirements; (2) initial air deployments were hampered by problems of coordination between users and the Military Airlift Command; (3) during Phase II, unit integrity was not preserved in sealift operations; (4) during Phase II, the coordination of passenger and equipment deliveries was abandoned to get personnel into the area before the January 15th deadline; (5) resupply cargos in air channels came to exceed capacity; and (6) many prewar planning factors proved optimistic. To prepare for future contingencies that may require faster deployments through seaports and airports that are under attack, the Department of Defense needs to consider such issues as how to provide more responsive planning and how to improve the coordination of deployment operations.

N-3511-A Predicting the Battlefield Performance of Anti-Armor Missiles: A Case Study of the TOW Missile System (U). J. Grossman. Aug 1992. CONFIDENTIAL LIMITED: US GOV'T AGENCIES OR REFER TO CLIENT

This Note reports on some initial results from a study investigating the utility of using the data from live-fire exercises of precision-guided munitions (PGMs) conducted by the Air Force, Army, and Marines. The study uses the tube-launched, optically tracked, wire-guided (TOW) missile system as a case study. The study finds that by analyzing live-fire data in terms of how well it replicates combat conditions, analysts can fairly accurately predict the effectiveness of PGMs for given battlefield conditions.

N-3517-A Upgrading an Office Automation Environment: The Army's DCSPER Automation Project Final Report. H. J. Shukiar, R. O. Gates, R. J. Kaplan. 1992.

In November 1990, the Office of the Deputy Chief of Staff for Personnel (ODCSPER), U.S. Army, asked RAND to evaluate its current computing environment and recommend a course of action to improve it. RAND developed a questionnaire for ODCSPER staff members that focused on five broad categories: user characteristics; user sophistication; desktop- and nearby-equipment usage; user communications; and problems, limitations, and desired capabilities. This Note summarizes the survey

results and suggests several evolutionary enhancements to ODCSPER's computing environment. The enhancements are designed to address concerns identified in the survey and provide ODCSPER with a flexible computing architecture that permits ready adaptation to changing technologies. As part of the incremental approach to improving ODCSPER office automation, the authors recommend three conceptual steps that, taken together, would foster a well integrated cooperative processing environment: (1) integrate the ODCSPER computing environment via a local-area network, providing direct peer-to-peer connectivity among computer users; (2) add centralized file managers/servers to the network, within which to store important documents in preparation, other important products, and databases down-loaded from the mainframes; and (3) add centralized computer servers to the network, coupled with migration of the electronic mail function from the mainframe to the servers.

N-3527-A The Army Military Occupational Specialty Database. S. J. Kirin, J. D. Winkler. 1992.

This Note describes a dataset that integrates training-related information from a variety of military and civilian sources, at the military occupational specialty (MOS) level of detail. The database describes all Army MOS authorized as of fiscal year 1990, including personnel management statistics, enlistment pre-requisites and incentives, tasks, training requirements and costs, and "crosswalks" to civilian occupations and educational programs. It documents the database and illustrates the data to describe Army occupational structure and training. It also discusses potential uses of the data for supporting analyses of training and personnel structure alternatives.

N-3535-A Recommended Strategy for the Army's Role in Space. E. D. Harris, K. P. Horn, E. M. Cesar, P. S. Steinberg. 1993.

This Note lays out a recommended strategy for the Army's role in space, drawing on research the Arroyo Center has performed in this area over the past seven years. The document argues that the Army should make supporting the battlefield commander its primary role in space, supplementing the argument with a discussion of how the Army used space to support the battlefield commander during Operations Desert Shield and Storm. It then argues that implementing this role requires modifying the Army's organization so that it emphasizes space, which involves institutionalizing space in the Army's warfighting doctrine, establishing a high-ranking authority, and correcting the requirements and acquisition process. The document then proposes that the Army pursue a two-part investment strategy that involves exploiting existing space systems and participating in satellite requirement studies. Finally, it argues that the Army needs to modify its

operational procedures for space to deal with such issues as training and information distribution.

N-3551-A Finding a New Approach to Measure the Operational Value of Intelligence for Military Operations: Annotated Briefing. E. M. Cesar, P. D. Allen, R. Eden. 1992.

This Note documents the final executive-level briefing for a project whose goal was to develop and apply innovative analytic tools for quantifying the operational value of intelligence, electronic warfare/target acquisition (IEW/TA). The Note discusses the three analytic tools produced by the project: a methodology for relating commanders' requirements to collection results and two models that employ the methodology. The "static" model provides an aggregate assessment of the capability of specified systems and system packages to meet commanders' information needs in specified scenarios. The "dynamic" model is more detailed and broader in scope, assessing the impact of intelligence collection on commanders' decisionmaking over the course of an operation from initial planning to its conclusion. All three tools depend fundamentally on subjective-judgment data, but these data are systematically developed using experts in operations planning, intelligence collection and production, and analysis. The Note concludes with a discussion of the status of the three tools developed during the project and potential future directions for their use.

N-3558-AF/A Turkey: Toward the Twenty-First Century. P. B. Henze. 1992.

This Note discusses the most important trends in Turkey's political, economic, and social development, focusing on the last decade's progress and on future prospects. The study finds that Turkey will build on its record of stability and economic accomplishment during the 1980s to maintain an effective political and social system and to make further economic progress during the 1990s. Turkey will balance orientations toward Europe, the Middle East, and new republics of the Soviet Union (which are mostly Muslim and Turkic) during the 1990s while continuing to look toward the United States as its principal security partner within NATO. Prospects for continued economic progress are good, though persistent inflation, growing budget deficits, and the need for privatization of state economic enterprises require serious action. Finally, while Turkey will likely be very politically and socially cohesive and the standing of the military will remain high, military influence on government will wane.

N-3564-A U.S. Conventional Arms Control for Korea: A Proposed Approach. J. C. Wendt. 1993.

This Note presents an approach for integrating arms control into the changing Korean security environment and

for evaluating how alternative arms control measures affect U.S. interests. The study identifies five U.S. arms control objectives: maintain U.S. presence, minimize short-warning threat, eliminate ground force disparity, maintain a U.S. reinforcement capability, and produce a verifiable agreement. The study then finds that equipment reductions, which involve equal ceilings on three critical pieces of equipment, and U.S. reductions (above a residual amount) proportional to North Korean reductions, would meet four of the five objectives. (Exercise limitations and notifications would help meet the fifth one.) While the approach apparently satisfies South Korean objectives, it may not be enough for the North Koreans. Thus, if the United States and South Korea place a sufficiently high value on achieving their objectives, other political/economic incentives may have to be offered.

N-3566-AF/A Air Combat Model Engagement and Attrition Processes High Level Design. P. D. Allen. 1993.

This Note presents the high-level design document for air combat (engagement and attrition processes) for the theater-level or nonlinear combat (TLC/NLC) model and possibly, for the RAND Strategy Assessment System (RSAS). The design includes many qualitative factors not traditionally included in previous air combat models, such as a representation of how intelligence affects the frequency and distribution of specific types of air-to-air, ground-to-air, and air-to-ground engagements. The design is intended to be implemented as either a stochastic or a deterministic model, with either low resolution or high resolution, depending on the needs of the user. Thus, the model is being designed so that each version will be readily comparable given similar inputs. The document describes the three main parts of the overall air combat assessment process: 1) determine whether or not penetrators are detected before reaching in engagement zones; 2) determine the sequence of ground-to-air, and air-to-air, and air-to-ground engagements; and 3) assess air-to-air, ground-to-air, and air to ground engagements in sequence determined for ingress and egress.

N-3568-A Tactical Satellite Orbital Simulation and Requirements Study. E. Bedrosian, E. M. Cesar, J. R. Clark, G. K. Huth, K. Poehlmann, P. Propper. 1993.

This Note documents the results of a preliminary analysis of space communications requirements employing scenarios for military operations in three widely separated geographical areas where U.S. contingency operations could occur. The first scenario is set in Southwest Asia and is similar to Desert Shield/Storm, except with jamming; the second is set in Korea to typify a large operation between in-place forces, again with jamming; and the third is set in Argentina to typify a small operation in a remote location. Based on Desert Shield/Storm

experience and on RAND's experience with military communications satellite systems, the study argues that jamming will present a serious threat and that jam-resistant communication satellites and portable tactical jam-resistant earth terminals must continue to be fielded and developed. To test the operational scenarios under realistic circumstances, a comprehensive computer simulation will need to be developed—one that involves developing a system configuration tool capable of configuring a satellite communication system using the specified equipment and communications requirements within the spatial and temporal relationships laid out in the scenarios.

N-3579-AF/A Azerbaijan, Central Asia, and Future Persian Gulf Security. T. W. Karasik. 1993.

This Note examines the economic, religious, and ethnic connections between Transcaucasian and Central Asian Countries (CACs) and Turkey, Iran, Saudi Arabia, and Russia. The study finds that there is a growing interdependency between Azerbaijan and the CACs and Turkey, Iran, and Saudi Arabia; that Russia is becoming increasingly estranged from Azerbaijan and the CACs in terms of economic relations and the perception of a religious threat to Russian security; that Turkish, Saudi, and Iranian involvement is weakening Azeri and CAC central authority; and that Iran is the focal point in the region. The study recommends that the United States encourage stability and the kinds of relationships (e.g., emerging international economic organizations) that will limit outbreaks of violence; that it not ignore other emerging states of the former Soviet Union in its focus on Russia; and that it recognize the risks of isolating Iran or siding with Turkey or Saudi Arabia against Iran in the battle over influence.

N-3589-AF/A/OSD U.S. Space-Based Remote Sensing: Challenges and Prospects. D. J. Johnson, M. Nelson, R. J. Lempert. 1993.

This Note presents a survey of remote sensing policy issues for the 1990s. The study concludes that as the utility of remote sensing data is more widely understood and appreciated, greater efforts to exploit that data in unique ways will increase, thus blurring the distinctions among users in the federal agencies, state and local governments, and private entities. It will then be up to the owners and operators of remote sensing systems to justify why their particular systems should remain unique. The study recommends that the U.S. government develop remote sensing policies from a more comprehensive perspective, derived from U.S. remote sensing goals, user needs, and the diverse organizations that can participate in meeting those needs; should determine where broadening needs or new technologies allow planned programs to be better coordinated or consolidated to avoid duplication of

effort; should determine what areas are best pursued as public endeavors and as commercial or private ones; and should make remote sensing systems more responsive to user needs.

N-3600-A Design of Field-Based Crosstraining Programs and Implications for Readiness: Survey Instrument and Database Documentation. R. M. Mazel. 1992.

This Note documents the survey instruments and data sources used to support the analyses described in RAND report R-4242-A, Design of Field-Based Crosstraining Programs and Implications for Readiness. This study used two forms of data: (1) data collected via specially designed survey instruments; and (2) existing maintenance data and personnel records. Supervisors were queried about their job responsibilities, perceptions of train-up requirements, and perceptions of which military occupational specialties (MOS) might be combined in future training. This study also incorporated data from several existing databases: the Enlisted Master File (EMF), the official Department of the Army information base for enlisted personnel; the Army's Aviation Unscheduled Maintenance Sample Data Collection (UMSDC) system, and the Standard Army Maintenance System's (SAMS) Work Order Logistics File (WOLF). All these databases were used to understand the overall workload and job responsibilities of chosen maintenance units.

N-3613-A HELICOST: A Helicopter Cost Model. D. Dreyfuss, J. Jarvaise. 1993.

This Note provides a user's guide to the HELICOST model, illustrates its use by applying it to the LH (now Comanche) helicopter program, and presents the technical details underpinning the model's development. The model operates by taking data from the four components of a helicopter—airframe, the mission equipment package by subsystem, the engine, and the software-and computing a cost for them as a function of their weight for the first two, the shaft horsepower for the engine, and the number of lines of computer code for the last. The model provides costs for Research, Development, Test, and Evaluation (RDT&E), production, and total system. It is particularly useful for comparing contractor proposals or determining the effect of trade-offs between cost and performance; it also provides rapid recalculation of costs and ready graphical displays of information. In applying HELICOST to the Comanche helicopter, we found that HELICOST data compared quite favorably with the Army's estimate, coming within 4 percent of total cost.

ISSUE PAPERS

IP-105 Germany's Geopolitical Maturation: Strategy and Public Opinion After the Wall, R. D. Asmus, January 1993.

This Issue Paper presents the key findings of a recent public opinion survey conducted for RAND by Infracrest Burke Berlin in late 1992. The survey was the most recent in a series of RAND-sponsored opinion polls that seek to understand the future of German strategic thinking and implications for U.S. national security strategy. This year's survey results contain good news for American policymakers on an array of issues. A majority of Germans look forward to the Clinton Administration and view a more concerted U.S. effort to confront its domestic problems as a prerequisite for a strengthened U.S.-European relationship. German public support for NATO, for an American military presence in Germany, and for a broader "out of area" role for the alliance is on the rise. Germans also support European integration and see a strengthened European Community as a basis for a new "partnership among equals" across the Atlantic. Finally, the German public overwhelmingly supports the government's efforts to combat right-wing extremism. (For a more complete version of the survey results, see DRR-169-AF/A.)

IP-106 New Army Noncombat Initiatives, E. H. Ondaatje, April 1993.

This Issue Paper outlines the U.S. Army's current role in three noncombat initiatives—education and community service; nation assistance, particularly in the former Soviet Union and Eastern Europe; and disaster management—suggests potential new activities in these initiatives, and examines some possible concerns. Following the evaluation of the three initiatives, the document concludes that if noncombat activity expands as a proportion of total Army activity, the Reserve Component share of that total might increase disproportionately. The document also observes that in terms of much of its ongoing noncombat activity, the Army does not receive credit in the public mind, does not adequately reward its participants, and does not incorporate these activities into its image (or vision) of itself and that Army leadership could easily reap public benefits by highlighting its noncombat contributions. The document ultimately points out that although the Army has the requisite capabilities for performing noncombat activities, in the final analysis the activities must be evaluated within the context of a U.S. Army vision.

IP-137 Russian Military R&D: Are the Regions Taking Charge? S. Leiter and C. M. Levy, December 1993.

This Issue Paper examines the future of Russian weapons acquisition and military R&D, hypothesizing that the most fruitful way to examine what is still a primordial soup is to take a regional approach. Based on preliminary observations and research, the authors argue that in terms of the Russian R&D establishment that will develop, the regions are clearly no longer passive players in the federal-local game, but will now be active in shaping national policy. Over the next few years, the interdependence of regional and state levels are expected to develop along new lines, divorced from the old Communist, center-dominated system. Science and technology, both military and civilian, will play a central role in this evolution. Given the unevenness and diversity of the diminished but still vast Russian science establishment, individual case studies, tracing the evolution of the major regional R&D centers, will offer the best insights into Russia's resurgent military potential.

DRAFTS

DRR-108-A Strategies for Defining the Army's Objective Vision of Command and Control for the 21st Century. E. M. Cesar. December 1993.

This Draft examines the command and control (C2) lessons from Operation Desert Storm (ODS) and, based on those lessons, postulates a set of operational objectives for command, control, communications, and computers (C4) architectures and derives a set of physical and informational needs that such architectures must meet. The Draft conceptualizes three schematic architectures to fit those needs, examining one in greater detail. In addition, the author outlines several concepts for optimizing C4 architectures, such as providing commanders with a common picture of operations throughout a region and creating a switchboard in the sky by pushing information from the sustaining base to an intermediate point that is nominally above the active region where operations are being conducted. The main conclusion of this concept formulation study is that it is feasible for joint task enabling force elements to be more interoperable while moving by adopting new architectures, systems (particularly space systems), technologies and procedures.

DRR-110-A Support Forces in Contingency Operations: Implications for Army Active-Reserve Mix (U). R. E. Sortor, T. Lippiatt. May 1993. SECRET NOFORN NOCONTRACT

(U) This Draft examines a range of contingency scenarios and derives the support forces, including the appropriate mix of active and reserve units, needed to sustain the combat forces in various contingency environments. This structure is compared with alternative Army force structures, including the 1995 Base Force. The analysis indicates that the Base Force and an Active Component (AC) end-strength of 535,000 would meet the support requirements only under very optimistic assumptions about the timing of mobilization. It concludes that with the limited AC personnel available, the requirements place a premium on ensuring that Reserve Component support units are used to the maximum extent possible. The alternative is to place more echelon above division and echelon above corps support capability in the AC at the expense of having fewer active combat units. Further, some restructuring of the Base Force is needed if the units are to match the requirements postulated.

DRR-111-2-A A System View of Munitions Storage and Movement for Force Projection. K. J. Girardini, D. Hafele, D. M. Oaks. May 1993.

This Draft addresses issues related to storing and distributing munitions in a force projection environment, taking a system view that looks across all the processes required to deliver munitions to the soldier in the field. Four tentative findings have emerged. First, investment and policy decisions for munitions distribution must be driven by joint, time-phased requirements across multiple scenarios. Second, positioning of munitions stocks in the continental United States (CONUS) is becoming increasingly critical as storage facilities approach capacity and facilities are inactivated as part of Base Realignment and Closures. Third, the Department of Defense (DoD) should maximize integration of containerized munitions distribution with commercial industry (e.g., by using the commercial liner trade for munitions sealift); such integration will allow DoD to concentrate investments in areas requiring a unique military capability (such as intratheater distribution and CONUS storage facilities). Finally, the Army needs to reassess the role of airlift in munitions distribution; given the Army's increasing reliance on high-technology, high-lethality munitions, airlift can provide critical sustainment and firepower for early-deploying units.

DRR-136-A Precision-Guided Logistics: Flexible Support for the Force-Projection Army's High-Tech Weapons. M. L. Robbins, D. W. McIver. June 1993.

Drawing on the Army's experience in Operation Just Cause (OJC), Operation Desert Shield (ODS), and Operation Desert Storm (ODSt), this Draft explores "what if" scenarios for the three operations to examine how well the Army could have supported its new high-technology

weapon systems in the face of different stresses. Although the logistic support for all three operations was a success, the "what if" analysis suggests that the forces were vulnerable to risks in the nature of the contingencies; for example, an extended OJC would have severely affected weapon system sustainability, as would have been the case if fighting had erupted early in ODS or if operating tempos were higher than they were in ODS. To reduce the risks inherent in these uncertainties, the Draft argues for a more flexible support concept that tailors support packages to the specific needs of different types of contingencies. The research suggests that such a system could help maintain high weapon system availability across the range of contingency uncertainty and could do so at a cost no greater, and almost certainly less, than that of the current structure.

DRR-155-A Army's Role in Space in the New Geostrategic Environment: An Annotated Briefing. E. D. Harris, K. P. Horn, D. Castleman, E. M. Cesar, P. S. Steinberg. January 1993.

This Draft lays out a recommended strategy for the Army's role in space that argues that space capabilities are essential for Future Army Operations, that space should be a primary-not secondary-means of providing functional support for the battlefield commander, and that commercial systems, especially communications satellites, have supplied and can continue supplying a great deal of the needed capabilities. The Draft further argues that to carry out such a strategy, the Army needs to integrate space support into Future Army Operations as an essential element, to establish and support a high-ranking Army authority for space, and to adopt a "move out now" action plan that involves implementing changes in the requirements and acquisition process, relying on commercial systems, concentrating on acquiring ground-based elements for space systems (such as the Global Positioning System), revising training programs, and incorporating space into the Louisiana Maneuvers.

DRR-157-A Summary Review of GPALS and NMD Operational Requirements Documents: An Annotated Briefing (U). E. D. Harris. January 1993. SECRET NOFORN WNINTEL LIMITED INTEL

(U) This Draft presents the results of a special assistance effort to quickly review the GPALS and NMD ORDs before they were presented for approval by the JCS. The review presents a side-by-side comparison of the two ORDs. Our findings identified the design threat for GPALS to be excessive given all the changes in the geopolitical environment since the end of the Cold War (i.e., START agreement, Congressional guidance, changes in the U.S./CIS relationship, and projected CIS SSBN deployments). As specified, the GPALS threat would drive the NMD system design to use much larger

deployments and probably to the development and deployment of a space-based sensor system. In addition, discrepancies were identified in the GPALS and NMD leakage rates; these needed to be resolved before JCS approval. Finally, because the Army is responsible for five of the major GPALS elements, it needs to understand and consider the implications for NMD of political, budgetary, and arms control uncertainties and the possible impact that these uncertainties might have on the Army as an institution.

DRR-169-AF/A Germany's Geopolitical Maturation: Strategy and Public Opinion After the Wall. R. D. Asmus. January 1993.

This Draft presents briefing slides that show the key findings of a recent public opinion survey conducted for RAND by Infracrest Burke Berlin in late 1992. The survey was the most recent in a series of RAND-sponsored opinion polls that seek to understand the future of German strategic thinking and implications for U.S. national security strategy. This year's survey results contain good news for American policymakers on an array of issues. A majority of Germans look forward to the Clinton Administration and views a more concerted U.S. effort to confront its domestic problems as a prerequisite for a strengthened U.S.-European relationship. German public support for NATO, for an American military presence in Germany, and for a broader "out of area" role for the alliance is on the rise. Germans also support European integration and see a strengthened European Community as a basis for a new "partnership among equals" across the Atlantic. Finally, the German public overwhelmingly supports the government's efforts to combat right-wing extremism.

DRR-173-A Sealift in Major Regional Contingencies (U). J. A. Isaacson. February 1993. CONFIDENTIAL

(U) This Draft analyzes strategic sealift of U.S. Army forces in two parts. The first part of the study analyzes the capacity of the U.S. Army forces to deliver combat and support equipment in a Major Regional Contingency (MRC). This part of the study uses three options reflecting three possible levels of expenditure: (1) no expansion of current assets; (2) programmed expansion of current assets; and (3) sizable expansion of current assets, in addition to procuring several large, medium-speed roll-on/roll-off ships (LMSRs). The second part of the study analyzes the non-concurrent, time-phased sealift of combat units and related cargo to Southwest Asia and Korea. Combat elements include the 24th Infantry Division, the 1st Cavalry Division, the 101st Air Assault Division, the 3rd Armored Cavalry Regiment, and the 82nd Airborne Division. The arrival times of all forces were used as

inputs to theater combat modeling efforts in support of the larger post-Cold War Army study.

DRR-186-A Implications for the U.S. Army of Demographic Patterns in the Less Developed World. M. T. Childress, P. A. McCarthy. March 1993.

This Draft analyzes three demographic trends in the less developed world-rapidly expanding populations, increasing urbanization, and the growing number of displaced people-and discusses some preliminary implications for Army doctrine, training, and force structure. The Draft argues that both individually and collectively, these trends can foment domestic instability and create or exacerbate interstate tensions. For example, insurgent movements in developing nations often exploit the urbanization problems to establish support bases and even alternative "shadow" governments. The Draft concludes that Army involvement in conflicts in the less-developed world may entail providing basic services to displaced people and performing civil affairs duties. Also, preliminary research indicates that Army soldiers in general are not thoroughly trained in urban warfare (the need for which will likely grow) and with the attendant problems of urban terrorism and the threat of mass collateral damage from Army firepower. Finally, since the reserves have much of the Army's combat support and combat service support structure, the Army must deal with the political constraints of activating reserve units to deal with such operations.

DRR-199-A The Building Blocks of Russia's New Military Doctrine. E. B. Rumer. February 1993.

This Draft examines the fundamental factors that will determine the direction of Russia's security policy and military doctrine. The Draft argues that if Russia remains a truncated empire, neo-imperialism is likely to dominate its national security policy and military doctrine, which would be oriented toward reconstituting its internal empire and expanding through force and intimidation into its old sphere of influence in Eastern and Central Europe and Asia. However, the Draft also argues that the greatest threat to Russia's national security is from within (from both economic collapse and significantly diminished military capability) and that the path taken by Russia's political leaders toward resolving that crisis will determine the face it presents to the outside world and its military doctrine. The Draft concludes that given these uncertainties, U.S. policymakers have few, if any, options for significantly affecting the outcome of Russia's internal transformation. However, these uncertainties also underscore the importance of continuing U.S. involvement and military presence in Europe as a stabilizing force.

DRR-210-AF/A Russian Policy Towards Eastern Europe: Problems, Prospects and Policy Implications. F. S. Larrabee. March 1993.

This Draft examines how political forces in the new Russia will define what Russia sees as "legitimate" interests in Eastern Europe. The Draft argues that three major schools of thought have emerged on Russian foreign policy-a "Euro-Atlantic" school, which favors close ties to the West and more readily accepts the loss of Soviet empire; a "Eur-Asianist" school, which rejects a pro-Western course and favors an "independent" foreign policy; and a "Neo-imperialist" school, which wants to reconstruct the old Soviet Union, but under a Russian nationalist banner-and that foreign policy is shifting more toward the Eur-Asianist school. Russia currently seems to accept that it cannot reincorporate Eastern Europe into an explicit Russian sphere of influence, but would like to delay or slow down Eastern Europe's integration into Western security institutions until it has reasserted influence over the "near abroad" (the territory of the former USSR). The Draft concludes that the hardening of Russia's policy toward the near abroad will make the East Europeans nervous and increase their desire for closer ties to the West, especially to NATO.

DRR-220-A Measuring the Value of Scout/Reconnaissance: A Briefing. C. T. Veit, M. Callero. March 1993.

This Draft discusses an approach developed to measure the value of scout/reconnaissance so that different scout/reconnaissance systems (existing and proposed) and different subsystem technological concepts (e.g., sensors) can be compared, with the intent of bringing to light characteristics of the scout/reconnaissance mission that provide high-payoff potential. Because the scout/reconnaissance mission includes elements of technology, military doctrine and concepts, and human processes, an approach was developed that first applies modern subjective measurement techniques to model the division intelligence staff's performance of situation assessment and its contribution to the division's operational performance. Then, to provide inputs to these human process models, the approach also incorporates the simulation of scout/reconnaissance system missions in high-resolution models. To show the potential of the approach, it was applied in a preliminary manner to assess the value of the RAH-66 Comanche by simulating scout/reconnaissance operations. The indications are that an advanced scout helicopter of this type significantly improves the ground commander's capability to defeat the enemy.

DRR-223-A Ethnic Conflict in Central Europe and the Balkans in the Post-Communist Era: A Framework and U.S. Policy Options. T. S. Szayna. March 1993.

This Draft provides an analytical framework for thinking about the potential for militarized ethnic conflict in the

central part of Europe and the Balkans. The Draft distinguishes between three types of ethnic tensions: (1) a mobilized ethnic group without outside backers, which can escalate to a low-intensity conflict within a specific country; (2) a mobilized ethnic group backed by a neighboring nation-state, which can escalate into an international dispute or border war; and (3) the breakup of federal states made up of ethno-territorial administrative units, which can escalate to armed struggle (a hybrid between a civil war and a war for independence that may escalate into a larger regional war). The Draft argues that the type of regional ethnic demands is shifting away from outright succession (breakup of states) and toward calls for autonomy. It concludes that U.S. policy should focus on controlling ethnic tensions by limiting their spread, preventing their escalation into militarized conflict, and containing any conflicts that occur; the Draft ends with some recommendations for the United States and the Army.

DRR-228-A The Rising Tide: Demographic Pressures and Political Instability in the Middle East. M. E. Morris. March 1993.

This Draft examines the implications of projected demographic changes on the stability of the Middle East and the potential role of U.S. policy in the region. The Draft argues that high population growth rates, scarce or diminishing resources, increasing urbanization, and population movement and refugee flows, complicated by unresolved and deep-seated political divisions, portend a bleak future for the Middle East. The unsettled Arab-Israeli dilemma has precluded the resolution of other conflict situations and the subsequent development of cooperative regional efforts to address such problems. Without such common efforts, and the major policy changes that must accompany them, the Middle East governments will likely find themselves submerged in a rising tide of demographic problems, complicated by unresolved and deep-seated political divisions. These problems, with their implicit threat of violent upheavals, can affect the nature of future Middle East conflicts and have implications for Army roles, missions, and operations.

DRR-230-A U.S. Force Employment in the Post-Cold War World: Potential Adversary Responses. J. C. Wendt. May 1993.

This Draft examines the potential costs and benefits of using military force as an instrument of U.S. policy and describes how the actions of an adversary could change this cost-benefit relationship. The Draft argues that weighing the benefits and costs of using military force today is problematic because the current indirect threat makes the benefits less clear; in addition, although the costs have declined because potential adversaries will not likely

possess the size or sophistication of the Soviet threat, the costs could go up if the adversaries take a variety of actions: (1) attacking an important U.S. target set (e.g., attacks on ports and airfields or limited but valuable assets like C-141s and C-5s during deployments); (2) acquiring new weapons systems for such attacks (e.g., nuclear weapons and advanced air defense weapons); and (3) using a different strategy or operations for such attacks (e.g., taking hostages). The Draft concludes that given this cost-benefit relationship, the use or threatened use of American forces may decline in the future.

DRR-246-A Comparison of the Organizations and Procedures for Materiel Modernization Among the Military Services. E. M. Cesar, G. Frost, L. Horgan, K. P. Horn, B. Schweitzer. August 1993.

This Draft addresses the Army's organization and procedures for materiel modernization as seen from a cross-service perspective. The Draft argues that the entire requirements generation process is complex, having evolved into an intricate system with both formal and informal mechanisms interlinked with the Planning, Programming and Budgeting System (PPBS). It also argues that the CINCs are becoming much more important in the process, although this change does not appear to be as well recognized in the Army as in the other services, and that all services would benefit if the JCS would provide a more concrete vision of the integrated battlefield. The Draft further argues that the Navy and Air Force may have an advantage in the way they promote their requirements and that TRADOC, in its role as combat developer, may be hampered by the narrowness that results from the competing stovepipes of the various branches. The Draft concludes with some recommendations for the Army based off these observations.

DRR-247-A Army Support for Youth Development: Assessing Policy Options. E. H. Ondaatje. April 1993.

This Draft presents a framework for examining the Army's role in youth development activities. The Draft argues that the growing popularity of youth community service and the urge in policy circles to draw upon the military to help youth suggest that youth development will be increasingly important for the Army. It further argues that the Army's current efforts are insufficient to withstand the mounting pressure on the Army to do more for the nation's youth. The Draft posits five options for expanding the youth development effort, compares them in terms of such factors as how much effort they require and who participates, and then presents a framework for evaluating the impact of the options on such things as Army missions and budgets. The Draft recommends that the Army understand what it is already doing for civilian youth and quantify the benefits of military service for the

nation's youth who serve in the military and that the Army attempt to reduce the polarization of the current debate over whether support for youth development is an appropriate Army role.

DRR-256-A Military Formations of the Former USSR Member-States: A Survey. S. Zamascikov. March 1993.

This Draft examines the origins, the current environment, and the prospects for the armed forces of the former Soviet Union (FSU) republics. The Draft argues that although the dissolution of the Soviet military machine is in the West's interests, it poses some threats to the West. Specifically, the CIS is becoming a very loose security alliance, and most of the FSU republics are building up their own defense establishments. The U.S. and the West's response to these emerging new militaries must recognize and accept that each FSU republic has the right to have armed forces to guarantee its sovereignty, but that the new militaries can be used in conflicts that can spill beyond their national borders. Among the principles underlying U.S. and Western long-term goals should be the willingness to provide assistance in creating the new civil-military structures and military systems and, simultaneously, the carefully but firmly expressed demands for strict adherence to existing international agreements, most importantly, the CFE treaty and the nuclear nonproliferation treaty.

DRR-260-AF/A Modeling Global Positioning Satellite Effects in the TLC/NLC Model. P. D. Allen. June 1993.

This Draft presents a model design for representing the effects of global positioning satellites (GPS) in support of military operations. Three types of GPS coverage are discussed: (1) absolute GPS, which is the term applied to normal GPS positioning and navigation transmissions over the globe; (2) differential GPS, which can significantly increase the receiver's location accuracy and eliminate the effects of selective availability; and (3) relative GPS, of which there are two types—the first allows a GPS-equipped launcher and a GPS-equipped munition to share location data so that the target location error is decreased, while the second uses sensors to receive and provide more accurate target location data using the reflections from unique signatures within the sensor's field of view. The Draft also discusses the three main benefits of the design—improved self-location accuracy, improved target location accuracy, and standoff munitions launch—as well as the threats against GPS transmitters, GPS receivers, and GPS signals (specifically, jamming and spoofing, which involves an opponent sending a false message to a GPS receiver to direct the receiver's platform off course).

DRR-262-AF/A Future Gulf Dynamics and U.S. Security: An Annotated Briefing. B. R. Nardulli, M. Agmon, T. W. Karasik, J. A. Kechichian, M. E. Morris, N. Schahgaldian, L. Arghavan. April 1993.

This Draft examines the post-war strategic environment in the greater Gulf region and its implications for future U.S. security planning. The Draft argues that Iraq's invasion of Kuwait, the coalition war against Iraq, and the Soviet Union's collapse have unleashed political, economic, and social forces that are challenging the foundations of power in the region, and that given this environment, regional actors will be unlikely to form even a general consensus on how to approach future regional security problems and will not be able to create formal security structures. While the United States has successfully cultivated and expanded long-term security links in the region, the future prognosis is one of regional deterioration in which the U.S. military—in part because of this success—may be increasingly drawn into the web of Gulf dynamics. The Draft suggests some broad alternatives for addressing regional security challenges, but argues that policymakers cannot avoid distinct trade-offs among the alternatives and that "optimizing" among the trade-offs to avoid facing tough decisions will result in contradictory and potentially dangerous outcomes.

DRR-265-A European Security Institutions for the 21st Century: Putting Theory into Practice. J. B. Steinberg. April 1993.

This Draft examines what role institutions can play in meeting the objectives of the United States and its allies in post-Cold War Europe and offers some principles to guide decisionmakers. The Draft argues that based on international relations and organization theory, institutions can play a number of roles depending on the institution's characteristics—its purpose (e.g., single vs. multiple), composition (e.g., homogeneous vs. heterogeneous), procedures (e.g., rule-based vs. ad hoc), and origin (e.g., imposed vs. negotiated). The Draft further argues that these insights from theory need to be matched to the specific interests of European states and threats to stability, such as threats to borders, internal conflict, failure of the democratic/market transition in former Communist countries, erosion of democratic structures in the West, stagnant or declining economies, and economic competition. The Draft concludes by presenting ten specific policy recommendations for post-Cold War Europe, derived from a series of design rules of thumb, that broadly address the potential sources of conflict and the interests and objectives of the European states.

DRR-270-A Annotated Briefing: BW Terrorism in the 1990s. M. Eisenstein. April 1993.

This Draft discusses the "potential" of independent terrorist groups to employ biological agents or weapons (BW) against U.S. targets, domestically and abroad, and prioritizes among these groups for the possible use of BW. The Draft argues that BW may not be weapon of choice for terrorists in killing only a few people because its use would be more complex than employing conventional methods. However, for killing tens or even hundreds of Americans, using BW could lower the terrorists' risk of being detected. The author found no terrorist objective that would call for killing many thousands of Americans, with the exception of retaliation against the United States for Operation Desert Storm; moreover, if killing many thousands of Americans is the objective of a terrorist act, it would have to occur domestically and would require significant support by a foreign state. The Draft also concludes that as technical sophistication grows among international and domestic terrorist groups, the potential for BW use to inflict casualties and/or severe economic damage will increase.

DRR-275-A Some Ideas for Accelerating the Acquisition Process. E. M. Cesar, L. Horgan, K. P. Horn. April 1993.

This Draft documents seven promising ideas to help the Army in accelerating its acquisition process. These ideas involve (1) changing the Concept-Based Requirements System (CBRS) to eliminate restrictions that are causing delays in the requirements generation process; (2) developing requirements from the Joint Task Force perspective; (3) reducing the linearity of organizations and procedures so that they better match the circular relationship between the research community, the developers, and the users; (4) pushing for reform of DoD regulations; (5) using prototyping to understand production and to gain operational experience; (6) turning special access programs into "skunk works" operations to better exploit the unique acquisition environment provided by special access programs; and (7) implementing an epoch-step acquisition approach to deal with the problem of the widening gap between what technology can provide and what the Army can acquire; this means planning according to epochs (i.e., points in time characterized by a distinctive way of acquiring technologies for a functional area) and designing the systems in each epoch across all Services to achieve Joint operability.

DRR-276-A Marching to Different Drummers: Evolution of the Army's Environmental Program. D. S. Rubenson, J. Aroesty, P. W. Wicinas, G. Farnsworth, K. Ramsey. September 1993.

This Draft argues that a more efficient and effective environmental protection program can only be developed with an evolution to a decentralized/coordinated system—a system that is highly dependent on local decisionmaking

in response to local environmental regulation. Environmental projects must in the long run be balanced against other needs at an installation rather than overall Army needs. The Army has been forced to assert greater headquarters control to ensure environmental protection at local bases, but ultimately a system that is highly decentralized is most efficient. The Draft provides two strategic options for evolving toward a fully decentralized/coordinated system. If more local autonomy is to be relied upon, there must be "a mixing of the shades of green," which would involve more fully training the command in environmental affairs, providing a career path leading toward a Garrison Commander position and other base operations functions. This approach could divert soldiers from military training. An alternative is to "separate the shades of green": establish a base operations chain of command, organized regionally, and potentially with all civilians. Tactical units would be tenants at the bases and would be free to conduct training with fewer base operations responsibilities. The Draft closes by highlighting the disadvantages and advantages of each approach, but does not recommend a preferred option, leaving open the possibility of some type of hybrid approach.

DRR-290-A Review of Civilian Community Quality of Life Literature: Is It Applicable to Army Communities? D. S. August. October 1993.

This Draft reviews the literature on quality of life (QOL)—a vast body of literature that focuses primarily on civilian communities—and identifies five recurrent themes that would prove relevant in a study of military communities: (1) the importance of factors other than money; (2) the impact of city size and definition of community on assessments; (3) differences in QOL evaluation standards and outcomes among different demographic groups; (4) the distinction between objective and subjective QOL assessments and indicators; and (5) identification of life domains (and indicators within those domains) significant in QOL. In addition, this Draft outlines a possible analytic framework for helping the Army evaluate its QOL programs with respect to how these programs influence personnel retention. The author states that further research would contribute to the formulation of specific action plans by developing a methodology that can be used to assess the implications of alternative policies on personnel QOL and therefore on reenlistment decisions.

DRR-295-A Future Army Long-Range Fires: Bringing New Capability to the Battlefield (U). J. Matsumura, Ed. Cardenas, K. P. Horn, E. A. McDonald. September 1993. SECRET NOFORN WNINTEL LIMITED INTEL

(U) This Draft explores the application for future U.S. Army long-range or "deep fires" artillery systems. The study finds that the new attributes of long-range systems can be used in a variety of different ways—often offering substantially greater flexibility on a future battlefield. In addition, the study finds that in concept, deep fires is highly consistent with other aspects of current military planning for the future. The study recommends conducting new analyses showing the added benefit of having these systems available early in a conflict, considering "austere" scenarios as a background for future analysis, exploring the applicability of the smart dispense capability of TSSAM, and continuing to consider other emerging munitions concepts as possibilities for incorporation into the long-range delivery vehicle. The Draft concludes by recommending a further investigation of the utility of Army deep fires and Air Force tactical strikes and an exploration of various threats and appropriate ways to allocate such weapon systems to optimize their effectiveness in the joint operations arena.

DRR-297-A Communication Performance and Shortfalls in Operations Desert Shield/Storm (U). K. Poehlmann. May 1993. SECRET NOFORN

(U) This Draft looks at communications performance shortfalls during Operations Desert Shield/Storm (ODS/S). Examination of ODS/S situation reports and interviews with both military and commercial communications providers and managers lead to the assertion that operational, not technical, deficiencies predominated in the U.S. military's claims about communications shortfalls in ODS/S. Perceived shortfalls can be ameliorated by better management of existing systems as the Army prepares for future contingency operations. This includes paying serious attention to non-interoperable computer systems, unrealistic band with designations, abuses of priority systems, host-nation interfaces, and flaws in plans for deployment and distribution of communications equipment and data.

DRR-299-A The American Armies in the Current World Situation. J. M. Taw, P. A. McCarthy, K. J. Riley. May 1993.

This Draft examines the effects of the changing international environment on the U.S. military and the U.S. Army in particular. The Draft argues that the dilemma of dealing with changing threats and dramatically reduced budgets that confronts the U.S. military confronts the Army more acutely—it must broaden its capabilities, adjust its roles and missions, and compete with the other services, all in the face of manpower and budget cuts. While the Army will respond through such internal means as relying more on technology and rethinking its use of the reserves, the Draft argues that cooperation between the American armies could counteract some of the effects of

the drawdown and decreasing defense budget. For example, sharing rather than duplicating disaster-relief equipment and training, combining counterdrug operations, and leveraging off the Canadian Army's expertise in international peacekeeping could help optimize limited resources. The Draft concludes that before any of these efforts can take place, the countries of the region must redefine their political and military relationships to prevent being constrained by the residual fears of imperialism.

DRR-313-A Weapon System Sustainment Management: A Concept for Revolutionizing the Army Logistics System, J. Dumond, R. Eden, and J. Folkesson, September 1993.

This Draft advocates a comprehensive concept for managing the Army and DoD logistics systems—Weapon System Sustainment Management (WSSM)—and illustrates the concept by drawing on several RAND logistics studies. To meet future threats, the logistics system must become much leaner, more flexible, and more responsive. The most successful commercial firms have developed these same characteristics by adapting a new management paradigm. WSSM applies similar management concepts to improve the Army logistics system. WSSM identifies three strategies that can help the logistics system achieve improved performance at lower cost. The first strategy is to focus the entire system on meeting the needs of the "customer" (i.e., the operational commander). The second strategy is to design and redesign weapon systems to be more supportable. The third strategy calls for changes in the structure of the logistics system so that it depends less on mass and more on the speed and accuracy of its processes (repair, distribution, etc.). WSSM integrates much RAND logistics research conducted over the past several decades and is influencing Army and DoD policymakers through projects for several sponsors.

DRR-337-AF/A Cooperation with Turkey: Elements of a New Strategic Bargain and Implications for U.S. Policy. I. O. Lesser. June 1993.

This Draft explores the elements of a "new strategic bargain" with Turkey in the context of bilateral and Alliance relations and the implications for U.S. policy. The Draft examines both sides of the bargain, arguing that the West will look to Turkey to play a constructive regional role and will seek predictable security cooperation on both a routine and crisis basis, while Turkey will look to the West for reaffirmation of its membership in the Western "club." The study argues that bilateral relations with Turkey should be placed on a more diversified and mature footing, with greater attention to non-defense issues, that Turkish security cooperation can no longer be taken for granted, that the U.S. should support Turkey's desire for an explicit reaffirmation of the NATO guarantee

in extra-European scenarios, and that the adopting of a more active stance on the Bosnian crisis would make the greatest immediate contribution to relations with Turkey and would help to ensure a favorable climate for cooperation over the longer term.

DRR-343-AF/A Germany's Geopolitical Normalization. R. D. Asmus. July 1993.

This Draft highlights the key factors likely to shape future German strategic thinking. The Draft argues that such thinking will be driven, first, by a new set of German strategic interests in a radically altered geopolitical context in Europe-strategic interests focused around Germany's recognition that its vulnerabilities lie first and foremost along its Eastern arc: the zone of instability between Germany and Russia running from Northern Europe down through Turkey, the Caucasus, and Middle Asia. German strategic thinking will also be driven by the attitudes of Germany's allies and neighbors. To deal with its new challenges and vulnerabilities in Europe, Germany realizes that it desperately needs its allies and, above all, a strong strategic relationship with the United States. However, if Germany's allies fail to support or oppose Germany's efforts to, for example, transform the EC and NATO into the kinds of institutions that meet German needs, German attitudes toward its allies will change and Germany may be driven toward the kind of renationalization of German strategic thinking everyone wants to avoid.

DRR-347-A A Proposal for Heavy Battalion Reorganization Involving Headquarters Company and Echo Company. M. Goldsmith. June 1993.

This Draft proposes a solution to the problem that the scout and mortar platoons assigned to Headquarters Company (HHC) do not normally receive the command support required to perform their doctrinally required tasks. The Draft argues for the creation of a support company to absorb all the task force combat service support functions, while retaining the present staff support elements and special platoons in HHC. Additionally, Echo company, which a previous RAND study showed was underutilized, would be eliminated by dividing its forces into two six-vehicle platoons and by assigning one platoon to each of the HQ companies of all heavy battalions, both armor and mechanized. This would also solve the problem of security. The Draft argues that command and training relationships would be strengthened by this arrangement, and that it would be easier for the HHC task force to make proper utilization of attachments such as artillery observers, ground surveillance radars, chemical and air defense scouts, and other nonorganic elements.

DRR-348-A Quantifying the Battlefield: Battalion and Below Command and Control Issues Seen at

the National Training Center, Interim Report. J. Grossman. June 1993.

This Draft analyzes command and control (C2) issues from NTC Take-Home-Packages during the period preceding the Gulf War to determine how frequently C2 problems occur and their impact on the battle outcome. Twelve significant C2 issues were found to be systemic with the Blue Force. Their impact is important because roughly one-half of the Blue Force battles lost at the NTC had significant C2 problems. Initial in-the-field research has indicated the magnitude and frequency of these problems have not changed since the Gulf War. The Draft also addresses the issue of what technology can do to reduce or solve C2 problems, finding that only half the problems are amenable to a technological solution. Many of the technological solutions would need to focus on software, which must be readily accessible and user-friendly to be employed effectively during the battle. The Draft argues that all the problems could, in theory, be solved by better training, although the most cost-effective approach will probably be a combination of better C2 equipment and training.

DRR-349-A 1992 Bold Shift Survey Instruments. J. Hawes-Dawson, T. Kaganoff, J. M. Polich, R. E. Sortor. June 1993.

This Draft contains survey instruments and instructions developed to support an assessment of the 1992 BOLD SHIFT reserve training program. The first phase of the assessment was designed to focus primarily on two types of issues: (1) description of unit training activities; and (2) commanders' and soldiers' perceptions of the program. Five survey instruments were developed, focusing on unit training, battalion and brigade staff training, Operational Readiness Exercises, and Unit Leader Battle Skills Courses. The surveys were administered during the late summer and early fall of 1992. Analysis of the results, in conjunction with other data, is intended to provide a comprehensive view of the various initiatives that made up BOLD SHIFT and of their potential for improving Reserve Component unit readiness in the future.

DRR-350-A Future Contexts for Providing Army Morale, Welfare, and Recreation Programs. S. Way-Smith, P. A. Morrison, M. T. Childress, E. G. Keating. July 1993.

This Draft examines the future contexts for supplying and delivering Morale, Welfare, and Recreation (MWR) programs. The Draft documents the process of selecting specific MWR programs and prototype installations to be used in subsequent analysis. It also examines the approaches the military can take to provide MWR services on military bases and argues that in analyzing these approaches, the Army needs to consider the issue of

soldiers as consumers, national security, market structure, mechanisms for dealing with alternative provisions, and incentives or impediments to implementing the approaches. The Draft argues that changes in force structure and basing, as well as broader social changes, have important implications for Army support services. First, MWR services need to be tailored to the new Army family as consumers—a family more integrated into the civilian community and one in which each parent (or a lone parent) holds a job. Second, budgetary pressures dictate that the Army must restructure its existing MWR system to focus resources on the essentials.

DRR-353-1-A Enhancing Reserve Component Readiness: The 1992 BOLD SHIFT Program. R. E. Sortor, T. Lippiatt, J. M. Polich, J. C. Crowley. September 1993.

This Draft describes and evaluates the first year of the Army's Reserve Component (RC) training enhancement program, known as BOLD SHIFT. The program was implemented in 274 high-priority RC units during 1992. The Draft reports quantitative data and observations on five key areas targeted by BOLD SHIFT: individual military occupational specialty (MOS) qualification and skill levels; education and training for officers and noncommissioned officers; training activities at RC units' home station; Annual Training, including special efforts at "lane training" and gunnery qualification; and Operational Readiness Exercises. It concludes that the program was successfully implemented and readily accepted by RC commanders and personnel, but most units did not achieve their full pre-mobilization proficiency goals during the first year. In addition to providing specific recommendations in each of the five areas, the Draft identifies individual MOS qualification and personnel turbulence as fundamental problems that must be overcome if RC units are to reach the Army's training goals.

DRR-356-A Ensuring RC Personnel Readiness in the Post-Drawdown Army. B. R. Orvis, H. J. Shukiar, L. L. McDonald. July 1993.

This Draft provides interim results on the extent of cross-leveling between units of Army Reserve Component (RC) personnel during Operation Desert Shield/Storm and analyzes the reasons for cross-leveling actions. The study found an extensive pattern of cross-leveling during ODS in activated units. The chief reason for these actions is shortcomings in Duty Military Occupational Specialty Qualification (DMOSQ) rates. The Draft then explores the potential contributions of alternative policy approaches to decrease future cross-leveling requirements in the RC. Explicitly considered are the effects of changes—such as increased prior active service member content, improved retention, and decreased job turbulence—on MOS

qualification rates and accession and training requirements. The results suggest that increasing prior active-duty enlistments in the RC will not substantially improve DMOSQ rates unless retention and job turbulence problems are improved. Such improvements also promise to substantially reduce accession and training requirements.

DRR-362-ONDCP/A/DPRC Controlling Cocaine: Supply Vs. Demand Programs. C. P. Rydell, S. M. S. Everingham. June 1993.

This Draft analyzes the relative cost-effectiveness of various available drug interventions. Four such interventions analyzed in this document are (1) source country control; (2) interdiction; (3) domestic enforcement; and (4) treatment of heavy users. The first three of these programs focus on "supply-control," whereby the cost of supplying cocaine is increased by seizing drugs and assets and by arresting and incarcerating dealers and their agents. The fourth program is a "demand-control" program because it reduces consumption directly, without going through the price mechanism. This study states that an estimated \$13 billion are being spent in the United States each year on the four drug programs listed above and that the bulk of those resources are spent on domestic enforcement. Treatment of heavy users has only a small percentage of this budget, even when privately funded treatment is included. Given the high cost of "supply control" programs, this Draft concludes that treatment of heavy users may be a more cost-effective way of dealing with drug interventions.

DRR-364-A The Urbanization of Insurgency: The Potential Challenge to U.S. Army Operations. J. M. Taw, B. Hoffman. July 1993.

This Draft evaluates the effects of urbanization and population growth on the conduct of insurgency/counterinsurgency operations and assesses the U.S.'s ability to effectively support foreign nations' counterinsurgency activities. The Draft argues that as the dual demographic trends of rapid population growth and urbanization continue to change the face of the developing world, the likelihood of urban insurgency is increasing. It also argues that although urban insurgencies have traditionally been the easiest kind to defeat, that may no longer be the case. This means that governments, no longer able to simply rely on their urban counterterrorist or rural counterinsurgency strategies, will have to develop a hybrid strategy that prepares them to fight a broad-based insurgency across rural and urban environments. The Draft concludes that the United States can provide only limited support in these efforts, because it has neither the resources nor the will to become directly involved. The United States must realize that there are factors over which it has no control and that before committing its support to a counterinsurgency effort, it must determine how much it

is willing to spend, how much it can control, how its efforts will be perceived, and the minimum outcome it will accept.

DRR-370-A/RC Military Support for Youth Development: An Exploratory Analysis. B. J. Asch. July 1993.

This Draft assesses existing evidence about the potential of military service and training as methods to prepare disadvantaged youth for productive roles in the work force and society. It describes features of military training programs, the participation of minorities in such programs, and the research evidence on effects of military experience on post-service earnings. The evidence reveals no research consensus on whether veterans in general receive a positive or negative return to military service; but for disadvantaged veterans, it suggests little effect or a negative effect. Results also indicate that while minorities are more likely than majority-group members to obtain skills in the Army that are transferable to the civilian sector, they are less likely to leave the Army and to use their educational benefits. The Draft discusses implications of these findings for future military-based youth development programs and highlights gaps in current knowledge that need to be filled to formulate policy.

DRR-371-AF/A A Concept-Level Modeling Tool for Military Satellite Communications: Nonantijam Signals in a Nonprocessing Satellite. E. Bedrosian, G. K. Huth. September 1993.

This Draft is the first in a series that presents the analytical procedures required to construct a computer simulation of a military communication satellite system, load it efficiently with the radio signals required to support an operational scenario, and assess its vulnerability to jamming. The model is intended to facilitate relative, rather than absolute, comparisons between various communication satellite systems, both real and conceptual; only the essential technical characteristics of these systems and the terrestrial terminals with which they are intended to operate are considered. The study states that this not only simplifies the construction and operation of the model, but also focuses attention on those elements of the overall system that are of the greatest significance in a comparative analysis. This Draft also discusses scenarios and earth terminals, but only communication satellites incorporating frequency-translating transponders are considered.

DRR-372-AF/A A Concept-Level Modeling Tool for Military Satellite Communications: Direct-Sequence, Spread-Spectrum Signals in Nonprocessing Transponders. E. Bedrosian, G. K. Huth. September 1993.

This Draft is the second in a series that presents the analytical procedures and mathematical formulations required to construct a computer simulation of a military communication satellite system, load it efficiently with the radio signals required to support an operational scenario, and assess its vulnerability to jamming. However, instead of being operated in the linear mode, as was necessary to accommodate the frequency-division-multiplexed, nonantijam signals being considered, the transponders here are considered to be driven deliberately into saturation and to behave like hard limiters. This is done to obtain the best possible performance of the direct-sequence, spread-spectrum signals of interest. The antijam signaling is important to military communications because of the significant protection it can provide against jamming.

DRR-373-A Compensating Civilians on the Battlefield. E. G. Keating. July 1993.

Given that civilians will continue to be needed in future Army operations, this Draft considers how they should be compensated. The Draft suggests a number of methods of inducing civilians to accept battlefield assignments. One is for the Army to offer government-employed civilians two levels of compensation—one for peacetime and a higher one for wartime. Another is to pay different premia for different skills and/or to eliminate earnings caps; the current system appears to have a bias against high-skill workers. The Draft argues that the Army should allow its contractors to pay their employees more during conflict and to prudently overstaff. It also argues that because most civilian life and health insurance policies do not cover injuries or death caused by war, the government should either make such payments or reimburse contractors for doing so.

DRR-388-A Operation Sea Angel: A Case Study. P. A. McCarthy. June 1993.

This Draft examines the lessons learned in terms of training, doctrine, and force structure from Operation Sea Angel (OSA), an operation comprised of Marine forces supported by Army and Air Force elements, that the United States launched to provide assistance when Cyclone Marian struck Bangladesh in April 1991. In terms of training, OSA indicated that many combat skills are transferable to and exercised by humanitarian situations (e.g., reconnaissance, assessment, transport, and logistics), while areas like joint training, command and control, and deployment training illustrated training deficiencies. OSA clearly demonstrated some doctrinal deficiencies. Doctrine at the joint level needs revision and development; unique aspects of humanitarian operations, including unique aspects of the joint staff planning process, are lacking. Although Army involvement in OSA was limited, several force structure lessons can be inferred. Army forces will

be required to provide medical care to joint forces and the indigenous population. In addition, if OSA had been conducted in a hostile situation, or if massive troops were required, Army forces would have faced huge infrastructure problems. Finally, OSA showed that the Army cannot rely on joint forces for communications; establishing a satellite link is essential.

DRR-390-ONDCP/A/DPRC Modeling the Demand for Cocaine. S. M. S. Everingham, C. P. Rydell. July 1993.

This Draft documents the development of a two-state Markovian model of the demand for cocaine and includes the estimation of incidence, prevalence, cohort retention, and consumption. The Markovian model is required to fit (1) the overall prevalence data; (2) the fraction of all users that are heavy users in 1988, 1988, and 1990; and (3) the fraction of a cohort of users that is still using drugs ten years later, the ten-year cohort retention rate. The study states that the incidence of new users into light cocaine use has varied greatly over the years and is an input to the model; however, the model cannot predict future prevalence-it can only project prevalence given a hypothetical incidence scenario. The model also demonstrates that the fraction of all cocaine users who are heavy users has varied greatly over time, and that peak heavy usage followed peak incidence by about ten years. Consequently, the effect on heavy usage of government programs that reduce incidence (such as prevention programs) will only be realized many years later.

DRR-396-A Army Deployment for Restore Hope: Analysis and Issues. D. Kassing. July 1993.

In Operation Restore Hope (ORH), the Army successfully provided many of the capabilities needed to get food to starving Somalis. This Draft analyzes Army ORH deployment and makes five observations on how to improve future humanitarian operations. First, the details of planned Army movements varied considerably. DoD should consider adapting planning and operating procedures to place less reliance on detailed plans. Second, humanitarian operations place relatively high demands on support functions (Engineering, Medical, Transportation, Civil Affairs, etc.). The Army may wish to create "ready groups" for such functions. Third, ORH employed six of the nation's best sealift ships, undercutting the Army's ability to carry out its strategic mobility plan. Use of other types of ships should be considered. Fourth, difficulties in offloading prepositioning ships suggest that procedures and plans be re-examined. Finally, the Army needs to develop methods for defining objectives and measuring progress in the performance of humanitarian missions.

DRR-415-A Quantifying the Battlefield—Battalion Level Command and Control Issues Seen at the National Training Center. J. Grossman. July 1993.

The Draft expands on the work reported in DRR-348-A, presenting the results of in-the-field research conducted to verify the problems raised in the NTC Take-Home Packages. The study finds that roughly half the Blue Force battles lost at the NTC had significant command and control (C2) problems. These problems result primarily from training deficiencies; however, new C2 computer-based equipment can resolve or ameliorate about half the C2 problems seen at the NTC. We also found that for C2 equipment to be useful, designers need to investigate and emphasize battalion and below command and control information architecture as much as the equipment itself. Other issues raised by this study focus on improvements in how the units operate, including the need for units to generate more detailed plans, do more analysis to enhance the plans' chances of success, manage the battle preparations, report more often and more accurately (during the battle), and track the battle more accurately in the Tactical Operations Center.

DRR-421-A Cambodia: The Crisis in U.N. Peacekeeping and U.S. Policy. M. D. Swaine. July 1993.

This Draft provides details and analysis of the current situation facing the U.N. peace effort, presents an assessment of alternative future scenarios, and suggests some general principles that should guide U.S. policy. The Draft focuses on five research questions. In terms of the status of the UNTAC effort, the Draft argues that UNTAC is failing in many key areas, facing both external obstacles (e.g., no reconciliation among factions) and internal obstacles (e.g., the rigidity, vagueness, and broadness of the U.N. mandate). The Draft also argues that although the Khmer Rouge can severely disrupt the U.N. peace process, it is not poised to take control of Cambodia. Given the above situation, the briefing argues that the "least bad" outcome of the situation is any coalition government, but preferably one dominated by FUNCINPEC, and that the U.N. can do very little to attain this option. The Draft concludes that the optimum U.S. strategy should be conditional support for a continued U.N. presence.

DRR-422-A The Cost Consequences of Forming a DoD School of the Americas (DODSOA). M. G. Shanley. July 1993.

This Draft presents the results of a cost assessment of a proposal to create a joint DoD School of the Americas to oversee all training of Latin American military (and civilian) personnel conducted in the Spanish language, and of an alternative proposal calling for complete

consolidation of training to one location. The study finds that if cost is the primary consideration in evaluating the DODSOA proposal, neither proposal is recommended. The main reason is that the service schools currently teach different types of courses, and without the potential to significantly reduce course redundancy, the idea of a DODSOA lacks one of the primary characteristics that make centralization of training a good idea. However, if cost is considered secondary to the other goals of the DODSOA, then the study argues the Army should consider "more coordination" as an alternative because the alternative could achieve some of the objectives without the potential cost of an organizational change.

DRR-431-A Video Processing for FLIRs. R. M. Zwirn. July 1993.

This Draft provides initial results in identifying video processing techniques applicable to second-generation Forward-Looking Infrared (FLIR) sensors. The Draft begins by describing the configuration of various FLIRs and by showing the benefits of making provisions now for evolving upgrades in processing. It then identifies how processing's diversified rates can expand the number and scope of upgrade strategies. The Draft concludes that second-generation FLIRs must include processing to control its operating parameters effectively and that this processing can also fulfill other roles, such as providing performance enhancements. For example, zoom enlarges details, frame averaging helps penetrate the atmosphere, and eye-matching selects significant intensities. The Draft also argues that future fielded FLIRs can quickly benefit from improved algorithms and that first-generation FLIRs can also be quickly upgraded to provide improved performance for such areas as training, doctrine development, and rapidly emerging contingencies.

DRR-433-A The 1962 Howze Board and Army Combat Developments. J. A. Stockfisch. July 1993.

After reviewing Army "combat developments," with special reference to the 1962 U.S. Army Tactical Mobility Requirements Board ("Howze Board"), this Draft argues that the Army could improve combat developments by closer connection and interaction between its model building and testing activities. Presently, models and their simulations are uncritically used with little attention given to whether the model is empirically validated. This will be troublesome for the Battle Labs when they use simulations to carry out their work. Another problem is that much data or numerical inputs used in models may be of questionable quality, often because it is the output of some other invalidated model. These conditions suggest that the Army's system should have a mechanism that tries to lay out programs of models and assertions about tactics and operational performance that can be empirically validated and sequentially field-tests those assertions. It

may even be necessary for the Battle Labs to take on or acquire this function to carry out its objective. Otherwise, imperfect expedients like the Howze Board will continue to be used.

DRR-440-A Materiel Distribution: Improving Support to Army Operations in Peace and War. N. Y. Moore, J. M. Halliday, K. M. Beam, D. W. McIver, M. Lewis, F. W. Finnegan, T. Masselink. November 1993.

This Draft describes the Arroyo Center's study on materiel distribution, presents some initial results, outlines some current activities, and discusses some next steps. In terms of initial results, the Draft argues that the Army distribution is complex and compartmented, that it is slow, and that the problems affecting it are long-standing. The Draft further argues that fixing it requires a systemic approach, since past stovepipe approaches have not worked. The Draft points out that industry has met and overcome many of the challenges confronting DoD by combining technology with reorganization and by establishing high performance standards to increase performance and productivity, and argues that this approach is a useful model for DoD to explore. It concludes that now is the time to rethink how to provide distribution support to the Army. The Draft then discusses current activities and next steps in the project.

DRR-444-A Improving Participation of Civilians in Military Operations. J. R. Bondanella, E. G. Keating, W. L. Spencer. July 1993.

This Draft summarizes the results from the project. It argues that the current personnel planning system needs to refocus its vision to create a system where motivated civilians want to deploy, stay, and deploy again in the future. It further argues that although senior army leaders prefer a policy of voluntary participation because coercion does not work well, the current system frustrates volunteerism. As shown in ODS, there was relatively little financial incentive to volunteer, which was especially true for government civilians in high demand. The Draft also argues that organizational practices dampened volunteerism in recent contingencies, that peer information discouraged participation by potential volunteers, that current rules are unclear but very important, and that planners and leaders do not have an attrition concept. The Draft concludes with some general recommendations for a future system and policies.

DRR-449-AF/A Dealing with Ethnic Conflict in Central Europe and the Balkans: The Case of the Hungarian Minorities. T. S. Szayna. August 1993.

This Draft examines the potential for conflict over the ethnic Hungarian minorities in the Danube basin in the context of potential dangers to stability in Europe posed

by ethnic conflict. The author argues that Hungary is in a paradoxical situation. On the one hand, Hungary is viewed in the West as one of the former communist countries most committed to succeeding in implementing political and economic reform. On the other hand, Hungary is most vulnerable to a national radicalization centered on the minority issue, because it has the largest and most explosive ethnic problem in the former Eastern Europe. The author states that escalation could destabilize the region and end the successful process of transformation in the former communist countries of Europe, as well as have far-reaching negative consequences on Western Europe, most of all Germany. The author further argues that the challenge for the U.S. is to limit the spread of ethnic tensions, prevent the escalation of tensions into militarized conflict, and contain any incidents of militarized ethnic conflict so that they do not lead to a border or regional war.

DRR-455-A Cyprus: Implications of Traditional Peacekeeping for the U.S. Army. M. C. Harrell. August 1993.

This Draft is one case study in a series that catalogs and assesses the range of missions and requirements the U.S. Army is likely to face in the future with particular attention to: (1) Army roles and missions providing relief and humanitarian assistance to refugees; (2) involvement, and the implications of intervening in internal ethnic conflicts; and (3) peace enforcement and peacekeeping operations in urban settings. The author compares the peacekeeping policies of the United Nations Forces in Cyprus (UNFICYP)—which remained uninvolved and impartial in local conflict—with the current policies of the U.S. Army, which is to respond or intervene (e.g., in the current Somalia situation). The issue of mission termination, an obvious problem in the 29-year-old mission on Cyprus, is also discussed. The author concludes that unless the U.S. military can provide a unique capability necessary to peacekeeping, the U.S. military is more appropriate to peace enforcement missions than to traditional peacekeeping missions such as UNFICYP.

DRR-457-1-A The North Korean Nuclear Program: What Is to Be Done? J. C. Wendt. January 1994.

This Draft examines the possible outcomes of the North Korean threat to withdraw from the NPT and outlines alternative approaches for accomplishing U.S. security objectives affected by this situation. The Draft evaluates four approaches—constructive engagement, grand deal, pressure, and graduated incentives—in terms of whether the approaches help accomplish U.S. security objectives, whether they can be implemented given the other regional players involved, and whether they are robust given the

fluidity of the situation in Korea. The Draft concludes that an approach that combines graduated incentives with pressure if the first approach fails is the most effective approach for meeting all three criteria. Specifically, the graduated incentives approach could accomplish all the U.S. security objectives, while the pressure approach could accomplish the major ones; in terms of implementation, graduated incentives is supported now and would lay the groundwork for regional support for pressure by demonstrating the United States has "gone the extra mile"; and in terms of robustness, graduated incentives would be effective if the North Korean "price" is low enough, while pressure could be effective regardless of North Korean motivation and would be consistent with a policy of counter-proliferation.

DRR-458-A Same Bed, Different Dreams: Thinking About a U.S. Security Strategy. N. D. Levin, G. E. Fuller, I. O. Lesser, B. C. Schwarz, K. Watman. July 1993.

This Draft reflects the efforts of a group of RAND researchers to think about the implications of recent global and domestic changes for future U.S. national security challenges in great detail—"realism," "multinational security," "democratic internationalism," and "strategic independence." Although the differences between these strategies is profound, the commonalities provide some ground for identifying potential strategy components around which a future U.S. strategy might be developed: redefining the U.S. role in world affairs to deal with a perceived need for continuing U.S. engagement; reformulating U.S. military requirements to meet some core U.S. security concerns (e.g., protecting the security of the United States and of its citizens abroad and impeding the spread of weapons of mass destruction); and ensuring a greater linkage between U.S. foreign policy goals and domestic, especially economic, objectives. The Draft concludes with three overarching challenges the Administration will face in building a new national security strategy.

DRR-460-A/AF The Influence of Public Opinion Regarding Casualties on American Military Intervention: Implications for U.S. Regional Deterrence Strategies. B. C. Schwarz. September 1993.

This Draft examines the issue of whether the presumed American phobia about casualties and the presumed American uneasiness toward strategies deemed too brutal constrain U.S. intervention. To examine these concerns, the study used existing public opinion polling data from Harris, Roper, Gallup, the National Opinion Research Center, and selected national newspapers to examine three cases of U.S. involvement—Korea, Vietnam, and the Gulf War. The Draft argues that although public support does erode with growing casualties, growing casualties do not

imply support for withdrawal. In fact, support for escalation increases. The Draft thus argues that the perception that Americans have a phobia against casualties is fundamentally flawed-the United States is impatient with long wars, but it is unlikely to withdraw. The Draft concludes that intra-war resolve is not a problem, that there's a need to strengthen the public's pre-war commitment, that there's a need to convince adversaries that escalation, not withdrawal, will result if deterrence fails, and that multilateral approaches present a problem by constraining U.S. escalation options.

DRR-461-A/SOCOM The United States Special Operations Command Resource Management Process: An Application of the Strategy-to-Tasks Framework. L. K. Lewis, James A. Coggin, C. Robert Roll. Jul 1993.

This Draft discusses how a structured methodology called Strategy-to-Tasks can help the U.S. Special Operations Command (USSOCOM) improve its resource allocation and management process. Analysis of USSOCOM's processes and program requirements suggests that RAND's Strategy-to-Tasks methodology might be able to accomplish the task of linking USSOCOM's programs and resources to national security strategy. Specifically, the methodology meets three critical requirements in USSOCOM's program that do not now exist: (1) a top-to-bottom linkage of Special Operations Forces (SOF) programs; (2) a more disciplined Planning, Programming, and Budgeting System (PPBS) that includes a clearer understanding of the resource issues (the process includes analytical tools and linked data bases); and (3) a structured process that involves the components in the resource debate. The study created a baseline taxonomy that provides a traceable audit trail from national security and military strategies through operational concept to force elements. It also fosters operationally oriented statements to the Chairman, Joint Chiefs of Staff, the Secretary of Defense, and Congress about special operations force capabilities.

DRR-466-A/AF Constraints on Regional Deterrence After the Cold War. J. J. Arquilla. August 1993.

This Draft develops and evaluates a set of policy options that aim at either mitigating or managing the problems posed by various deterrence constraints in the post-Cold War world. The author states that the U.S.'s cumbersome domestic politics, straitened economic condition, and distant geographic position may impede its ability to deter aggressive acts in various regions of the world. The author compares the 19th century Monroe Doctrine of the United States, which adopted one general deterrent commitment toward one region, Latin America, with that of the British Empire, which adopted a regional perspective

that included all the regions of the world. The U.S. policy was successful and was maintained even while many other regions of the world were torn by conflict. The British policy, on the other hand, left the British overextended and made them an unwitting contributor to the fomenting of world war. The Draft concludes by stating that if the United States adopts this limited approach to regional security, then the imperial trap that ensnared Britain can be avoided and the rise of great powers willing to confront the United States can be forestalled.

DRR-502-A Economic Perspectives on Military Housing. E. G. Keating. October 1993.

This Draft discusses housing provided by the military and the private sector from both the military's perspective and from an individual soldier's view. The Draft argues that the existing stock of on-post housing will deteriorate as money becomes scarce and maintenance is deferred. The author discusses two possible scenarios. Under the more optimistic scenario, more and more base housing will be sold to private concerns or demolished. The role of the private sector will enlarge. There will be an increase in soldier homeownership. The government will spend more money on housing allowances, but on net it will save money because of reduction in housing construction, maintenance, and repair. The more pessimistic scenario is that the military will retain its deteriorating housing stock and start mandating that soldiers inhabit them to full capacity. As a result, the military would end up with a population of soldiers who inhabit base housing only reluctantly as part of an effort to use the government's declining housing stock, which may reduce morale and reenlistment rates.

DRR-507-1-A Maturing Weapon Systems for Improved Availability at Lower Costs. J. Dumond, R. Eden, D. W. McIver, H. L. Shulman. November 1993.

This Draft advocates an approach to reducing the reliability and maintainability (R&M) burden associated with advanced weapon systems such as the Apache helicopter and the M1A1 tank. Maturation development seeks improvements in detecting, reporting, isolating, and removing component faults; it also identifies and implements changes to component design that improve R&M. Maturation development is a dedicated period of intense operation, data collection, and analysis immediately upon fielding a weapon system. The purpose is to detect and isolate design deficiencies by intensively operating the components in a fixed configuration within the normal operating environment. Another key element is a well-developed management information system linked to an integrated R&M database to facilitate efficient and effective resolution of the R&M problems associated with high-tech components. Maturation development can be applied both to new systems and to major modifications of

fielded systems. The potential benefits of maturation development are the achievement of full designed system performance and a reduction in lifecycle support costs.

DRR-524-A Afghanistan: Conflict, Refugees and Demographic Change. G. E. Fuller. October 1993.

This Draft examines the implications of civil war and international conflict in Afghanistan from 1979 to 1993, focusing on how the conflict affected the civilian population and on its implications for future intervention operations by the U.S. and other countries or international organizations. The author argues that the kind of conflict that broke out in Afghanistan and the amount of refugees it produced is hardly a unique incident and is likely to be repeated frequently in coming decades. The author also states that while the U.S. military has not so far been involved in the Afghan conflict and refugee problem, there has been intense American government involvement in many aspects of the problem. For example, the U.S. was involved diplomatically with Afghanistan and the entire operation has had a major impact on U.S. relations with Pakistan. In addition, U.S. non-governmental organizations have also played extremely active roles in Afghanistan. The Afghan case is highly instructive for its sequence of events, the character of its refugee dilemma, and the social impact of exile on the large refugee population.

DRR-532-A F/A Poland and the Soviet Successor States, T. Szayna, October 1993.

This Draft examines Poland's strategic position in post-Cold War Europe and its relations with the newly emerged neighbors to its east. Poland has attempted to establish good relations with all its eastern neighbors (despite discriminatory policies faced by the ethnic Poles in Lithuania) while simultaneously pressing for integration into Western economic and security structures. However, despite the accommodating Polish policy, a variety of scenarios leading to tensions and even conflict between Poland and its eastern neighbors are possible. These scenarios center on events beyond Polish control (e.g., Ukrainian or Belarusian disintegration). If Polish membership in a security organization of which Germany is a member fails to materialize, then Poland will be forced to seek security guarantees somewhere else. This may lead to: (1) an alliance of the have-nots (the former communist European states west of Russia), with Poland and Ukraine forming its main axis; or (2) an autarkic and xenophobic Poland. Both options contain the possibility of Poland acquiring nuclear weapons. It is in the U.S. and Western interest to see Polish integration into Western security and economic institutions.

DRR-534-A Resupply in Force-Projection Operations: Evidence from Restore Hope, Desert Shield/

Storm, and Just Cause; an Annotated Briefing. M. L. Robbins. October 1993.

This Draft examines the ability of the current DoD distribution system, and its Army component, to move high-priority items rapidly to the customer. The author uses recent operations in central America, Southwest Asia, and the Horn of Africa as examples of force projection missions in which strategic resupply was critical for theater support. In these operations, the standard distribution system showed limited ability to discriminate among the priorities of needed items, with the lowest priority item sometimes moving just as quickly, or more quickly, as the highest priority item. In each mission, "side channels," either ad hoc, created specifically for that operation, or serving just part of the deployed forces, were far more effective in responding quickly to theater needs. The author concludes that: (1) a future system should retain selected aspects of each of these side channels, emphasizing rapid in-theater monitoring of critical requisitions and direct communication between representatives of the National Inventory Control Point (NICP) in the theater and in CONUS; and (2) the system needs a way of communicating these high priorities between the NICP and the non-Army supply depots and air ports of embarkation.

DRR-543-A Command and Control Factors Related to Effective Company Direct Fire Performance at the National Training Center: Proposed Research Plan. B. W. Hallmark. October 1993.

This Draft presents a briefing that discusses possible problems with company-level direct fire control, terrain and enemy analysis, and command and control planning and preparation and explores how these problems affect combat effectiveness at the National Training Center (NTC). This research is: (1) gathering the critical elements associated with a company's battlefield success; (2) quantifying the frequency of occurrence of each critical element; (3) estimating the relationship between completing the critical elements and successful battlefield execution; and (4) suggesting possible changes to training that could lead to more companies completing critical elements. Based on five NTC rotations, the author observes that: (1) critical aspects of the company operation orders are often not discussed in sufficient detail; (2) the commander's intent and purpose are not completely conveyed; (3) the appropriate actions on contact crucial for battlefield success vary widely among companies; and (4) the degree of quality in direct fire control during execution varies widely among companies.

DRR-546-A Stockage Policy Research and LAM Exercise Support. J. B. Abell. October 1993.

This Draft presents an annotated briefing that proposes a body of research in stockage policy in support of the stockage-related issues of the Army's Louisiana Maneuvers (LAM) and that proposes support to exercises conducted as part of the LAM. This research has three principal thrusts: (1) war reserve stockage policy; (2) war reserve requirements determination; and (3) allocating war reserve assets to units in execution. In addition to these principal research thrusts, RAND will develop concepts for including logistics issues in simulations, exercises, and field tests. The Draft also discusses RAND's research approach.

DRR-547-A ACAC: Anticipating Combat Ammunition Consumption, Senior Analysts' Review. J. Marti, K. M. Beam. October 1993.

This Draft presents ongoing work on the Arroyo Center's ACAC project that is developing a decision support system that provides a high resolution view of high-cost, high-weight munitions consumption based on computer simulation. Conventional techniques of modeling ammunition consumption rely on tables developed over many years and do not account for advances in munitions technology and tactics or non-linear and highly mobile combat operations. In this work, JANUS-A, a high resolution combat simulation, is used to refine ammunition consumption modeling. The Draft describes the Intelligent Operations Associate that automates much of the low-level decisionmaking during JANUS scenario construction. The Draft discusses interfaces with supporting databases, such as the Army's TOE A57, and with high resolution terrain, DMA ITD. The Draft then describes the automated Intelligence Preparation of the Battlefield, route planning, and force laydowns dependent on METT-T, and discusses the experimental design and presents some initial results. Finally, the Draft presents the current VV&A status that includes successful implementations on several platforms using differing systems.

DRR-550-OSD/A Rapid Force Projection Technologies: An Interim Report. K. W. Brendley, R. Steeb, T. G. Covington, S. Eisenhard, G. Halverson, T. Herbert, P. Kantar, K. Littlefield, J. Marti, L. Melody, W. Sollfrey, A. L. Zobrist. October 1993.

This Draft examines the Rapid Force Projection Initiative (RFPI) and breaks it down into six areas of discussion: (1) RAND's Role in RFPI; (2) Experimental Plan; (3) Modeling and Simulation Approach; (4) Scenarios; (5) Experimental Results and Observations; and (6) Future Work. This Draft concentrates on the airliftable portion of U.S. Army forces deployed to areas of potential or actual conflict. The authors had several interim observations. First, baseline force with currently planned Army improvements are unable to fight and survive against

heavy force in open terrain. Second, LCV/FOG-M allows the light force to defeat the heavy force in defense and survive. Third, signature reduction is required for LCV/FOG-M to survive against future threat. Fourth, wide area mine (WAM) is an effective force multiplier and fifth, the performance of standoff line-of-sight (LOS) systems such as kinetic energy missiles (KEM) is greatly enhanced when fighting in combined force with non-line-of-sight (NLOS) systems.

DRR-551-A Integrating JANUS and BDS-D to Support the A2 ATD (Project Update). K. W. Brendley, J. Marti. October 1993.

This Draft presents an annotated briefing that discusses progress on a project integrating the constructive model JANUS and DIS that is being conducted jointly by TRAC-MTRY, the Naval Postgraduate School, and the Arroyo Center. The project supports AMSAA in their Anti-Armor Advanced Technology Demonstration (A2 ATD) effort to develop a DIS methodology for mission area analyses. After discussing some of the differences between JANUS and BDS-D—including mismatches of battlefield scale, terrain resolution and presentation, object resolution, event time, and scenario—the Draft focuses on the Arroyo Center's efforts to modify JANUS, which consist initially of system name correlations, software connections to DIS, and terrain and algorithm modifications. The Draft then discusses the project's next steps, which include developing tools for the automatic building of JANUS 4.0 terrain databases; expanding the DIS interface software and verifying its operation in a repeatable setting; and building test jigs to verify code being incorporated from other models such as GROUNDWARS.

DRR-552-1-A/AF Theater Level Campaign Model and Nonlinear Combat Modeling Toolkit. L. R. Moore, R. J. Hillestad. December 1993.

This Draft discusses the Theater Level Campaign model/Non-linear Combat modeling toolkit (TLC/NLC) and is seeking to remedy deficiencies in current theater-level models in several ways. First, the researchers are continuing to develop a selectable-resolution theater- and operation-level model suitable for the type of issues expected to demand attention into the 21st century. Second, the model is calibrated to models with higher resolution but more limited scope. Third, the researchers are creating a superior environment for analysis relying heavily on graphical user interfaces. The Draft states that TLC/NLC is most applicable to studies at the operational level of warfare where resource availability and allocation, operational doctrine, and the attainment of strategic goals are key elements. In addition, TLC/NLC may be used to screen new capabilities to determine how much a new weapon system contributes to the outcome of a campaign or how much additional capability is required to make a

significant difference. TLC/NLC can also contribute to the understanding of the uncertainties facing decisionmakers.

DRR-553-A Measuring Army Deployment Risk: Methodology and Modeling Approach. K. J. Girardini, B. Nichiporuk, D. Kassing, R. E. Stanton, B. Leverich, B. Lewis. November 1993.

This Draft presents a framework for dealing with the problem of measuring in mission-oriented terms the risk levels of less than doctrinal Army support force (combat support, CS and combat service support, CSS) deployments overseas. Measuring risk in mission terms requires a methodology that links support capabilities and combat accomplishment. Rather than develop another combat model, the researchers developed a methodology that links support to combat planning and execution functions of a new RAND model of air and ground combat. This methodology has two steps: (1) using linear programming methods to develop lift-constrained deployment schedules for Army support forces; and (2) integrating a logistics evaluator to assess the logistics supportability of combat plans in the combat model. The authors state that the completed methodology should (1) help Army planners to better balance CSS forces within deployment constraints; (2) assess the impact of new support doctrine; and (3) justify CSS deployment needs.

DRR-559-A Islam and the West. G. E. Fuller, I. O. Lesser. October 1993.

This Draft examines the controversial issue of the relationship between "Islam and the West" and its implications for both Western and American policy as well as for the Muslim world. The authors take the popularized concept of a broad cultural and political confrontation between the two civilizations and attempt to break it down into its component parts. What are we really talking about when we discuss "Islam and the West?" What are the grievances on each side—historical, psychological, military, political, economic, and social? All these issues are examined and put into a policy context. The authors maintain that only by examining each of these critical sub-issues in its own right will the two regions of the world be able to deal with frictions that normally arise—as between any two regions of the world. The authors do not believe that the next ideological confrontation in the world will be that of "Islam vs. the West," but they caution that both parties will need to objectively treat the real sources of friction on both sides to prevent the idea of "Islam vs. the West" from becoming a self-fulfilling prophesy.

DRR-560-A The Marine Barracks Bombing of 1983: Lessons from the American Participation in Multinational Force 2: A Case Study. J. C. Schmeidel. August 1993.

This Draft examines the deployment of American military forces in Beirut between 1982 and 1984 as part of the First and Second Multinational Forces sent by the United States, France, Italy and Great Britain in an attempt to stabilize the political situation of Lebanon. Following a discussion of the implications for force structure, doctrine, and training, the author presents several strategic lessons to be learned from the multinational forces 2 (MNF 2) intervention, including: Undertaking a peace-making mission in volatile circumstances where the inserted forces are likely to come under attack and not allow retaliation will invite disaster; The concept of "presence" is incompatible with the ethos and training of an offensively oriented military formation such as the Marines; Prompt distribution of intelligence to all not just some consumers, and most especially to the tactical commander, should be top priority; The performance of U.S. forces, particularly the Marines, could profit from more training in military operations on urban terrain (MOUT) and in techniques of peacekeeping patrolling in hostile civilian zones where rules of engagement are restricted.

DRR-562-A The Role of Special Operations Forces in Peace Operations. J. M. Taw. October 1993.

This Draft analyses the role and utility of U.S. special operations forces (SOF)—including the U.S. Army Green Berets, Rangers, and Civil Affairs and Psychological Operations forces; the Naval Special Warfare Groups (SEALs and special boat squadrons); and the 23rd Air Force—in peace operations. The author argues that such forces are ideally suited to meet requirements allowing them to operate in the emerging conflict environment. Although conventional military planners are beginning to recognize the value of SOF in the post-Cold War, their understanding of how to efficiently and effectively employ SOF is still superficial. Also, the author states that for SOF to be most useful in peace operations, peace operations themselves must be better understood than they currently are. For example, the distinction between peacekeeping and peace enforcement must be recognized so that strategy, planning, force structure, and equipment are appropriate to the context. The role of SOF will be different where U.S. military forces are universally welcomed than in situations where there is resistance to a foreign military presence by one or more factions.

DRR-569-A The Liberation of Kuwait City: Urban Operations in Ongoing Conflict. M. E. Morris. November 1993

This Draft focuses on the military and political components of the liberation of Kuwait City from Iraqi forces on February 25, 1991. The urban combat that took place during the Iraqi crisis and war was primarily confined to three instances: (1) the initial capture of Kuwait City by combined Iraqi forces on August 2—3, 1990; (2) actions

in Khafji in late January and early February 1991; and (3) the recapture of Kuwait City on February 24, 1991 by allied forces. Both Khafji and the retaking of Kuwait City called for U.S. planning and reliance on U.S. military doctrine pertaining to Military Operations in Urbanized Terrain (MOUT). The Gulf War presented an opportunity for internationally supported action and laid to rest the question of whether the U.S. could perform militarily. The author states that the United States must retain an appreciation of the consequences of both moral certitude and military action. The author also states that while coalition actions accomplished both stated political objectives and associated military ones, the situation in the Middle East is far from settled.

DRR-570-A Improving Training at School and Work: Lessons from RAND Research on Army Individual Training. J. D. Winkler. December 1993.

This Draft summarizes results and insights from a number of RAND studies that assessed alternative strategies for making Army individual training more efficient and affordable. The Army has proposed a number of measures to reduce costs, which often follow two general approaches: (1) shift training from schoolhouses to job sites; and (2) use training technologies—e.g., training aids, devices, simulators, and simulations (TADSS)—more extensively in school or at soldiers' units and home stations through "distance learning" technologies. With respect to the first approach, research shows that: (1) Army techniques for determining curricula for school and work-based training; and (2) as training is shifted from work to school, costs and savings depend on the capacity for absorbing additional training in the field. With respect to the second approach, research shows that: (1) considerable room exists to increase the use of technology in schools; (2) most savings are obtained by adapting existing resources; and (3) technology should be used to replace, not enhance, hands-on training. These general lessons also seem relevant for civilian education and training, especially in technical fields.

DRR-573-AF/A The Commonwealth of Independent States: The Road Back to Economic Integration. A. S. Becker. November 1993

This Draft examines the Moscow-led effort to reintegrate the economies of most of the Soviet successor states after an initial period of accelerating disintegration. A year after its December 1991 proclamation, the CIS seemed to consist of three groups: (1) the dominant power, Russia; (2) countries that believed they had a viable future outside an integrated CIS—Azerbaijan, Georgia, Turkmenistan, Ukraine—or that were struggling to find their political identity—Moldova; and (3) countries that believed their future was associated with Russia and the CIS—Armenia, Belarus, Kazakhstan, Kyrgyzstan, Tajikistan, and

Uzbekistan. In 1993, only Turkmenistan remained in the second group; the others moved or are clearly moving into the third group. This resulted from the weakness of the non-Russian states and from Russia's power to frame the terms of association with it. This shift must be considered of potentially cardinal importance in international affairs, significantly affecting the power of Russia and its role in the strategic zones of Eastern Europe and the Near and Middle East.

DRR-579-A/AF Eastern Europe Between Russia and Germany. F. S. Larrabee. November 1993.

This Draft addresses Eastern Europe's security concerns in the context of relations with Germany and Russia. The author examines four strategies open to Moscow to deal with Eastern Europe. The first strategy would be a bilateral condominium with the United States through NATO to guarantee the security of Eastern Europe. Second, would be to delay East European integration into NATO as long as possible in the hopes that NATO will collapse or atrophy and push instead for enhancing pan-European cooperation. Third, would be an explicit or implicit deal with the West involving a tradeoff between Russian agreement to East European membership in NATO in return for Russia being given a free hand in the near abroad, including Ukraine. A final option would be a Russian-German condominium in which Russia and Germany share responsibility for Eastern Europe and guarantee its security. The author argues that if NATO fails to address East European security concerns, more directly and systematically, the East European countries could feel compelled to search for alternative security arrangements.

DRR-588-A Weapons Proliferation and Military Integration: An Iranian Threat Assessment (U). J. A. Isaacson, B. G. Chow, P. Propper, B. C. Schwarz. December 1993. SECRET NOFORN WNINTEL NOCONTRACT

(U) This Draft addresses the emerging threats to the U.S. Army resulting from conventional proliferation in the coming decade. In the past, conventional approaches to the proliferation problem have relied on threat assessments consisting primarily of manpower and order of battle tabulations, paying little attention to factors critically important to operations on the modern battlefield. Recognizing that high-technology weapons may require specialized doctrine, tactics, training, and support and that deficiencies in any of these areas may eradicate the potential advantages of fielding leading-edge weaponry, this assessment gives central consideration to the integration issue. Technology's impact on future conflicts is greatly limited by what is available for export. The first half of the Draft discusses important trends in the arms export market and examines which of the available

systems/technologies are most important. The second half examines whether Iran is a potentially threatening importer and whether it is likely to use its imports effectively. The authors conclude with an assessment of the Iranian proliferation threat.

DRR-594-AF/A Ukraine: Between Russia and Independence. E. B. Rumer. January 1994.

This Draft examines Ukraine's transformation since the breakup of the Soviet Union, assesses the prospects for Ukraine's survival as an independent state, and identifies key policy challenges facing the West. Although Ukraine has attained formal independence from Russia, it finds itself caught in a pattern of internal crises. Underlying these crises are: (1) the postponement of internal economic reform; (2) a gridlocked legislative process; (3) the radicalization of the opposition; (4) escalating tensions with Russia; and (5) growing regional and interethnic rivalries. In addition, nuclear weapons remain a key issue. The author argues that the U.S., while reaffirming its commitment to Ukraine's territorial integrity, condemning secessionists' claims, and urging Russia to do the same, should acknowledge the lack of alternatives to Russian intervention in the event of a civil war in Crimea. However, Russian action under the aegis of the international community would be preferable to unilateral action. Considering the possible spillover into neighboring countries, reincorporation into greater Russia might be the only realistic—albeit not attractive—solution.

DRR-606-A Assessing Changes to the Total Army School System. J. D. Winkler, C. Moore, G. A. Moody, M. G. Shanley, J. C. Crowley, J. M. Polich. December 1993.

This Draft presents a framework, methods, and data requirements for evaluating the effects of changes in the organization and management of the Total Army School System, with special attention to the prototype regional school system being established in the southeastern United States. The evaluation analyzes changes in training inputs and outputs across geographic regions and over time, while measuring school system performance in three areas: (1) meeting training requirements; (2) efficiently using resources; and (3) providing quality instruction. A fair evaluation requires a fully implemented program, which will occur throughout fiscal year 1994. Moreover, routine program operations are not likely to be observed before fiscal year 1995 at the earliest. These considerations indicate that baseline data collection can begin in the initial year, but at least two years are needed before a full, outcome-oriented evaluation of the prototype can be performed. Hence, decisions about modifying or expanding the prototype, if they are to rely on outcome-oriented evaluation data, can be made no earlier than fiscal

year 1996, after routine operations are achieved and occur over a complete training year.

DRR-629-A Operation Just Cause: Lessons for Military Operations Other Than War. J. M. Taw. January 1994

This Draft examines U.S. Army roles and functions in military operations other than war (MOOTW) and assesses the range of missions and requirements the Army is likely to face in the future. Operation Just Cause (OJC) was distinguished from subsequent MOOTW in Kuwait, Iraq, Bangladesh, Bosnia, and Somalia, in part because OJC was a unilateral effort that did not involve coalition issues or problems. Nor did the U.S. have to coordinate its efforts with non-government organizations or humanitarian relief organizations. The author argues that OJC nonetheless offers the Army some practical lessons for current and future MOOTW. Among them are: (1) military reliance on electronic intelligence, though reasonable in conventional battlefield warfare, is misguided in MOOTW and must be supplemented by human intelligence; (2) planning for MOOTW must not overlook or underemphasize stability operations (as was the case in OJC); and (3) special operations forces' employment should be maximized by ensuring that conventional planners and commanders understood how best to use them.

DRR-644-A Military Operations Other Than War: Lessons from U.S. Army Operations in Somalia. B. Hoffman, J. M. Taw, M. C. Harrell, P. Steinberg. February 1994.

This Draft analyses U.S. operations in Somalia, paying particular attention to Army roles and functions in providing relief and humanitarian assistance to refugees; involvement, and the implications of intervening in internal conflicts; and peace enforcement and peacekeeping operations in urban settings. Several lessons emerge about force structure, training, command and control, coordination, intelligence, and logistics. Among them are: (1) the need for doctrine and additional training in the use of combined arms in both military operations on urban terrain (MOUT) and military operations other than war (MOOTW); (2) the greater need for special operations, combat support, and combat service support capabilities; (3) the requirement for contingency plans that anticipate shifting political goals and dynamic operational environments; and (4) the need for flexibility and innovation in coalition operations, where other contingents' materiel deficiencies and limitations may limit the U.S. contingents' ability to rely on traditional U.S. methods.

WD-2782-1-A Profile of the Arroyo Center. S. M. Drezner. January 1986.

WORKING DRAFTS

WD-1317-A An Integrated View About Improving Combat Readiness. M. D. Rich, S. M. Drezner. October 1981.

Access requires specific approval of author.

WD-2313-A Thoughts on Army Logistics Assessment-Extended (ALA-X). J. H. Bigelow. July 1984.

WD-2605-4-A Expanded Concept Statement: U.S. Army Space Operations (U). E. M. Cesar, R. E. Darilek, K. Watman. May 1985. SECRET

WD-2616-A Logistics Research at Rand and Exploratory Logistics Efforts in the Arroyo Center. M. B. Berman. April 1985.

Access requires specific approval by author.

WD-2640-1-A/AF Inputs for Joint Air Defense Study (U). P. M. Dadant. January 1986. SECRET NOFORN WNINTEL LIMITED INTEL

WD-2668-A Military Applications for Space: A Bibliography. M. Jas, M. F. Lawrence, R. M. Shanman. September 1985.

WD-2701-AF/A Comparison of F-16 and Patriot Total System Costs for the Joint Army/Air Force Defense Study. A. A. Barbour. July 1985.

WD-2736-A Estimating Maintenance Capability: A Key to Logistics Policy Analysis. J. B. Abell. October 1985.

Access requires specific approval by author.

WD-2741-A Low-Intensity Conflict: An Annotated Bibliography. L. K. Lewis, H. Korbonski, M. Yokota. August 1985.

WD-2801-A Army Exploitation of Space: An Interim Briefing (U). R. E. Darilek, K. P. Horn. October 1985. SECRET WNINTEL LIMITED INTEL

WD-2876-2-A A Beginner's Guide to Programming in RLISP '88. J. Marti. November 1989. 164 pp. Bibliog. Index.

WD-2877-A Survey of Army Logistics Assessment Functions in Support of ALA-X Methodology (U). W. H. Mitchell. January 1986. SECRET LIMITED-CLEAR THROUGH AUTHOR

Access requires specific approval by author.

WD-2959-A A Comparative Analysis of the Causes of the Guatemalan Insurgencies. L. K. Lewis. August 1986.

WD-3002-2-A Applying the NTC Experience: Incidence of Ground-Ground Fratricide. M. Goldsmith. February 1986.

WD-3106-A Unit Performance and Readiness: Research Prospectus. J. M. Polich. July 1986.

WD-3108-A Potential Futures and the U.S. Army: A Conference Report. B. R. Nardulli. July 1986.

WD-3115-A A Guide to Army Quality-of-Life and Family Support Programs. G. Vernez, L. S. Meredith, A. M. Praskac. September 1986.

Access requires specific approval by author.

WD-3117-A Doctrinal Ferment in NATO: ALB and FOFA. B. Wolf, R. L. Perry. July 1986.

WD-3119-A Overview of the U.S. Army Combat Analysis Laboratory. Arroyo Center Staff. August 1986.

WD-3120-A Assessing Potential Roles for the U.S. Army in Latin America: A Guatemalan Case Study. L. K. Lewis. April 1987.

WD-3123-A Designing Flexible Physician Teams for Wartime: Research Plan. S. Hosek, K. N. Lohr, W. H. Bell. August 1986.

WD-3150-A Arroyo Center Project Report: Executive Summary, 1 August 1985-31 July 1986. S. M. Drezner. September 1986.

Access requires specific approval by author.

WD-3152-2-A F/A Enhancing NATO Conventional Defense in Central Europe: Conference Papers. S. M. Holroyd. December 1986.

WD-3160-2-A CPAS Programmers' Manual. C. D. Burdorf, B. L. Gates, J. Marti, J. A. Padget, R. Steeb, B. Florman. July 1987.

WD-3176-A Identifying Relevant Emerging Technologies for the Army of the Future (U). R. E. Darilek, E. M. Cesar, J. A. Dewar, G. Gould, E. D. Harris, J. Hiland, Horn K. P., M. Nelson, K. E. Phillips, J. H. Rosen. J. H. SECRET

WD-3193-A Report on the Army Logistics Assessment--Extended (ALA-X) Project. J. H. Bigelow. October 1986.

WD-3213-A Deriving Lessons from the National Training Center. M. Goldsmith. October 1985.

WD-3222-A Theater Warfare Scenario: Initial Scaling Analysis and Plans for Simulation. R. Steeb. November 1986.

WD-3227-A The French Army and Combined Operations in the Central Region (U). M. A. Lorell. Mark A. SECRET NOFORN INTEL NOT RELEASABLE TO CLEARED IMMIGRANT ALIENS CONTAINS NATO CLASSIFIED INFORMATION

WD-3235-A Minimizing Interprocessor Computation Overhead in Concurrent LISP Systems. C. D. Burdorf, J. Marti. November 1986.

In this Working Draft, the authors describe an investigation of the cost of transferring LISP data structures between multiple processors, and present a method for minimizing computational overhead. The method deals with the two most expensive structures to transfer—symbols and numbers. It reduces computational overhead, but requires additional storage dependent on the number of network connections per machine. Initial tests indicate that conventional local area network technologies have sufficient bandwidth to support a moderate number of message-passing concurrent processors.

WD-3249-A Battlefield Rocket Probe Tradeoff Analysis: A Status Report (U). E. D. Harris, I. S. Blumenthal, E. M. Cesar, J. Hiland, T. F. Kirkwood, L. G. Mundie, K. E. Phillips. February 1987. SECRET

WD-3268-A Deep Operations at CENTAG (U). J. P. Kahan, L. M. Jamison. February 1987. SECRET

(U) This paper, the first in a series aimed at understanding the information needs and priorities of higher-echelon battlefield commanders, examines how the AirLand Battle concept of deep operations is presently implemented at the NATO Central Army Group (CENTAG). It focuses in particular on the decisions made by the commander of CENTAG compared to CENTAG's actions in a number of 1986 Command Post exercises.

WD-3283-A Space Elements of Theatre Missile Defense (U). K. P. Horn. Kenneth P. SECRET INTEL

WD-3307-A Soviet Power Projection. L. T. Caldwell. February 1987.

WD-3322-A Deep Operations and Follow-On Forces Attack. J. P. Kahan. February 1987.

This Working Draft examines how the AirLand Battle (ALB) concept of deep operations and the NATO subconcept of follow-on forces attack (FOFA) relate. It examines the bases of both and concludes that deep operations and FOFA are consistent with each other, given the political and military realities of the Central European theater. The main difference between FOFA and deep operations as set down in ALB doctrine is the scope of the operations. FOFA is restricted to indirect attack, while

ALB sees maneuver and direct engagement of forces as part of the overall operational plan. In that sense, then, FOFA can be viewed as a part of overall ALB doctrine.

WD-3332-A Political Constraints on Military Doctrinal Shifts in the Federal Republic of Germany. J. B. Rohlfing. February 1987.

WD-3340-A F/A Enhancing NATO Conventional Defense in Central Europe: Conference Summary. S. M. Holroyd. August 1987.

WD-3343-A German Army Tactical Doctrine (U). K. Watman. February 1987. CONFIDENTIAL

WD-3345-A Space Systems and Army Missions: An Annotated Briefing (U). K. P. Horn. March 1987. SECRET

WD-3347-A Preliminary Thoughts on Evaluation of Army Space-Related Demonstrations. E. D. Harris, I. S. Blumenthal, C. M. Crain, G. Gould, J. Hiland, L. G. Mundie, K. E. Phillips, J. H. Rosen. March 1987.

WD-3367-1-A Assessing the Risk of Chemical/Biological Warfare to Army Fixed Facilities (U). J. F. Benzoni, K. A. Solomon, D. C. Baker, K. A. Alesch. August 1988. SECRET NOFORN WNINTEL LIMITED INTEL

WD-3409-A Abrams Tank Repair Characteristics from the Army Sample Data Collection System. R. M. Holland, D. W. McIver, A. Bamezai, M. B. Berman. April 1987.

Access requires specific approval by author.

WD-3413-A Applying the NTC Experience--Tactical Reconnaissance. M. Goldsmith, J. S. Hodges. April 1987.

WD-3417-A Space-Related Issues Facing the Army (U). K. P. Horn. May 1987. SECRET LIMITED-CLEAR THROUGH AUTHOR

Access requires specific approval by author.

WD-3424-A Intelligence, Electronic Warfare, and Target Acquisition: Some Promising Technology Areas for Candidate IEW Initiatives (U). E. M. Cesar, T. B. Garber, R. E. Huschke, M. G. Kroger, J. H. Rosen. J. H. SECRET

WD-3442-2-A Arroyo Center Publications and Briefings. R. A. Eden, H. Kofalk. July 1988.

WD-3447-A Warsaw Pact Cohesion and Conventional Deterrence (U). D. B. Kassing, R. Shishko. May 1987. SECRET NOFORN WNINTEL LIMITED INTEL

(U) This Working Draft evaluates the non-Soviet states' contributions to the Warsaw Pact's military capabilities and estimates the effects of various wartime failures in Pact cohesion. Non-Soviet contributions, though differing, are generally significant. Particular attention is given to the Pact's ability to mass ground forces at the inter-German border with less-than-full non-Soviet participation. The effects of failures of Pact cohesion in war also vary, depending on the situation considered. These effects range from problems the Pact should be able to accommodate to major dilemmas of force employment and strategy. The paper also discusses how NATO planning for ground and air forces might be adapted to capitalize on breakdowns within the Pact. The authors then suggest a framework for considering policy options that might give the East Europeans some choice other than supporting the Soviets in crises and war.

WD-3456-A Applying the NTC Experience--Tactical Reconnaissance: Executive Briefing. M. Goldsmith. April 1987.

WD-3469-A RISE: The RAND Integrated Simulation Environment. J. Marti. June 1987.

The RAND Integrated Simulation Environment (RISE) aids simulation programmers with graphics support, database access, rule-driven programming, and object-oriented multiprocessing. This Working Draft presents RISE's design strategy, with particular emphasis on the use of multiple processors to support large-scale simulations. The paper also identifies issues that require further study.

WD-3483-A An Empirical Study of Time Warp Request Mechanisms. B. L. Gates, J. Marti. June 1987.

The Time Warp paradigm promises implementation ease and speed-up for distributed object-oriented simulations. A major Time Warp problem is transferring data between objects in a reliable and timely fashion. This paper examines two methods for synchronizing this transmission: the indirect and priority request mechanisms. With the indirect request mechanism, the requester schedules the requestee to return a value in the future. Proper timing is assured by the Time Warp mechanism. With the priority request mechanism, a request always receives an immediate response, even if the requested value does not yet exist. If the correct value (computed in the future) would change the simulation state, a rollback occurs. This Working Draft discusses the details of the two mechanisms and the results of an empirical study of their performance.

WD-3508-2-A Managing a Successful Analysis. B. F. Goeller, H. J. Miser. April 1988.

WD-3538-1-A Logistics Support of Coalition War: The NATO Case. J. A. Stockfisch. December 1987.

WD-3543-A Doctrinal Interoperability in NATO: The U.S., German, and British Armies (U). K. H. Watman. September 1987. CONFIDENTIAL

WD-3560-A Users' Manual for the Logistics Decision Model: A Theater Campaign Simulation Written for a Personal Computer. J. H. Bigelow. August 1987.

WD-3564-A Army Quality-of-Life Programs: Expenditures and Users. G. Vernez, M. F. Tharrington. April 1988.

Altogether, about 12 percent of the Army budget (in excess of \$12 billion) is spent annually on more than 65 programs that directly or indirectly enhance the quality of life of soldiers and the members of their families. This study examines how resources were allocated between these programs in FY1983 and FY1985. During that period, expenditures for family programs (child development; youth activities; and Army community services) have increased twice as rapidly as Army-wide expenditures, as have expenditures for housing and some morale, welfare, and recreation (MWR) programs including sports, outdoor recreation and arts and crafts. A majority of military personnel who use MWR and family programs use them "a few times a year." A large proportion of military

personnel use civilian and Army-provided services alternatively. Examination of service utilization by Army personnel suggests four general propositions useful for future program planning and resource allocations: (1) use of Army services is from 30 percent to 65 percent higher in Germany and Korea than in the United States; (2) residence off-post "on the economy" decreases use of Army services by up to 20 percent; (3) officers tend to use MWR and family services to a greater extent than enlisted personnel; and (4) enlisted personnel are two times less likely than officers to be assigned a sponsor when on permanent change of station. Enhanced coverage and effectiveness of the sponsorship program might go a long way to ease adjustment difficulties of first-termers and others when moving on a permanent change of station.

WD-3588-A Manpower and Technology Project: Progress Report. B. R. Orvis, R. H. Ruth, M. T. Gahart, H. W. Gustafson, A. Majchrzak. August 1987.

RAND's Arroyo Center undertook the Manpower and Technology project to help the Army meet the objective of the MANPRINT program—to integrate manpower, personnel, training, human factors engineering, system safety, and health hazard issues into the development and acquisition of new systems. To date, project staff have reviewed the acquisition process and experience for recent systems; constructed a preliminary framework of critical MANPRINT variables; and selected systems for continued intensive study. The preliminary organizing framework has four parts: Force Structure and Doctrine; Engineering and Technology; Manpower, Personnel, and Training; and Acquisition Process. Intensive study of four new and four fielded systems identified specific instances of variables and provided insight into significant factors that should be addressed by MANPRINT to avoid problems for new systems. Systems selected for continued study will collectively maximize the information obtained on mission areas, interrelationships among critical variables, and ways to improve the MANPRINT process.

WD-3598-JDMAG Enhancing Depot Maintenance Capacity Assessment: First Steps. R. A. Pyles, R. J. Kaplan, W. L. Stringer, J. P. Stucker. August 1987.

WD-3609-AFMIC Chronology of Chemical-Biological Incidents. K. Gardela, G. M. Petty. September 1987.

This Working Draft presents a representational listing of cases involving the use of chemical-biological agents by either common criminals or terrorists. Each incident, taken from public domain sources, includes a brief textual abstract accompanied by a codeline of variables relating to

the incident (e.g., type of contamination, lethality, etc.). When used on-line, the codelines of this database are used as tools by the researcher to group certain subsets of incidents by variables for the purpose of studying similarities, etc., rather than for statistical purposes. This chronology is being published in hardcopy form in order for the client to get a better idea of the type of monitoring being done by RAND in the realm of chemical-biological data. Access requires specific approval by author.

WD-3614-AFMIC Terrorism and the Judicial Interpretation of the Foreign Intelligence Surveillance Act. M. S. Colen. September 1987.

Access requires specific approval by author.

WD-3616-A Fixed-Site NBC Survivability--A Briefing Given to Army Fixed-Site Commanders in Europe. J. F. Benzoni, D. C. Baker. September 1987.

This Working Draft contains a briefing the authors gave to fixed-site commanders during a data-collection trip to West Germany from March 31 to April 16, 1987. The trip was taken in support of the Arroyo Center project "Fixed-Site NBC Survivability," aimed at enhancing the level of operability of fixed sites in a nuclear, biological or chemical (NBC) environment. The briefing was intended to provide background information on the nature of the project and who is involved, and to outline the type of data that the authors hoped to obtain. The data collected on this trip will be summarized in a separate Working Draft, and ultimately incorporated into a report. The results will be used by the U.S. Army Chemical School to develop a comprehensive plan to mitigate the effects of an NBC attack.

WD-3624-A/ACQ Arms Control, Allied Concerns, and the Conventional TBM Threat. D. S. Rubenson. October 1987.

WD-3645-JDMAG Demand Predictability for Naval Aviation Components: Implications for Spare Parts and Depot Capacity. R. A. Pyles, Z. F. Lansdowne. May 1988.

WD-3651-A/ACQ Computing the Closure Probability for an Airfield Defended with Anti-Tactical Ballistic Missiles. Z. F. Lansdowne. December 1987.

WD-3666-A Warsaw Pact and NATO Ground Force Deployments for a 1993 Central European Conventional War (U). M. G. Weiner, R. A. Wise, J. R.

Bondanella, L. J. Marcelino. October 1987. SECRET NOFORN WNINTEL LIMITED INTEL

WD-3671-A Definition of Inputs to MOSCOW (Method of Screening Concepts of Operational Warfare). P. J. Romero, C. P. Rydell, R. E. Stanton. October 1987.

WD-3676-A Near-Term Options for Active Defense Against Tactical Missiles (U). J. Bonomo, J. G. Boltan, D. Dreyfuss, T. B. Garber. November 1987. SECRET NOFORN INTEL

WD-3680-A Assessing the Vulnerability of Army Fixed Sites in Europe to NBC Attack (U). D. C. Baker, J. F. Benzoni. November 1987. SECRET

WD-3683-A Alternative Airframe Analysis: Final Briefing (U). S. M. Drezner, B. Rostker, E. C. Gritton, M. Callero, G. K. Smith, M. B. Berman. November 1987. SECRET LIMITED--CLEAR THROUGH AUTHOR COMPETITION SENSITIVE

Access to this document requires CSI clearance and specific approval by author.

WD-3690/1-A/OSD Counterforce Responses to Tactical Ballistic Missiles (U). A. Slomovic, K. P. Horn. November 1987. SECRET LIMITED--CLEAR THROUGH AUTHOR

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WD-3691-A/OSD Vulnerability of NATO Airbases to TBM Attacks (U). J. R. Hewitt, C. T. Kelley. November 1987. SECRET NOFORN WNINTEL LIMITED INTEL

WD-3695-A The Two-Year Recruiting Option: Policy Issues. J. M. Polich, J. N. Dertouzos. November 1987.

WD-3699-A A Metaphor for Thinking About Changes in Army Doctrine. J. A. Dewar, M. J. Hammer. November 1987.

WD-3738/1-A Potential Army Responses to Zero-Zero. K. Watman. December 1987.

WD-3739-2-A Tactical Deception at the National Training Center. F. S. Feer. March 1989.

Access requires specific approval by author.

WD-3742-A PC-ROSS User's Reference Manual. B. Leverich, S. Cantey, R. Millar. August 1988.

WD-3756-A Army Alternative Airframes Analysis: Overview Report (U). S. M. Drezner, B. Rostker, E. C. Gritton, G. K. Smith, M. Callero, M. B. Berman. January 1988. SECRET COMPETITION SENSITIVE

WD-3764-A Pilot Workload Reduction and Mission Equipment Package Prioritization for LHX. D. G. Hartley. December 1987.

WD-3769-A Armament for LHX (U). M. B. Schaffer, W. R. Benson. January 1987. SECRET NOFORN WNINTEL LIMITED INTEL

WD-3811-A Terrorists and the Future Use of Unconventional Weapons. J. Simon. February 1988.

Access requires specific approval by author.

WD-3838-A A Roadmap to Deep Operations Air Support at CENTAG. J. P. Kahan. February 1988.

To understand deep operations at the NATO Central Army Group (CENTAG), one must understand sometimes conflicting terminology from the U.S. Army, the U.S. Air Force, and NATO. This Working Draft provides some basic nomenclature for the various offensive air support roles that comprise deep operations at CENTAG and examines how the two deep operations air support roles of air interdiction and battlefield air interdiction are conducted in a joint and combined environment. Access requires specific approval by author.

WD-3871-1-A/AF An Annotated Briefing: Conventional Defense Improvements for NATO's Central Region (U). B. W. Don, Richard. J. Hillestad. August 1988. SECRET LIMITED INTEL

WD-3881-A Dyna-METRIC Version 4.5: An Army Version. K. Isaacson, P. Boren. April 1988.

WD-3929-A Assessing the Risks of Chemical/Biological Warfare to Army Fixed Facilities: Executive Summary. J. F. Benzoni, D. C. Baker, K. A. Alesch, K. A. Solomon. May 1988.

WD-3953-A Current Soviet Strategy in the Third World: Proceedings of a RAND Workshop. S. L. Martin, T. W. Karasik. May 1988.

WD-3955-JDMAG Coupling the Depots to the Combat Forces Through Advanced Assessment and Management Systems. J. B. Abell, I. K. Cohen. June 1988.

Access requires specific approval by author.

WD-3957-A RISE: A Tactical Simulation Environment. B. Florman, J. Marti, R. Steeb. June 1988.

The RAND Integrated Simulation Environment (RISE) supports high resolution tactical simulations. It provides capabilities for close graphic interaction, automated planning activities, object-oriented simulation, and flexible multiprocessing. In this Working Draft, the authors describe the development of the environment over the last several years, give examples of its use in two tactical applications (armor engagements and standoff sensing of ground maneuvers), and discuss performance effects of scaling up to larger and more complex simulations.

WD-3961-A The Future U.S. Role in NATO: A Global Perspective. A. J. Vick, M. L. Robbins, S. L. Martin, J. E. Nation. June 1988.

WD-3976-1-A User's Guide to the Method of Screening Concepts of Warfare (MOSCOW-M1). P. J. Romero, C. P. Rydell, R. E. Stanton. December 1991.

This Working Draft serves as a user's guide for MOSCOW-M1—a Method of Screening Concepts of Operational Warfare; it provides users with implementation and operational details for interacting with the model and defines inputs necessary to operate the MOSCOW model and some brief guidelines for interpreting outputs. The document also presents the

result of an extensive verification of MOSCOW, in which each of the model's 475 input variables were varied in a range from 1/20th to 20 times its base case value. This verification confirmed that 98 percent of the model's variables performed "convergently," meaning small changes in inputs produced small and monotonic changes in output. Three types of nonconvergent behavior were observed: outputs could cycle among several values, outputs could oscillate around a "strange attractor" (i.e., behave chaotically), or the model could produce error messages.

WD-3990-A Repair Policy for the Bradley Fighting Vehicle Turret Distribution Box. W. G. Wild. June 1988.

WD-4011-USDP/A The Conventional Balance in Europe: Myths and Realities. B. R. Nardulli, R. Bitzinger, C. P. Niblack, E. H. Ondaatje, L. L. Rohn. July 1988.

WD-4016-A Coping with Potential Budget Shortfalls: Historical Lessons for Army Planners. K. N. Lewis, J. E. Nation. July 1988.

WD-4025-A The Viability of Expert Systems for Theater Ammunition Distribution Decisionmaking. J. Paul, S. Cantey. January 1989.

WD-4031-A The Army in Latin America: Leverage in a Constrained Environment. L. K. Lewis, M. J. Hammer, J. Eddins. August 1988.

WD-4038-A Enhancing Army Force Flexibility. J. Eddins, P. A. Wilson. July 1988.

WD-4057-A Evaluating Changes to the Wartime Theater Ammunition Distribution System. B. Leverich. August 1988.

WD-4062-A The Operational Value of Intelligence Project Methodology: An Annotated Briefing. P. D. Allen, S. C. Bankes, E. M. Cesar, H. E. Hall, M. G. Kroger, B. A. Wilson. November 1988.

WD-4076-1-A Technical Elements of the RAND Cartographic Analysis and Geographic Information System (CAGIS). A. L. Zobrist, L. J. Marcelino, J. R. Bondanella, J. P. Jennings, B. Bennett. August 1988.

The U.S. Army Arroyo Center project entitled Alternative Army Airframe Analysis (the LHX) study) was conducted in part using a JANUS computer simulation of theater combat. The studies were augmented by subjecting individual flight paths to examination in finer detail using a simulation system called CAGIS (cartographic analysis and geographic information system). This system was designed and built at RAND to integrate and support standard military models, and its features include (1) a geographic information system (65 functions); (2) image, graphics, and tabular data types; (3) image processing for digital terrain data including line of sight from air to ground, ground to air, and point to point; and (4) specialized graphics for entering flight paths in (x,y,z,t) coordinates against a backdrop of terrain information. In the LHX study, individual flight paths were entered using a realistic flight model, DMA level-1 data interpolated to 25-meter cell size, simulated forest and building height, and with pilot selection of height and speed. Collisions with the ground were displayed during entry so that the pilot could back up and refly. For each path, the action of multiple defensive sites was analyzed in a batch run.

WD-4116-A Attack Helicopters in the Modern Battlefield. S. Gordon. December 1990.

Access requires specific approval by author.

WD-4175-A The Operational Value of Intelligence and Electronic Warfare: Intelligence Module. P. D. Allen, E. M. Cesar, H. E. Hall, B. A. Wilson. March 1989.

WD-4176-A The Operational Value of Intelligence and Electronic Warfare: Decision Module. P. D. Allen, E. M. Cesar, H. E. Hall, R. E. Weissler. March 1989.

WD-4177-1-A Measuring the Operational Value of Intelligence: Defining Measures of Effectiveness. P. D. Allen, S. C. Bankes, E. M. Cesar, M. J. Diver. December 1988.

WD-4180-A Army Applications of Interactive Videodisk Technology. J. D. Winkler. January 1989.

WD-4193-A/ACQ European U.S. Force Positioning and Soviet RSTA Capabilities (U). P. B. Rehms. January 1989. SECRET NOFORN WNINTEL LIMITED INTEL

WD-4208-A The Future Role of the U.S. Army in Deterrence of War in Europe. R. E. Darilek, K. Watman. December 1988.

Access requires specific approval by author.

WD-4224-A Wartime Treatment Skills of Army Physicians: Results of Expert Panels for Family Practice, Internal Medicine, Pediatrics, Obstetrics/Gynecology, and General Surgery. M. T. Gahart, S. Hosek, G. A. Goldberg, E. S. Bloomfield, J. M. Hanley, E. H. Starbird. January 1989.

WD-4230-A A Nasty, Untidy Mess: Vietnam and the Problem of Mid-Level Conflict, 1965-1968. B. C. Schwarz. June 1989.

WD-4233-A Army Family Programs and Readiness Study: Descriptive Tabulations of the 1987 Surveys of Soldiers and Spouses. G. Vernez, M. A. Burnam, C. D. Sherbourne, L. S. Meredith. July 1989.

This Working Draft presents tabulations of responses to a 1987 survey of 6,000 Army soldiers and 3,000 spouses stationed in the United States, West Germany, and South Korea. The survey asked questions about (1) soldiers' individual readiness; (2) needs for, use of, and experiences with Army services; (3) work experiences; (4) family and individual functioning; (5) perceptions of civilian alternatives; and (6) activities of spouses at their current location. All measures are presented in standardized tables showing their values for the Army as a whole and for the following subgroups: (1) officers, senior and junior enlisted; (2) soldiers and spouses located in the continental United States, West Germany, and South Korea; (3) soldiers and spouses stationed at combat and support installations; (4) singles, singles with children, married without children, and married with children; and (5) male and female soldiers and spouses. Interpretation and analyses of these data, with implications for Army policy, will be included in a forthcoming RAND report.

WD-4268-A Deception at the Operational Level. F. S. Feer. February 1989.

Access requires specific approval by author.

WD-4269-A Preliminary Theater-Level Assessment of U.S. Army Competitive Strategy Force Packages (U). W. L. Stanley, M. J. Carrillo, L. R. Moore, B. Rostker. March 1989. SECRET

This quick-response analysis examines the implications of alternative competitive strategy programs for NATO's ability to conduct an effective forward defense against Warsaw Pact forces in a conventional conflict in Central Europe in the 1990s. The theater effectiveness of alternative close battle modernization force packages are evaluated as well as the potential contribution of and need for deep fires anti-armor missiles under various assumptions about NATO's close battle capabilities. Results suggest that the U.S. Army's close battle modernization plan embodied in the current Five-Year Defense Plan could substantially improve NATO's Central Region defenses in the mid-1990s, if commensurate force improvements are made by our NATO allies. These improvements, coupled with an investment in deep fires anti-armor missiles, could provide NATO with a FLOT- (forward line of own troops) stabilizing capability.

WD-4270-A Operations-Based Deception: A Concept Paper. F. S. Feer. February 1989.

Access requires specific approval by author.

WD-4272-A Toward a Theory of Deception. F. S. Feer. February 1989.

Access requires specific approval by author.

WD-4291-A Projecting Trends in Public Opinion and Their Impact on Foreign Policymaking. M. L. Robbins, S. L. Martin. November 1989.

WD-4313-A MANPRINT: Integrating Manpower and Personnel Issues in Acquisition. B. R. Orvis, R. H. Ruth, H. W. Gustafson, L. A. Haigazian, G. M. Hewitt, E. Hinson, A. Majchrzak. March 1989.

WD-4316-2-A Apogee, Perigee, and Recovery: Chronology of Army Exploitation of Space. E. Mitchell. April 1990.

WD-4319-A 2 + 2 + 4 Recruiting Program: Test Design. J. M. Polich, R. J. Buddin. March 1989.

WD-4347-A Attack Direction Centers for Integrated Weapons Employment (U). L. M. Jamison. April 1989. SECRET
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WD-4348-A/OSD Military Role of Soviet RSTA. D. S. Rubenson, E. M. Cesar, T. B. Garber, P. B. Rehms. April 1989.

WD-4367-A/DARPA TGSM Technology and Countermeasure Issues (U). M. B. Schaffer. June 1989. SECRET NOFORN WNINTEL LIMITED INTEL

WD-4376-1-A Deceptive Operations: Making Deception Integral to Operations Doctrine and Planning. J. Arbeeny, W. J. Whelan. November 1991.

This Working Draft describes the operations flexibility approach and the operations-based deception concept that were designed to make deception integral to operations. The study argues that one way to make deception integral to operations is to deliberately use the deceptive potential inherent in operations flexibility—an approach that begins with the planning of multiple, credible, distinguishable alternatives to achieve a common objective. Integrating the concept requires altering the current decisionmaking process by combining three sequenced component estimates for intelligence, operations, and deception into a single estimate process that ensures that explanations and predictions about enemy and friendly forces and their interaction are based on information produced by preceding analyses. The study recommends that the concept be employed during planning exercises and be revised accordingly; it further recommends that the concept be introduced into the curricula of the Army's senior staff colleges and that the ability to conceptualize and plan deceptive operations should become a standard evaluation item during field training and command post exercises.

WD-4387-A Organizational Analysis and Resource Management Planning: A Final Report. L. K. Lewis, C. R. Roll, J. Eddins, B. Rostker, R. E. Sortor. December 1989.

WD-4435-A Sources of Change in Army Doctrine in the Next 30 Years. J. A. Dewar, M. H. Levin. June 1989.

WD-4436-A Conceptual Framework for Future Warfighting. S. Gordon. August 1990.

Access requires specific approval by author.

WD-4444-A/DARPA The Impact of FOIA on Soviet Military Thought. E. B. Rumer. June 1989.

WD-4447-A Assessment of Soldier Performance: Interim Results for Patriot Air Defense System Operators. B. R. Orvis, M. T. Childress, J. M. Polich. June 1989.

WD-4448-A Soldier Quality and Communications Operator Proficiency. J. D. Winkler, J. C. Fernandez, J. M. Polich. June 1989.

WD-4459-A/DARPA Passive Technical Countermeasures to Deep Fires (U). M. M. Balaban. June 1989. SECRET NOFORN WNINTEL LIMITED INTEL

(U) This Working Draft assesses Soviet masking-type technological countermeasures, such as decoys and the suppression of target observables, that could be applied against U.S. reconnaissance, surveillance, target acquisition, and so-called "smart" weapon systems to defeat or compromise effective implementation of the U.S. Deep Fires doctrine.

WD-4469-A Three Half Wars: A New Strategic Planning Framework for the 1990s. K. N. Lewis. June 1989.

WD-4476-A A Preliminary Look at Converting Soon-to-Be-Closed Military Bases into Prisons. S. A. Resetar. July 1989.

WD-4519-A Concepts to Determine Effective Support Structures for the Integrated Family of Test Equipment (IFTE). W. G. Wild. August 1989.

WD-4521-A/AF French Military Modernization Goals, Resources, and Conventional Arms Control. J. E. Nation. April 1990.

WD-4526-A/DARPA Soviet Counters to U.S. Deep Fires: Interim Briefing. K. A. Solomon. August 1989.

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WD-4534-A/DARPA Active Countermeasures to Deep Fires (U). M. M. Balaban. September 1989. SECRET NOFORN WNINTEL LIMITED INTEL

(U) This Working Draft presents a qualitative assessment of active countermeasures the Soviets might employ to defeat effective U.S. implementation of its Deep Battle doctrine.

WD-4589-A Observations of Wheeled Scout Platoons at the NTC. M. Goldsmith. October 1989.

Access requires specific approval by author.

WD-4593-A The United Kingdom's Land Force Structure: Prospects for the Future. M. T. Childress. January 1990.

WD-4596-A A Concept for Testing an SRA-Based Support Structure for the AH-64 Mission Equipment Package. M. L. Robbins, M. B. Berman, D. W. McIver. October 1989.

WD-4597-A ASAT Studies in Support of the JPO: Early Intercept, ASCOT (U). J. H. Rosen, L. G. Mundie, B. G. Chow, R. H. Frick, G. Gould, E. D. Harris, J. Hiland. October 1989. SECRET INTEL

WD-4604-A CFE and Force Reintroduction. J. C. Wendt. October 1989.

WD-4613-A A Methodology for Assessing RISTA System Performance (U). D. Gonzales, J. R. Clark, R. O. Hundley, C. L. Shipbaugh, G. I. Taylor, M. E. Chenoweth. February 1990. SECRET NOFORN LIMITED--CLEAR THROUGH AUTHOR

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WD-4614-A Overview of IEW Systems and RISTA Architecture Design. J. R. Clark, E. M. Cesar, D. B. Novikoff, G. I. Taylor, E. Wojtaszek. April 1990.

WD-4617-A Methodology for Estimating the Combat Effectiveness of Advanced Munitions (U). D. Orletsky, G. Gould, K. P. Horn, H. Ory, G. I. Taylor. November 1990. SECRET NOFORN WNINTEL LIMITED INTEL

(U) This Working Draft illustrates a methodology for estimating the combat effectiveness of a weapon system using the basic technical and operational characteristics of the systems as input parameters. Specifically, the author outlines an example analysis performed to determine the net combat effectiveness of the non-line-of-sight missile system for use against ground vehicles in the mid-1990s European scenario. This work will be of interest to those who evaluate the effectiveness of various advanced technology weapons.

WD-4618-A Advanced Munitions Investment Methodology. J. F. Benzoni, R. E. Stanton, G. Gould, J. Hiland, K. P. Horn, D. Orletsky, H. Ory, M. B. Schaffer, G. I. Taylor. July 1990.

WD-4727-A Conflict Scenarios and Army Intervention in the Year 2000. H. De Santis. December 1989.

WD-4733-A Enhancing the Readiness of Army Soldiers. M. A. Burnam, L. S. Meredith, C. D. Sherbourne, R. B. Valdez, G. Vemez. February 1991.

WD-4739-A Increasing Combat Capability Through Enhancing the Responsiveness of Wartime Ammunition Logistics: Measurement Methodology, Case Studies, and Policy Implications. B. Leverich. October 1990.

WD-4743-A Wartime Diseases and Medical Conditions: Results of an Expert Panel on the Treatment Skills of Army Physicians. S. Hosek, M. T. Gahart, G. A. Goldberg. February 1990.

WD-4747-A A Compendium of Advanced Munitions for Army Missions (U). J. Hiland, M. B. Schaffer. June 1990. CONFIDENTIAL

WD-4760-A Supporting Electronic Subsystems for the Army of the Future. M. L. Robbins, M. B. Berman, D. W. McIver. January 1990.

This briefing describes the problem facing the Army in supporting high-tech weaponry, presents evidence from a study at the Army Aviation Center at Ft. Rucker relevant to new concepts of supporting these systems, and describes

the major elements of a new, more responsive form of support to be pursued in a field test of a special-repair-activity-based support structure for the Apache mission equipment package. Access requires specific approval by author.

WD-4774-A Force Generation Under a CFE Agreement. J. C. Wendt. January 1990.

Access requires specific approval by author.

WD-4785-A American Military Retrenchment: Symbolic and Psychological Effects on Global Stability. H. De Santis. January 1990.

WD-4788-A U.S. Army Advanced Munitions: High-Payoff Targets (U). G. I. Taylor, D. Orletsky, R. E. Stanton. June 1991. SECRET NOFORN WNINTEL INTEL LIMITED--CLEAR THROUGH AUTHOR

Access requires specific approval by author.

WD-4804-A A Proposed Test Plan for the VISION Assessment System Demonstration Prototype. C. L. Tsai. February 1990.

WD-4820-A A Proposed Test Plan for the VISION Execution System Operational Prototype. C. L. Tsai, J. Payne, P. Boren, J. B. Abell. February 1990.

Access requires specific approval by author.

WD-4841-A Measuring the Operational Value of Intelligence and Electronic Warfare: Project Update. E. M. Cesar, S. C. Bankes, J. R. Clark, J. R. Bondanella, H. E. Hall, R. D. Howe, J. P. Marquis, L. S. Verma, R. E. Weissler. March 1990.

This Working Draft provides a status update and a general description, in annotated briefing form, of the RAND Arroyo Center project, Measuring the Operational Value of Intelligence and Electronic Warfare (OPVIEW). The project's objectives and goals are presented, along with arguments that relate the project's research products to important, unmet U.S. Army policy analysis needs. To formulate intelligence and electronic warfare (IEW) policy rationally, the Army needs a capability to assess or measure the value of IEW in quantifiable combat outcome terms. This capability, embodied in the OPVIEW methodology and modeling environment under development at RAND, will help the Army select system configurations and mixes, assess system operational utility, conduct technical tradeoff analyses, and make programmatic decisions. This WD describes the OPVIEW study approach and methodological framework, and their

foundations in top-down, variable resolution modeling for sensitivity analysis. The methodology is illustrated through an example of combat at a corps command level, and the impact of different IEW system mixes and employment strategies on combat outcomes. OPVIEW status and milestones are also discussed; the project is currently about six months from completion of the first phase of model development. Access requires specific approval by author.

WD-4854-1-A Issues for an Empirical Evaluation of the Army's Apprentice Aviation Mechanic Initiative. W. G. Wild, B. R. Orvis. March 1990.

WD-4866-A Army's Role in Space in the New Geo-Strategic Environment. E. Bedrosian, D. Castleman, S. M. S. Everingham, E. D. Harris, J. J. Milanese. June 1990.

WD-4877-A A Proposed Plan for the Readiness-Based Maintenance System (RBMS) Operational Prototype in the SRA-Based Support Structure Test. P. Boren, J. Payne, M. L. Robbins, C. L. Tsai. April 1990.

Access requires specific approval by author.

WD-4890-A The Political Dynamics of Perestroika. J. R. Azrael. April 1990.

WD-4903-A Assessment of Army Options for Force Modernization (U). W. M. Hix, N. T. Omeara, A. Durso. June 1990. SECRET

WD-4920-A UAV Employment in the Close AirLand Battle. S. Gordon. August 1990.

Access requires specific approval by author.

WD-4956-A Mid-Level Contingencies: A Revised Basis for Army Posture Planning. K. N. Lewis. June 1990.

WD-4965-A Description of Current RISTA Systems (U). C. L. Shipbaugh, D. Gonzales, M. E. Chenoweth. December 1991. SECRET NOFORN

WD-4967-A Arms Control Regimes and Ballistic Missile Defense: Project Review. M. D. Miller,

H. L. Weisberg, H. De Santis, S. M. S. Everingham, W. R. Harris, H. G. Hoover, B. Wolf. June 1990.

WD-4996-A Controlling Soviet Force Generation Advantages in Future European Security Environments. J. C. Wendt. August 1990.

WD-4998-OSD/A/AF Proposed Table of Organization and Equipment (TO&E) for a Battalion Equipped with the Non-Line-of-Sight Fiber Optic Guided Missile System (NLOS-FOGM). S. J. Kirin, M. J. Lavine. November 1990.

WD-5002-A Operability of Fixed Sites Under NBC Attack (U). K. A. Solomon, J. F. Benzoni, M. M. Balaban, M. L. Juncosa. July 1990. SECRET NOFORN WNINTEL LIMITED INTEL

WD-5006-A Potential Impacts of the Soviet Army Reorganization on Deep Target Sets (U). E. A. McDonald, J. R. Bondanella. August 1990. SECRET NOFORN WNINTEL LIMITED INTEL

WD-5020-1-DR&E/A/AF Joint Close Support Project Report (U). B. W. Don, M. Callero, F. L. Frostic. August 1990. SECRET LIMITED--CLEAR THROUGH AUTHOR

Access requires specific approval by author.

WD-5063-A A New Operational Doctrine for the Field Artillery. S. Gordon. December 1990.

Access requires specific approval by author.

WD-5066-AF/A Bogie Dope: The Military's Entry into Air Interdiction of Southern Drug Traffic. J. L. Ahart, G. J. Stiles. September 1990.

WD-5085-A Military Implications of German Unification. T. J. Hirschfeld. August 1990.

WD-5111-1-A Ideas for Enhancing the Combat Support System for Regional Contingencies: Derived from the Operation Just Cause Experience. I. K. Cohen,

D. B. Kassing, D. W. McIver, M. L. Robbins, H. L. Shulman, R. Tripp, C. L. Tsai. January 1991.

WD-5112-1-A A Proposal for a Heavy Battalion Reconnaissance/Security Company: Annotated Briefing. M. Goldsmith. September 1990.

WD-5125-A Force Implications of European Conflict Scenarios. J. R. Azrael, H. De Santis, T. J. Hirschfeld. October 1990.

WD-5143-A The Battle Command Training Program for U.S. National Guard Divisions. M. J. Lavine, J. P. Kahan, S. M. Holroyd. February 1991.

WD-5153-2-A Initial ODS Deployments: Description and Analysis (U). D. B. Kassing, M. Hura, K. J. Girardini, J. R. Lund, M. L. Robbins. June 1991. SECRET LIMITED--CLEAR THROUGH AUTHOR

Access requires specific approval by author.

WD-5159-A Reserve Forces in Operation Desert Shield: Implications for Future Contingencies (U). R. E. Sortor, T. F. Lippiatt, J. M. Polich. October 1990. SECRET LIMITED--CLEAR THROUGH AUTHOR

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WD-5180-1-A/OSD The Quantitative Analysis of Gangsters and Guerillas. P. J. Romero, C. P. Rydell. June 1991.

WD-5181-A ALICE: Arroyo Lifecycle Cost Estimator. G. C. Sumner. November 1990.

WD-5191-A Dyna-METRIC Version 4.7: Extending Capabilities to the Army Case. P. Boren, K. Isaacson. November 1990.

WD-5205-A The 2 + 2 + 4 Recruiting Experiment: Preliminary Enlistment Results. R. J. Buddin. November 1990.

WD-5225-A Tailoring the Battle Command Training Program to Corps Training. D. R. Worley, J. P. Kahan. January 1991.

WD-5231-A/NAVY An Adaptive Approach to Material Support: Work in Progress. J. S. Hodges, J. Payne. December 1990.

WD-5232-A Munition Acquisition Decision Support System Programmer's Manual. K. J. Girardini, M. E. Chenoweth. January 1991.

WD-5234-A Anticipating Combat Ammunition Consumption: In-Progress Review. J. Marti, N. E. Catsimpoalas, J. R. Kipps. December 1990.

WD-5243-A The USSR Supreme Soviet and Soviet Defense and Foreign Policy Decisionmaking. J. Vanoudenaren. January 1991.

WD-5253-A The Impact of Post-CFE Soviet Army on Deep Target Sets (U). E. A. McDonald, W. D. O'Malley, J. R. Bondanella. June 1991. SECRET NOFORN WNINTEL LIMITED INTEL

WD-5254-A/AF Soviet Conventional Forces in a Post-CFE Setting (U). E. A. McDonald, W. D. O'Malley. January 1991. SECRET NOFORN WNINTEL LIMITED INTEL

WD-5269-A/FMP/RA/PA&E The Transition-to-War Linear Program. J. H. Bigelow. January 1991.

WD-5279-A Convenient Equations for Munition Effectiveness Models. H. Ory. January 1991.

WD-5286-A A Conceptual Framework for Weapon System Management. J. Dumond, J. R. Folkesson, L. A. Galway, L. W. Miller, D. Powell, R. Tripp. February 1991.

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WD-5292-1-A A Selected Bibliography of Arroyo Center Documents. Arroyo Center Staff. Jan 1992.

WD-5304-A/NAVY Observations and Suggestions in Support of NIMMS Inventory Model Revisions: An Annotated Briefing. J. S. Hodges, L. A. Galway. February 1991.

WD-5310-1-A Medical Issues in Operation Desert Shield: Implications for Contingencies and for the Army of the Future. H. A. Coley. June 1991.

WD-5333-A Scripting Highly Autonomous Simulation Behavior Using Case-Based Reasoning. N. E. Catsimpoalas, J. Marti. February 1991.

This Working Draft describes additions to the object-oriented RISE (RAND Integrated Simulation Environment) system to allow high-level simulation of autonomous units. The authors are attempting to use case-based reasoning as a basis for simulating intelligent behavior of military units. They present details of the mechanism and argue that the key to its success is the proper balance of high-level planning code and efficient primitive behaviors.

WD-5372-A/AF Elements of a U.S. Security Strategy for the Persian Gulf. M. Agmon. April 1991.

WD-5408-A Analysis of Alternative Deployment Improvements (U). D. B. Kassing, M. Hura, J. P. Stucker, R. W. Robinson. June 1991.

Access requires specific approval by author.

WD-5426-A British Naval Efforts to Suppress the Transatlantic Slave Trade : An Interdiction Case Study. B. Wolf. June 1991.

WD-5434-2-A Verification and Validation Issues as Applied to the OPVIEW Project. E. V. Larson. August 1991.

This Working Draft describes the reasoning that led to defining a proposed framework for verification and validation (V&V) of the Operational Value of Intelligence, Electronic Warfare, and Target Acquisition (OPVIEW) model and examines the broader applicability of the framework for Army modeling activities. Following the

establishment of some common definitions for V&V terms, the study finds that models like OPVIEW that are developed for analytic purposes should be held to a V&V standard that is more closely tied to the analyses the model will actually support. In terms of the broader applicability to the Army, the study finds that beyond the mandates implicit in its regulations for modeling, the Army has three additional tools for making analytic purpose a more central consideration in modeling: capacity building, inducements, and system-changing policy instruments. While each makes a contribution, it appears that a decentralized framework emphasizing internal and external peer review would best ensure proper use of models.

WD-5435-A Soldier Quality and Job Performance in Team Tasks. J. C. Fernandez. June 1991.

High-quality enlistees cost more to recruit but are often assumed to make better soldiers. Statistical analysis of the relation between recruit quality and team performance, based on an objective, hands-on performance test given to Army radio operators, reveals that among newly-trained soldiers there is indeed a statistically significant relation between results on the Armed Forces Qualification Test and team performance. For more experienced soldiers the test yielded less clear results.

WD-5451-AF/A Turkey's Future Geo-Political Orientation: A Preliminary Assessment. J. F. Brown, G. E. Fuller, I. O. Lesser. July 1991.

WD-5460-A Sustainability Organization and Operations in Desert Shield (U). J. M. Halliday, L. Horgan, M. L. Robbins, D. Powell, J. M. Sollinger, W. G. Wild. June 1991. SECRET

WD-5464-A DCSPER Automation Project: Analysis of Survey Results and Recommendations. H. J. Shukiar, L. O. Gates, R. J. Kaplan. June 1991.

WD-5466-A Saudi Arabian Host Nation Support for Operation Desert Shield. R. J. Kaplan. August 1991.

WD-5474-OSD/A/AF RMMS: The RAND Metadata Management System. S. Cammarata, I. Kameny, J. A. Lender, C. R. Replogle. July 1991.

WD-5530-A Readiness Status of Reserve Component Support Units in Operation Desert Shield (U).

T. Lippiatt, R. E. Sortor, P. K. Dey. September 1991. SECRET

WD-5532-A New Army Noncombat Initiatives. E. H. Ondaatje. May 1992.

This Working Draft identifies categories of ideas for noncombat missions and discusses their initial evaluation. After generating a list of possible noncombat initiatives, the study identified the most promising categories of ideas for further research: education and community service, nation assistance, and disaster management. In education and community service, fruitful ideas include the transition of Army personnel into teaching, the establishment of a partnership for vocational training, the development of an Army-wide program for youth training, education, and service, the compilation of a volunteer service data bank, and the provision of emergency medical services to underserved populations. In nation assistance, ideas include expanding the Army's overseas training efforts to include host-country professionals and expanding its current nation assistance activities to the former Soviet Union and Eastern Europe. In disaster management, ideas include increasing the Army's efforts in international disaster relief and conducting disaster response exercises with other governments and militaries.

WD-5536-DR&E/A/AF Army Organic Close Support Systems Analysis: Attack Helicopters and Advanced Artillery (U). M. Callero, C. T. Veit. March 1992. SECRET

WD-5555/2-A A Conceptual Framework for Weapon System Sustainment Management : Vol. II, a Preliminary Action Plan. P. Boren, M. E. Chenoweth, J. Dumond, J. R. Folkson, L. A. Galway, L. W. Miller, D. Powell, M. L. Robbins, R. Tripp. August 1991.

WD-5560-1-AF/A Post-CFE Soviet General Staff Force Structure Planning: Implications for Future Republican or Commonwealth Ground Forces. E. A. McDonald, W. D. O'Malley. February 1992.

This Working Draft outlines the force structure trends that have developed in the Soviet ground forces through July 1991; specifically, it examines how the Soviet General Staff has tried to adapt to the changing environment and the anticipated arms control constraints in ways that would maximize its conventional force capability and optimize its future planning options. The study finds that in the short term (a period full of turmoil and uncertainty), the General Staff is likely to postpone any further major force

restructuring until 1994 or later. In the longer term, General Staff representatives indicated in late 1991 that they were considering a planning option that would radically alter the basic form of their ground forces from one based on armies, divisions, and regiments to a more operationally flexible force structure based on armies, corps, and brigades. However, it is still too early to know what effect the creation of individual post-Soviet republican armies would have on these developments.

WD-5566-A Readiness Challenges in Army Support Units. R. E. Sortor, D. W. Grissmer. November 1991.

This Working Draft examines intermediate level maintenance units in the Reserve and Active Components to assess the problems affecting their ability to maintain readiness. It also considers current and proposed initiatives aimed at improving readiness. Three general problems afflict these units: recruiting and retention, individual and unit training, and turnover. The first affects only the reserve units, and the second two apply to both active and reserve units, although reserve units feel the effects somewhat more profoundly. Numerous initiatives to improve training are either underway or are being proposed. However, evaluation of these initiatives will require more systematic analysis. An initiative may correct one problem, while another, such as lack of equipment, may preclude any overall improvement. Finally, there does not seem to be a universal set of problems and solutions. Even active units may experience difficulties based on location. These differences may suggest a need for local flexibility in dealing with unique circumstances. Conversely, centrally determined and nationally imposed solutions may not yield anticipated results.

WD-5585-A Expanding the Army's Role in Disaster Management: Some Preliminary Thoughts. K. A. Solomon. December 1991.

This Working Draft examines whether the Army should expand its current role in civilian disaster management and, if so, what that expanded role might include. To meet these objectives, the study formulated five specific and exemplary noncombat missions and evaluated them using criteria to measure the suitability and potential value of the Army's role. Based on the preliminary set of criteria and the five exemplary missions, the study finds that the Army should expand its role in civilian disaster management. Of the five selected missions, the most promising for further and more careful study are the missions for training and networking police and other emergency workers for disaster preparedness; training civilians for disaster response in real time and for large-scale disasters; and managing the cleanup of hazardous waste storage facilities in Hanford,

Washington, as well as applying its skills at mitigating disasters before they happen.

WD-5586-A Germany: Europeanism Versus Atlanticism. R. D. Asmus. December 1991.

This Working Draft assesses the growing convergence and divergence in French and German views on core issues on the European integration agenda, where Franco-German consensus or understanding is an important precondition for substantial progress toward European integration. The study concludes that despite the flurry of official statements in which Bonn and Paris have laid out a broad and ambitious agenda for accelerated political, economic, and security policy, Franco-German relations have been largely stagnant since unification. The two countries still lack consensus on several key issues about the priorities and scope of European integration (broadening versus deepening of the European Community, economic and monetary union, and political union). While working out the differences, neither France or Germany is willing to take steps that will undercut the process of European integration. Therefore, to be effective, the United States should avoid policies that appear to openly oppose European integration.

WD-5595-A Analysis of Navy-Proposed Sealift Options. D. B. Kassing, M. Hura. August 1991.

WD-5612-A A Concept for Integrating Logistics Command and Control with Operational Demands: The VISION Operational Interface (VOICE). P. Boren, D. Powell, M. L. Robbins, R. Tripp. October 1991.

To assist the Army in meeting the challenges of the world's rapidly changing geo-political situation, RAND developed a three-part concept for an integrated logistics information system called VISION to control the allocation and distribution of spare parts. It consists of an assessment system to help in planning, an execution system to determine what needs to be done to meet requirements, and a command and control system to link the commander to the logisticians. This document presents an initial concept for the command and control portion, which is called the Vision Operation Interface or VOICE. This system works in conjunction with the other two parts of VISION, and it performs four functions. It gathers data required by the other systems, translates operational information into logistically usable formats, integrates operational and logistical data, and exchanges the information with the other VISION modules. VOICE allows the logistician to interact with the operators, both to advise on the feasibility of an operation and then to support it once a course of action has been selected.

WD-5623-A A Quantitative Treatment of Multilevel Specificity and Certainty in Variable Precision Reasoning. W. L. Perry. Sep 1992.

One of the things that makes battlefield situation assessment difficult is that a decisionmaker's reasoning process varies with the quality of the evidence he receives, which is usually incomplete and often ambiguous when dealing with the true nature of the environment. This Working Draft proposes that if this evidence can be represented as a probability mass function defined on the discrete set of hypotheses about the environment, then its quality depends on its ability to suggest clear choices among the hypotheses. This ability is determined by using an indistinguishability measure that focuses on how similar the hypotheses are to each other and on the closeness of their probability support levels. The two aspects of variable precision reasoning-specificity and certainty-are addressed by transforming the basic probability mass function on the set of hypotheses into a belief function. The belief function core set consists of aggregate disjunctive sets of hypotheses that reflect how much specificity is present in the evidence. The set of basic probability assessments on the core establishes how much certainty is associated with the derived level of specificity.

WD-5624-A Belief Function Divergence as a Classifier. W. L. Perry. Sept. 1992.

This Working Draft outlines a new classification process in support of battlefield situation assessment. Classification in this context refers to the process of assigning perceived observations of the environment to inference classes with the objective of providing guidance for command decisions and actions. The Working Draft presents a technique for classifying observations that can be expressed as aggregates of disparate belief functions. The belief functions reflect the level of precision consistent with the current operational status of the sensor suite and the occlusions present in the environment. The classification process consists of applying a divergence measure to the evidential aggregate of belief functions and a set of prototype aggregate belief functions in the knowledge base. The process allows analysts to measure the distance between the belief function in the evidential aggregate, the prototype belief functions in terms of their relative belief, and the similarity between their focal elements. In this way, the process considers both aspects of precision-specificity and certainty.

WD-5629-A Future Army Active-Reserve Mix: Drawing Inferences from Operation Desert Shield--A Briefing (U). R. E. Sortor, J. M. Polich, T. F. Lippiatt. September 1991. SECRET

WD-5652-A Supporting Army Families: Priorities for the Future. R. B. Valdez, P. A. Morrison, L. Meredith, G. Zellman. Jul 1992.

As the Army bases more of its units in the United States and reduces the numbers of moves its soldiers make, it may want to re-evaluate the methods by which it provides family services. This Working Draft aims at helping Army decisionmakers sort among choices about reducing family services, obtaining them from civilian sources or moving in new directions. The emphasis on rapid deployment suggests a need for both ordinary services that can expand rapidly (e.g., child care) and extraordinary services (e.g., counseling). Rather than depend on the traditional method of dedicated services, the Army could consider alternative models such as cafeteria benefit plans, which allow participants to choose from a menu of services according to need or beneficiary-based financing plans in which participants in an activity bear its costs. Civilian-provided services such as child care might suit the Army's needs better in terms of access and expandability. The Army might also want to explore mechanisms that allow soldier access to services available through a civilian-employed spouse.

WD-5660-A Controlling Operations and Support Costs in the Future Army Truck Fleet: Areas for Analysis and Discussion. W. G. Wild, J. M. Halliday, D. M. Oaks. December 1991.

This Working Draft investigates controlling the operations and support (O&S) costs of the Army's tactical wheeled vehicle (TWV) fleet. It focuses on two areas: O&S cost estimates and possible policy options. With respect to O&S costs, we found estimates of O&S differ widely, perhaps by as much as \$2 billion. Some vehicles are considerably more expensive to operate than others, especially 2.5 and 5-ton trucks. Further, unscheduled maintenance accounts for about 70 percent of all O&S costs. We identified three areas in which policy options could reduce O&S costs: the size of the fleet, its peacetime usage, and the nature of its support. The Army could save considerable O&S costs by reducing the size of the TWV fleet. Further, because O&S costs relate directly to the miles driven, reducing peacetime mileage by such methods as finding alternative transportation or using low-cost tactical vehicles could also promote significant savings. Support of the TWV fleet accounts for a large part of its costs, and alternative systems, perhaps more along the lines of commercial operations, should be rigorously explored.

WD-5669-A Future Light Combat Vehicles: Winning and Surviving. K. W. Brendley, K. P. Horn, T. G. Covington. September 1991.

This Working Draft examines the effectiveness of the Division Ready Brigade (DRB) of the 82nd Airborne against a determined Southern thrust by an Iraqi-like armored division. Simulations indicate that the 82nd Airborne could be modernized so that, with no additional lift requirements, it would perform significantly better against heavy forces. Specifically, effectiveness could be doubled if Sheridans were replaced by a future light tank and the Dragon by the Javelin, and tripled again if a number of the tube-launched, optically tracked, wire-guided (TOW) weapon systems mounted on high-mobility, multipurpose wheeled vehicles (HMMWVs), a line-of-sight tank killer (TK-NLOS) and the remainder, with a non-line-of-sight one (TK-NLOS). The study also finds that force gains can be further multiplied by using advanced protection technologies, such as reduced signature and countermeasures to Antitank Guided Missiles (ATGMs). The study proposes three activities to verify the robustness of the interim findings: examining a greater variety of forces and scenarios; examining technologies and associated performance expectations more closely; and upgrading simulation tools as needed.

WD-5671-A/USN Calculating the Value of Parts. D. A. Relles. September 1991.

This Working Draft describes a methodology to identify cost reduction opportunities in stocking policies for spare parts in Naval Aviation Depots. The methodology hinges on determining the value of a specific part (as opposed to its cost). The cost of a part is readily accessible; but if a part is never used, it has little value. Determining a part's value allows managers to evaluate different stock policies and to identify parts and systems that require management. Although preliminary, the results show that using value to guide stocking policies yields substantial payoffs. Savings occur when policies result in systems returned to service sooner. Using value as a guide, managers can stock those parts that make the largest contribution, regardless of their price. By quantifying costs and benefits of specific policies, the value calculation can also evaluate policies as well as determine them.

WD-5679-A/USN NIF Stockage Policies: An Annotated Briefing. J. S. Hodges. October 1991.

This Working Draft reports the results of an analysis of Naval Industrial Fund (NIF) stock policies. The study posited four hypothesis about the effect of increasing or decreasing stock of routine or high-demand parts and then examined them with a simulation using data on TF 30 engine repair. Results indicate that a blanket cut in authorized stock will not affect repairs and stocks can be reduced from 13 to 10 weeks. Incremental additions above the 10-week base for high-demand items increases inventory slightly but reduces substantially those the number of jobs that spend a long time waiting for parts.

But even small reductions of high-cost items below the 10-week level has a much more severe effect. Finally, frequent small orders reduce excess and do not affect service. The simulation indicates the "best" stock policy would have a 10-week stock level, submit replenishment requisitions every seven days and increase stocks of high-demand items.

WD-5684-FMP/A Evaluating Policies for Voluntary Senior Separations During Drawdown. D. W. Grissmer, R. L. Eisenman, W. W. Taylor. April 1992.

This Working Draft addresses the problem of drawing down the military services. Specifically, it deals with structuring separation offers so that they elicit the desired number and type of voluntary departures as cost effectively as possible. Operating from assumptions about discount rates, perceived value of retirement benefits and chances of civilian employment, and assessed chances of promotion, the project develops a methodology for determining how many people in a target group would accept a given separation offer. It is then possible to determine the increase or decrease in acceptance by varying certain parameters of that offer. This methodology provides decisionmakers a way to structure offers so that they promote the requisite number of departures from the target groups and do so cost effectively. Applying the methodology to achieve a specified Army force structure, the study concludes none of the current separation proposals would produce the right number of acceptances (30-50 percent acceptance rates are the most efficient). Proposals that combine lump sum payments with annuities achieve the desired rate and also address some fairness issues. However, the services need to monitor the process closely and maintain the flexibility to shift target groups

WD-5696-A Preliminary Comparison of Precision Guided Munitions Live Fire Data with Combat Effectiveness (U). J. Grossman. October 1991. CONFIDENTIAL LIMITED--CLEAR THROUGH AUTHOR

(U) This Working Draft documents the results of an independent assessment of expected battlefield performance of the tube-launched, optically tracked, wire-guided (TOW) and examines methods of improving its performance. The study finds that TOW missile performance deteriorates under moderate battlefield conditions (like those in Operation Desert Storm), with its expected probability of hit being about one half to two thirds of what it was on the firing range. Poor training is the major cause of the problem, and there is a real need for more training in battlefield conditions. Specific recommendations include more training in mission-oriented protective posture gear, more battlefield-like live-fire exercises, a requirement that TOW unit leaders receive formal individual training, and a

reexamination of both individual and unit TOW training and doctrine. Product improvements, such as adding an improved forward-looking infrared system and a rangefinder, are also recommended.

WD-5702-A A Perspective on Armor/Anti-Armor Modernization. W. M. Hix, B. W. Don. March 1992.

This Working Draft presents a framework—emphasizing versatility across a variety of dimensions—for assessing alternative systems to improve the Army's fighting capability and demonstrates the framework in an assessment of eight close-combat anti-armor systems the Army is considering. Besides versatility, the assessment also evaluated deployability, marginal contributions to current capabilities, technical risk, and cost. Except for risk and cost, the assessments were based largely on quantitative analyses, which were in turn used to subjectively rank the eight systems. Based on this ranking, the AH-64 Longbow is the top priority system, although the prioritization does not reflect the potential trade-offs between systems. The study also recommended a dual-track modernization strategy for the Army: acquire a quick fix for cases where the Army identified a hole in current capabilities and a near-term improvement exists at marginal cost and risk; and concentrate on acquiring long-term improvements for cases where the Army's capability is clearly superior to anticipated threats.

WD-5714-1-A Operations Flexibility and Deception. W. J. Whelan, J. Arbeeney. May 1992.

This Working Draft describes the operations flexibility approach and the operations-based deception concept that were designed to make deception integral to operations. The study argues that one way to make deception integral to operations is to deliberately use the deceptive potential inherent in operation flexibility—an approach that begins with the planning of multiple, credible, distinguishable alternatives to achieve a common objective. Integrating the concept requires altering the current decisionmaking process by combining three sequenced component estimates for intelligence, operations, and deception into a single estimate process that ensures that explanations and predictions about enemy and friendly forces and their interaction are based on information produced by preceding analyses. The study recommends that the concept be employed during planning exercises and be revised accordingly; it further recommends that the concept be introduced into the curricula of the Army's senior staff colleges and that the ability to conceptualize and plan deceptive operations should become a standard evaluation item during field training and command post exercises.

WD-5751-A Decision and Control in Combat Operations. W. L. Perry. Sept. 1992.

This Working Draft suggests a comprehensive framework for analyzing command and control (C2) issues and their application to battlefield situation assessment, decision, and action. The study developed a C2 system testbed to examine the basic elements of C2 and to suggest a modeling paradigm for developing, modifying, and testing C2 models. The notion of developing a C2 testbed for studying C2 issues allows the analyst to focus on C2 aspects generally neglected in existing models—the C2 system and the C2 concept of operations. The testbed also allows analysts to generate alternative operating concepts and systems whose performance can be compared. In addition, the testbed allows the physical aspects of the C2 system to be modeled by the external combat simulation and thus be affected by the same battle dynamics as other elements on the battlefield. The application of this methodology moves the debate about C2 from a question of connectivity to one of decision and the exercise of control. It also provides the C3I research community with a mechanism to test new fusion and classification methods to support command decisions and actions.

WD-5752-A Theater Missile Defense Depressed Trajectory Threat: Analysis of the Ascent Phase. D. R. Vaughan. Jun 1992.

This Working Draft analyzes the range penalties and additional stresses that would be incurred if a missile designed for a maximum range of 875 km is flown so that the apogee is kept below 95 km. The study analyzes both "simple depression" in which the missile is given a turn shortly after ignition and "high-altitude trajectory shaping" in which the missile is given a modest turn shortly after ignition and an additional turn at high altitude. In neither case do the additional stresses appear to be severe. In contrast to the situation for long-range (strategic) missiles, high-altitude trajectory shaping does not appear to lead to less stress on the missile than does simple depression. This analysis was done for the Theater Missile Defense Advanced Technologies Study conducted by POET.

WD-5756-OSD/A/AF RDB--A Relational Database Management System. W. V. Hobbs. November 1991.

WD-5759-A Improvements to the Support Structure for Contingency Operations--Directions from Operation Desert Shield. J. M. Halliday. November 1991.

This Working Draft examines six areas critical to the sustainment of operations in Operation Desert Shield—support doctrine, combat service support structure, support for high-technology items, intratheater ground transportation, distribution, and ammunition—and likely

to be important to future Army operations. Based on the examination, the study argues that Army doctrine should address what the support structure should be, how and when the structure should arrive, and how the ammunition system can support rapid deployments. In addition, the Army needs to tailor the force structure to eliminate imbalances and meet demands of varied threats, to develop policies to preserve benefits of integrated support in peace and war, to retain ability to meet ground transport needs for a variety of operations, and to develop a strategy to address serious problems in the DoD distribution system.

WD-5764-A Lessons Learned from the Gulf War: Lessons and Implications for Israel's Strategy. S. Gordon. October 1991.

WD-5766-AF/A Turkey in the Balkans: A Revived Presence. J. F. Brown. December 1991.

This Working Draft explores the evolution of Turkey's role in the Balkans and the prospects for Turkish policy towards this region after the Cold War. The study finds that although the Balkans have continued to remain outside Turkey's main foreign policy purview, a combination of developments in the Balkans and in Turkey itself could steadily increase Turkish interest in the peninsula, revive concern for the fate of the Muslims there, and perhaps cause a policy shift toward commitment and even activism on their behalf. In the Balkans, the collapse of communist rule has unleashed the tensions between Slavs and Muslims who live there, which might impel Turkish involvement—not necessarily military—in the Balkans on a scale unprecedented for over a century. In Turkey itself, there is a strong revival of Islam; if this revival grows and if the Western rejection and marginalization of Turkey becomes more apparent, a Turkish involvement in the Balkans would be become more likely.

WD-5781-A Retreat from Empire: The Gorbachev Revolution in Eastern Europe and Its Consequences. F. S. Larrabee. December 1991.

This Working Draft examines the evolution of the Soviet policy toward Eastern Europe since 1989. Following a discussion of the dramatic changes since 1989—including the coup and the breakup of the Soviet Union—the study focuses on implications of these changes for U.S. policy. It finds that the republics will be the key political actors in the future; that NATO will need to be reshaped to address security threats coming from the proliferation of deep-seated ethnic antagonisms and territorial conflicts rather than from a reconstituted Soviet military; that Central European countries are more likely to forge closer ties to Western security organizations, especially NATO; that Ukraine is likely to emerge as a major regional power in

Central Europe; that conventional arms control will need to be rethought in light of the new realities; that Germany is likely to emerge as the predominant power in Central Europe and likely to be more assertive in pursuing its own national interests than in the past; and that despite the end of the Cold War, the United States acts as an important stabilizing force in Europe.

WD-5805-A Advanced Munition Evaluation Model (AMEM) (U). R. E. Stanton, G. Gould, K. P. Horn, G. Dolbear, J. Green, J. Hiland, D. Orletsky, H. Ory, M. B. Schaffer, G. I. Taylor. Jan 1992. CONFIDENTIAL

(U) This Working Draft describes an Advance Munition Evaluation Methodology (AMEM) that will help Army decisionmakers select among competing advanced munitions concepts for development. In the devised framework, munition and target parameters dealing with effectiveness, combat value, and cost are input, and constraints are imposed. Sensitivity analyses relating to scenario and cost uncertainties, environmental effects, countermeasures, and technical risks can be undertaken iteratively. The end product is a robust munitions mix optimized for one or more objectives. As currently implemented, AMEM incorporates 38 munitions and 23 generic targets and is tested with scenarios in post-CFE Europe and Southwest Asia. Although scenario results are only illustrative, they are realistic enough to recommend that AMEM be considered for used by the Deputy Chief of Staff for Operations and by commanders of the Training and Doctrine Command and the Combined Arms Combat Development Activity, that it be considered for use in selecting munition mixes for use in large, two-sided simulations, and that improvements be made in the framework as resources permit.

WD-5820-A Building Integrated Support for the Army's New Technologies: Evidence from Apache TADS/PNVs in Operation Desert Shield/Storm. M. L. Robbins, D. W. McIver. February 1992.

This Working Draft attempts to define a cost-effective but robust support structure for high-tech weapon systems in an Army likely to have to project its forces quickly rather than deploy them forward in peacetime. It takes the logistical support of a sophisticated electronic component of the Apache helicopter, the TADS/PNVs, during Operation Desert Shield/Storm as a case study and examines the effect of increasing the flying rate of the helicopters. Subsequently, the project varies three components of the support system—structures, transportation, and management systems—to determine their effect on operational rates. Results show that raising the operating tempo to three hours per day dramatically increases the number of inoperative helicopters. But improved structures such as the Consolidated Forward

Repair Activity, faster inter- and intra-theater transportation, and an execution system that allows managers to prioritize repairs, in concert improve both system availability and performance.

WD-5824-1-OSD/AF/A Ultimate Computation: Possibilities and Issues. B. W. Augenstein. March 1992.

WD-5839-OSD/A/AF A Review of Statistical Database Management at RAND. S. Cammarata. January 1992.

WD-5848-NA/OSD/AF/A Future of Warfare, Gaming Issues Using a Persian Gulf Scenario. B. W. Bennett, M. Cecchine, D. B. Fox, S. Gardiner. February 1992.

WD-5855-USDP/A The Situation in the Baltic States: A Trip Report. T. S. Szayna. February 1992.

This Working Draft summarizes and analyzes discussions about security issues with senior officials from Lithuania, Latvia, and Estonia, as well as from Poland, Finland, and other countries in the region. The study finds that while the Baltic states have achieved independence, they have a long, difficult, and uncertain way to go to before reaching full sovereignty. Key issues include Soviet troop presence, problems between the eponymous ethnic groups in the three countries and East Slavs, territorial and boundary claims from within the three states, and the problem of compensating Russia/ex-USSR for investments over the past 45 years. Given the region's strategic importance for U.S. allies, the United States should lay the groundwork for infusing Western investment and for reintegrating the states into the European economy, insist that Moscow begin good-faith negotiations on the troop issue, pressure the states to adopt the Conference on Security and Cooperation in Europe standards on minority rights, and encourage that a disinterested third party be involved in territorial or economic compensation claims.

WD-5863-A Operation Just Cause and Low-Intensity Conflict. J. M. Taw. February 1992.

This Working Draft examines Operation Just Cause (OJC)—the December 1989 U.S. invasion of Panama—in the context of low-intensity conflict (LIC) and the evolving U.S. interest in promoting international stability through U.S. governmental and military support for foreign internal defense and development. The study finds

that whereas OJC has been widely regarded as an exemplary execution of American LIC doctrine, the U.S. invasion was a conventional operation, not an LIC: it was not part of a long-term political battle, it was not intended to win over the hearts and minds of the Panamanian citizenry, and the military was the primary instrument of influence. Moreover, its occurrence was separate and distinct from the ongoing LIC that Panama was experiencing at the time. Indeed, while OJC was an effective and successful conventional operation, it is not a good model for future U.S. actions in LIC environments in which the United States is interested in promoting foreign internal defense and development.

WD-5894-A Reserve Component Personnel and Training Resources. J. M. Polich, R. E. Sortor. Jul 1992.

This paper describes key concepts and a research approach for assessing future training and resource requirements of the Army Reserve Component (RC). The research framework considers three primary processes involving the RC: (a) peacetime training and execution of peacetime missions; (b) the process of preparation for war, involving personnel and equipment fill, individual training, and collective train-up; and (c) the deployment of units to theater on a specified schedule. Analysis of these processes needs to consider the trade-offs between peacetime and post-mobilization resources. For example, previous research indicates that many RC units lack their full complement of personnel, and some of their personnel have not yet qualified in their Military Occupational Specialty. These problems impede effective collective training in peacetime and lengthen the required post-mobilization period. Similar trade-offs between peacetime investments and post-mobilization timing apply to collective training activities involving equipment, OPTEMPO, training devices and simulators, ranges, training time, and other resources. The paper describes an approach to examining these trade-offs that builds upon the experience of Operations Desert Shield and Storm and incorporates empirical assessments from the Army's ongoing Bold Shift RC enhancement initiative.

WD-5895-A Analyses of Midcourse Penetration Aid Feasibility (U). H. L. Weisberg, C. Shipbaugh, H. Weisberg. Mar 1992. SECRET NOFORN FORMERLY RESTRICTED DATA

This Working Draft analyzes three techniques for penetrating the "mid-course defense" elements of a ballistic missile defense system. The techniques analyzed are barrage jamming, active thermal antisimulation, and the use of light replica decoys. This analysis was done for the Decoy Feasibility Study conducted for SDIO.

WD-5953-AF/A The Theater Level Campaign Model/Non-Linear Combat Toolkit: An Overview. R. J. Hillestad, L. Moore, E. Larson. Apr 1992.

This Working Draft describes the future need for the TLC/NLC model and describes and documents its principal features and design goals. Research on TLC/NLC is driven by dramatic changes in the political-military environment, the need to treat more explicitly the large uncertainties in today's analytic environment, and an opportunity to capitalize on new methodological, software, and hardware developments. The major design goals include the capability for analyst operation via an intuitive graphical user interface, facilities for incorporating input from database management systems, tools for managing multiple simulation runs and sensitivity analyses, and tools for exporting results to graphical, spreadsheet, and other application software for further analysis and display. Four features make TLC/NLC unique: (1) its flexibility in enabling the user to tailor the model to particular research questions; (2) the NetSim gameboard and processor; (3) heterogeneous air and ground attrition processes (based on detailed models of attrition but also sensitive to situation factors); and (4) analytic resource allocation decision processes, which can provide optional optimized control over the allocation of combat and noncombat assets.

WD-5967-A Retail Readiness-Based Maintenance System (RBMS): The Computational Engine. L. W. Miller, K. J. Girardini, K. E. Isaacson. Apr 1992.

This Working Draft describes the extension of the Readiness-Based Maintenance System (RBMS) concept to recognize the financial constraints imposed by the decision to charge units for stock-funded repairables. Originally, RBMS was designed to help logisticians prioritize the repair and distribution of spare parts to achieve weapon system availability goals when confronted with limited supplies and maintenance capability. However, the advent of the requirement to pay for stock-funded items requires RBMS to deal with both logistical execution and financial management issues. The original model recognized limits due to available repair capacity and number of repairable items on hand. The extended model uses a combination of marginal analysis and mathematical programming to permit a richer set of constraints. Repair and distribution priorities are then functions of effectiveness (what contributes most to weapon system availability), repair capability, and cost.

WD-5981-A A Modular Support Concept for the Force-Projection Army's High-Technology Weapons. M. L. Robbins. Apr 1992.

Building on earlier work, this Working Draft investigates a modular support concept as a way of supporting high-

technology weapon systems across a range of scenarios. Using the logistical structures of Operations Just Cause, Desert Shield and Desert Storm as base cases, we assessed the effect of some plausible extrapolations of those operations on the availability of attack helicopters. For example, what would have happened if the fighting in Just Cause had lasted longer or the fighting in Desert Storm had begun sooner? Our analysis indicates helicopter availability would decline significantly for a number of reasons to include an inability to provide spares or use repair capability effectively. But different contingencies will demand different responses. Short operations need fast resupply from CONUS. Larger contingencies need better asset visibility and reallocation mechanisms. Major operations need integrated theater support. These capabilities should be developed and applied by module to meet the demands of the specific operation.

WD-5986-A Sealift Ship Access to Foreign Seaports. D. Kassing, J. Cox. Apr 1992.

This Working Draft examines the capabilities of two notional large roll-on/roll-off ships (a 950-foot and a 700-foot ship)—representing the sorts of ships the Department of Defense is considering—to enter and use a selection of 100 seaports in Latin America, Africa, the Middle East, and Asia. The study finds that physical constraints at foreign seaports in the regions studied will limit the ability of large ships—whether existing or newly constructed—to deploy and redeploy United States ground forces. This conclusion does not reflect potentially important operational constraints. Analysis of physical port limits fails to identify a clear preference or complementarity between the two ships. Sealift capabilities "optimized" for major contingencies will not necessarily meet the needs of smaller contingencies. Large ships, preferred for large contingencies, will be unable to enter and use many seaports in less developed regions. Sealift planning should consider how to acquire the appropriate mix of large and small shipping needed for a truly robust deployment capability.

WD-5987-A Maturing Weapon Systems for Improved Availability at Lower Costs: A Strategy in Support of Weapon System Sustainment Management. J. Dumond, R. Eden, D. McIver, Hy. Shulman. Apr 1992.

This Working Draft documents procedures suggested to help the Army reduce the burden caused by the failures of technologically complex—chiefly digital—repair parts. Because complex electronic parts cost more than mechanical parts and fail in very different ways, they require a different management approach. The procedures suggested here taken together comprise an approach to weapon system design and development we call "maturational development process." The process provides for early resolution of repair and maintenance problems. It

begins early in the weapons system lifecycle, gathering data on component performance even of prototypes. It intensifies during low-rate production by collecting data on systems intensively operating in fixed configurations and continues into high-rate production and fielding. A key element is a well-developed management information system that collects information across components and that links to an integrated R&M database. The maturational development process promises substantial benefits by, first, assisting in the achievement of full design performance and, second, reducing support costs over the system's lifecycle.

WD-5996-A Adaptive Battlefield Ammunition Distribution: Supporting the Strategic Army in the Twenty-First Century. D. Newton. May 1992.

The shift from a European-focused to a projection Army complicates the logistics task. This Working Draft investigates the problems logistics systems face in distributing ammunition. A body of research called Complex Adaptive System Theory provides both the means to understand systemic adaptation and to manage it. Applied to an ammunition distribution system, this theory can provide a way for the system to adapt to different combat situations and changes within them. A four-phase process determines what changes have occurred and addresses them in three dimensions. The first assesses changes and adapts the system before combat begins. The second two deal with the changes that occur during combat operations. Some adaptations result from changes in tactical operations, and others come from external influences. The assessment of the changes leads to new systemic forms. During operations, it is more a matter of tailoring the form created for the new combat situation. Changes may be effected by manipulating a variety of "levers," e.g., aspects of the storage and distribution system.

WD-6001-A Ukraine's Nuclear Game: In Search of Sovereignty and Statehood. R. E. Gottemoeller, E. Rumer. May 1992.

This Working Draft discusses the sources of the nuclear policy currently emerging in Ukraine and analyzes the implications for U.S. policy. The study finds that despite Ukraine's pledge to become a nuclear-free state, the actual denuclearization process has become enmeshed in the Russian-Ukrainian political conflict, with disagreement over weapons disposition serving as a surrogate for Ukraine's struggle for sovereignty. In the near term, the United States should encourage Ukraine's denuclearization by clearly spelling out rewards for denuclearizing and the sanctions for not, helping Ukrainians appraise the value to their country of the materials and components of nuclear weapons on their territory, and assuring Kiev that the West will not allow Russia to dominate the denuclearization

process. In the long term, the United States must articulate a process for assuring Ukraine that Russia will continue to reduce its nuclear arsenal once Ukrainian denuclearization is achieved. The United States can play a decisive role by committing itself to further reductions in strategic nuclear weapons.

WD-6010-1-A/AF CADEM: Calibrated Differential Equation Methodology for Aggregate Attrition. L. R. Moore. Jun 1992.

This Working Draft addresses the difficult problem of modeling close combat attrition in highly aggregated simulations. It describes an attrition process called CADEM (Calculated Differential Equation Methodology), which calculates attrition through a three-step process. It draws on killer-victim scoreboards and computes calibration parameter sets for each new situation the model will encounter, selects the appropriate set for a situation and adjusts it for the resources to be considered (e.g., weapon systems, ammunition, and so forth), and computes the attrition by solving a series of differential equations. Its output is a curve showing how resources decline over time. This process offers a number of advantages over other attrition models, including links to high-resolution models, ease of extension to situations with inadequate or missing data, and an easily modified system of equations. It also offers a user-friendly spreadsheet application that allows analysts to vary the model. However, the process does require data sets to run, and these are not always readily available.

WD-6031-A Preparing for the 21st Century: The U.S. Military Role in a Changing Asia. N. D. Levin, P. J. Bracken. Jul 1992.

This Working Draft presents the results of an examination of U.S. and U.S. military roles in a changing Asia. The document argues that trends in both Asia and United States are stimulating a new kind of regional dynamic that, left unattended, could adversely affect U.S. interests. Based on this trend analysis, the study concludes that the United States needs a new strategy of comprehensive security—a strategy of access that involves maintaining alliances and forward presence; using the military indirectly to create a foundation for coalition activities; fostering and directing a regional security dialogue; encouraging alternative development paths to restrain proliferation; and using arms control to bolster U.S. presence, establish regional equilibrium, and lock in the current U.S. advantageous strategic position. Such a strategy involves adding some military roles to prevent regional imbalance and realignments, provide regional presence for rapid response and humanitarian assistance, provide a catalyst/forward trigger for U.S.-led coalitions (including the UN), and help exploit Asian dynamism and strengthen U.S. leverage.

WD-6043-A/AF A Systems Description of the Cocaine Trade. B. Dombey-Moore, S. Resetar, P. Reuter. Jul 1992.

Gaps and inconsistencies in the picture of the cocaine trade increase the difficulty of making good choices about resource allocation and drug-fighting strategies. They also make it more difficult to evaluate the effectiveness of existing policies. This Working Draft documents a computer spreadsheet-based "systems description" for the cocaine trade that is a combination of database and analytical tool. Its structure allows users to substitute their own data or assumptions about parameters while preserving consistency or "conservation of mass" throughout the system. Three systems spreadsheets mirror the general pattern of the cocaine trade: production, international transportation, and U.S. distribution. In addition, a longitudinal database provides primarily production-related data from 1984 through 1990. These production data can be used as the initial conditions for the systems model. To help provide some sense for the potential utility of this tool, the document examines three distinct, but related, applications for the systems description: improving the estimation processes, conducting sensitivity analyses, and guiding planning and assessment.

WD-6052-A Weapon System Sustainment Management Concept and Implementation : Annotated Briefing. J. Dumond, R. Eden, J. R. Folkson. Jun 1992.

This Working Draft documents a briefing delivered to senior leaders in the Army logistics and acquisition communities. It provides a progress report for a project called "An Evolving Action Plan for Implementing Weapon System Management Concepts in Future Army Environments." The briefing reviews the objectives of Weapon System Sustainment Management (WSSM), outlines three broad strategies for its implementation, and discusses current and potential actions for contributing to each. The discussion focuses on Class IX items. WSSM has three objectives: (1) providing weapon system availability to meet the demands of both combat and noncombat operations; (2) easing the transition to war; and (3) achieving these objectives at the lowest cost. Strategies to achieve these objectives include managing resources along weapon system lines, designing and operating logistics processes for greater efficiency, and designing sustainable weapon systems.

WD-6062-A A Model for Assessing Unit-Level Class IX Sustainability: Dyna-METRIC Version 6.3. P. Boren, K. Isaacson, M. E. Chenoweth. Jun 1992.

This Working Draft describes a recent update of Dyna-METRIC, a computer model that assesses logistic

capability. This model underlies the Vision Assessment System (VAS) that helps logistics planners evaluate and enhance equipment sustainability through better management of spare parts. A national-level system supported by an earlier version of Dyna-METRIC is currently being tested. This version is designed to work at a lower level, possibly at the division. This version is structured like earlier versions, but it has a number of refinements that better represent constrained repair capabilities and offers management strategies to mitigate the inherent uncertainty of the repair process. These strategies include lateral supply and repair, priority repair, and queue overflow (i.e., sending low-priority items to higher echelons for repair).

WD-6069-A Allocating Deep Fires. W. L. Perry, T. C. Wegleitner. Jun 1992.

This Working Draft presents an exploratory look at how the United States should allocate its deep fires systems given that it will likely face an enemy equipped with systems as capable as its own. The research uses a highly stylized situation consisting of Army forces to see if there are insights that can be used to expand the research to the larger problem. The results from the initial work indicate that the allocation strategy should be to focus on enemy deep systems first and then turn to armor. However, because the strategy may not be valid in all situations, some variations are being added to the analysis. The modified scenario will include command, control, and communications ground stations, which are essential to the target acquisition process and to processing command targeting instructions, and attack helicopters, which when used in a deep fires mode will siphon targets from the rocket systems. In addition, the scenario will be expanded incrementally to the full joint operations level.

WD-6076-A Support Forces in Contingency Operations: Implications for Army Active-Reserve Mix (U). R. E. Sorter, T. Lippiatt. Aug 1992. SECRET NOCONTRACT LIMITED

Army doctrine for support forces, particularly for theater-level but also corps-level support, is based on previous planning for a large-scale military conflict in Europe. Analysis of other likely scenarios suggests that the Army needs to develop a new support force doctrine for operations that is robust but readily tailorable to the diverse and uncertain circumstances that may occur in any future contingency employment. This Working Draft compares the support forces actually deployed in Operation Desert Shield/Storm (ODS/S) with the doctrinal support force requirements generated by the Army's FASTALS model (Force Analysis Simulation of Theater Administrative and Logistic Support), for similar combat force deployments. The analysis concludes that, for some functions such as engineering and general support

maintenance, the Army military support force in Saudi Arabia never reached the level of a mature theater as reflected in doctrine and in FASTALS. Even for functions that reached the full level of capability predicted by the model, the capability was deployed to the theater more slowly, much more slowly in some cases, than would have been predicted prior to ODS/S. These conclusions appear to be true even after accounting for the special circumstances of ODS/S. This Working Draft reports interim results that were later incorporated into DRR-110-A. See DRR-110-A abstract above for results.

WD-6078-A The TDA Army: A Definition, Description, and Search for Leverage. M. T. Childress, B. Dombey-Moore, L. Finch. Aug 1992.

This Working Draft assesses the potential impact of declining Army budgets on the Army's ability to satisfy its roles and missions in the future security environment, with a focus on the TDA (or nondeploying) Army. The study finds that the TDA budget promises to become a key battleground in the budget war as the Army budget declines, in part because the TDA part of the Army represents almost half the budget and in part because it has typically absorbed less than proportional budget reductions. Although six functional categories within the TDA Army-base operations, supply and maintenance, research and development, training, personnel activities, and medical- account for about 85 percent of all TDA funding, it will be difficult to cut the TDA budget because it has traditionally been less malleable than the TOE (warfighting) part of the Army and because the big TDA functional categories are generally less malleable. The study concludes that the key to efficiently managing future Army resources lies in understanding the strategic factors that have a significant impact on these large functional categories.

WD-6096-A The Unit Level VISION Assessment System: An Annotated Briefing. M. E. Chenoweth, C. Tsai. Jun 1992.

The Army is currently testing the VISION Assessment System (VAS) at the national level. It would like to extend this test to the unit—in this case the division—level and is preparing the groundwork for such a test. This Working Draft provides the background of VAS and discusses its application at the division. It includes the findings on the potential users of VAS at the division and addresses a number of questions of interest to planners at that level. Potential users of the tool are the division operations officer, the logistics officer, and the material management centers in the division's support command.

WD-6103-A Army Reserve Component Accessions from Personnel with Previous Active-Duty Experience. R. J. Buddin, S. J. Kirin. Jul 1992.

The planned restructuring of the Army Active Component (AC) will affect the size and composition (occupation, paygrade, recruit quality) of the prior service accession pool available to the Reserve Component (RC). This Working Draft examines factors that affect whether prior-service personnel affiliate with RC units. The goal is to identify soldiers who are likely to join the RC and understand what can be done to improve the rate of transition of prior service soldiers into the reserves. The study focuses on the transition rates of active-duty first-term soldiers into the RC. A major finding of the research is that recruits with shorter terms of service in the AC are substantially more likely to join the RC at the completion of their AC tour. Holding constant other recruit characteristics, about 50 percent of two-year enlistees join the reserves as compared with 40 and 30 percent of three- and four-year enlistees, respectively. This finding suggests that a shift to shorter terms might ease RC manning problems because it would cycle people who are disposed to joining the RC more quickly through the AC.

WD-6118-1-A A Unit-Level VISION Assessment System: A Decision Support Tool for Class IX Sustainment Planning. M. E. Chenoweth, P. Boren, K. E. Isaacson. Aug 1992.

This Working Draft establishes the need for an assessment tool at the unit level, discusses a version of RAND's VISION Assessment System (VAS)—a decision support tool designed to help planners evaluate and enhance sustainability throughout the Army through better management of Class IX items—developed for the needs of the unit, and presents the issues needed for a proof-of-principle (POP) test. Projected reductions in the defense budget and the uncertainty about what future missions might be emphasize the need for sustainment planning at the unit level. To make VAS more useful to the unit, a new feature has been added—constrained repair capabilities—which makes it useful to several unit-level planners. The document recommends beginning a POP test and argues that issues of feasibility (e.g., data availability and quality), usability (e.g., automatic data updates, user friendliness, and customized reports), and benefits and costs (e.g., the ability to identify and resolve Class IX problems better and faster) stand out as benchmarks for the test.

WD-6119-1-A How to Estimate the Costs of Changes in Army Individual Skill Training. S. Way-Smith. Sep 1992.

This Working Draft describes a new method for estimating Army-wide costs that result from changes in training strategies in Army individual skill training courses. The method, called TRAM (Training Resource Analysis Method), employs a five-step procedure. The first defines specific changes to be made to the existing training course. The second analyzes ramifications of changes for training

development, delivery, and support. The third analyzes resource implications of specific changes as these affect manpower, equipment, and facilities used to train. The next step develops models that estimate costs of resource changes among alternative training programs. The final step places the results in context, identifying cost flows, trade-offs, and risks. The method is applied to alternative course designs for two Armor courses. One application focuses on an officer course and the potential for distributing training from residence instruction to field units. The other application of the method examines an enlisted course and the increased use of technology as a substitute for hands-on weapons training. The document concludes that the method is useful for crafting new training strategies and identifying training resource policy issues.

WD-6144-A The Soviet Military: The Threat from Within. E. B. Rumer. Apr 1992.

This Working Draft describes the situation within the former Soviet military in December 1991. This brief paper argues that while political leaders and top military brass wrangle over the fate of the Soviet military and members of the Commonwealth of Independent States search for solutions to the political and economic crisis, the military institution remains potentially the most destabilizing force in the former Soviet Union. Growing discontent within the military about its uncertain future, a declining standard of living, and political turmoil could generate the spark that may upset the fragile civil peace in the Commonwealth and ignite the flame of full-fledged civil war.

WD-6145-A Ukraine: After Independence Toward Sovereignty. E. B. Rumer. Apr 1992.

This Working Draft identifies key factors in Ukrainian domestic politics and suggests policy instruments that may help smooth out Ukraine's transition to sovereignty and statehood. This brief paper points out that a combination of historical, ideological, ethnic, cultural, religious, political, and security factors shapes the domestic political landscape in Ukraine and that these factors provide an unstable context for its foreign and security policies, especially for its relations with Russia. The pivotal issue in these relations is the fate of the former Soviet nuclear arsenal deployed on Ukrainian territory, which is mired in the larger domestic political context. Thus, despite Ukrainian pledges to adhere to a promise of denuclearization, fulfillment of these pledges will be slow and difficult. The document concludes that western policymakers can either get tough or bargain with Ukrainian leaders, but that neither choice is straightforward.

WD-6151-A Planning for EAC Support in Contingency Operations. R. D. Howe. Jul 1992.

This Working Draft assesses the current Army doctrine for managing capabilities in the Echelons Above Corps (EAC) in contingencies and explains how these capabilities should be managed. The study recommends making the command of the units that provide support from EAC a Joint command directly subordinate to the CINC or the JTF Commander rather than an Army component function. This would better integrate support by and for all the Services while simultaneously allowing the Army component to focus on operational responsibilities. The study also recommends that a Joint command be established that is responsible, in peacetime, for coordinating the requirements of the CINCs and the capabilities produced by the various support activities. In addition, this command would organize itself to provide the support command with staff to deploy to a developing theater while remaining in existence in the continental United States to support the ongoing contingency and continuing to prepare for a second contingency before the first one concludes. Because these recommendations require changes in Joint doctrine that are both time consuming and not under the Army's control, the study recommends that the Army (as an interim measure) establish an Army headquarters as the planning headquarters.

WD-6165-1-A Computer-Based Training of Cannon Fire Direction Specialists. H. Farris, W. L. Spencer, J. D. Winkler, J. P. Kahan. Aug 1993.

WD-6167-A The Breakup of Czechoslovakia: Domestic and Regional Implications. T. S. Szayna. Aug 1992.

This Working Draft outlines some of the domestic and international implications stemming from the potential breakup of the Czech and Slovak Federal Republic (CSFR), suggests options for U.S. policy, and makes suggestions for U.S. Army policy. On the domestic side, the study concludes that the breakup of the CSFR seems unlikely at this time to dissolve into open Czech-Slovak armed conflict as in Yugoslavia. On the international side, the breakup calls into question continued regional cooperation and introduces new irritants into the bilateral relations between the region's countries. Although the breakup creates some U.S. policy problems, it may actually help stabilize the regional situation in the long run because it removes a weak and ineffectual entity (the CSFR) and replaces it with two strong states. The U.S. Army can play a significant role in supporting the Slovak military's evolution into an apolitical state institution; it also may need to prepare some contingency plans for a

potential multilateral peacekeeping role in Slovakia in the future, as well as provide refugee relief operations and medical assistance.

WD-6194-A/DPRC A Systems Description of the Heroin Trade. M. T. Childress. Oct 1992.

This Working Draft describes and discusses applications for a computer spreadsheet-based, comprehensive "systems description" of the quantity and flow of heroin from initial cultivation and processing, through international transportation, to domestic distribution. To examine the potential utility of this tool, this Working Draft details three distinct but related applications: improving the estimation processes, conducting sensitivity analyses, and guiding planning and assessment. In improving the estimation process, an analyst can use the framework to evaluate assumptions or data in terms of their downstream effects on other indicators (e.g., the likely downstream effects of an increase in the opium crop yields). Sensitivity analysis can be used to understand the impact of certain parameters versus others, which may be helpful in allocating intelligence resources, and to evaluate first-order effects of a change in the system, such as an eradication program. As a tool for more effective planning and assessment, the model can help planners think in terms of a strategic framework, for example, of linking assumptions on production in Southeast Asia to heroin flows in the United States.

WD-6195-A/DPRC A Systems Description of the Marijuana Trade. M. T. Childress. Oct 1992.

This Working Draft describes and discusses applications for a computer spreadsheet-based, comprehensive "systems description" of the quantity and flow of marijuana from initial cultivation and processing, through international transportation, to domestic distribution. To examine the potential utility of this tool, this Working Draft details three distinct but related applications: improving the estimation processes, conducting sensitivity analyses, and guiding planning and assessment. In improving the estimation process, an analyst can use the framework to evaluate assumptions or data in terms of their downstream effects on other indicators (e.g., the likely downstream effects of an increase in the marijuana crop yields). Sensitivity analysis can be used to understand the impact of certain parameters versus others, which may be helpful in allocating intelligence resources, and to evaluate first-order effects of a change in the system, such as an eradication program. As a tool for more effective planning and assessment, the model can help planners think in terms of a strategic framework, for example, of linking assumptions on production in Southeast Asia to marijuana flows in the United States.

WD-6197-1-A Estimating Mobilization and Train-Up Times for Army Reserve Component Units. T. Lippiatt, J. M. Polich, R. E. Sortor. Sep 1992.

This Working Draft documents an Arroyo Center briefing on the time required to mobilize and prepare Army Reserve Component units for wartime deployment. The briefing reported preliminary research results later documented in MR-125-A (see abstract above) and MR-124-A. (See abstract for MR-124-A under the write-up for the "Reserve Component Peacetime and Post-Mobilization Training" project.)

WD-6220-NA/OSD/AF/A Future of Warfare: Gaming U.S. Reactions to a Future Persian Gulf Scenario. B. W. Bennett, M. Cecchine. Sep 1992.

WD-6225-A RAND Research at the National Training Center. M. Goldsmith, J. Grossman. Sep 1992.

This Working Draft discusses RAND's research approach at the National Training Center (NTC), describes some of the representative studies completed over the past eight years, and illustrates how the Army uses the results. The research process identifies discrepancies among training, doctrine, and practice, constructs hypotheses about causes, and then supports or refutes them by examining data in standard data bases or gathered from focused field collection efforts. The project disseminates its results throughout the Army. One of the two studies addressed in detail in the report examined the frequency of ground-to-ground fratricide to estimate its importance for battle outcomes and concluded that improved command and control could be prevent most fratricides. Another study focused on tactical reconnaissance and found that although a clear correlation exists between success in battle and reconnaissance, essential reconnaissance tasks were accomplished in only half the battles studied. The document also shows that RAND's NTC work has contributed to Army decisions affecting doctrine, training, and equipment.

WD-6267-A Issues in Cost Effective Base Management. E. G. Keating. Oct 1992.

This Working Draft discusses some of the alternative ways services might be provided on Army bases. The options discussed include autonomy-the base provides a service using its own personnel and resources; regionalization-the base coordinates for a service with other bases in the region; local government provision-the base receives a service from a local government entity, such as a municipality; and privatization-the base receives a service (or good) from the private sector, such as having a private company provide food service in a base cafeteria. The Working Draft concludes that private-sector provision is preferred for goods and services provided by competitive

industries (e.g., housing), though there may be transition problems. For goods and services not provided competitively (e.g., the sewer industry), the answer is less clear-cut and would appear to require case-by-case evaluation of each base's specific situation. Running a case study on a specific base to trace through a decision process might provide insight into how to make these decisions, how to structure real-world contracts to maximize efficiency, and how to avoid future pitfalls and problems.

WD-6273-A The United States Special Operations Command Force Development Process: An Application of the Strategy to Task Framework. J. A. Coggin, L. Lewis, C. R. Roll. Nov 1992.

This Working Draft discusses how a structured methodology called Strategy-to-Tasks can help the U.S. Special Operations Command (USSOCOM) improve its resource allocation and management process. Analysis of USSOCOM's processes and program requirements suggests that RAND's Strategy-to-Tasks methodology might be able to accomplish the task of linking USSOCOM's programs and resources to national security strategy. Specifically, the methodology meets three critical requirements in USSOCOM's program that do not now exist: (1) a top-to-bottom linkage of Special Operations Forces (SOF) programs; (2) a more disciplined Planning, Programming, and Budgeting System (PPBS) that includes a clearer understanding of the resource issues (the process includes analytical tools and linked data bases); and (3) a structured process that involves the components in the resource debate. The study created a baseline taxonomy that provides a traceable audit trail from national security and military strategies through operational concept to force elements. The methodology provides a structure that enables USSOCOM to justify its resource choices to the Chairman, Joint Chiefs of Staff, the Secretary of Defense and Congress.

WD-6304-A Longbow Force Mix Analysis: A Briefing (U). M. Callero, M. B. Schaffer, R. Zwirn. Dec 1992. SECRET LIMITED

This Draft reports on the Longbow force mix analysis that was conducted to determine preferred numbers of Apache and Comanche helicopters to equip with the Longbow anti-tank system. That system features a missile seeker and a mechanical-scan, fire-control radar with millimeter wave (MMW) technology that could provide increased lethality and survivability for attack helicopters, particularly in bad weather. Comparative analyses of technology capabilities and operational factors pertaining to the Longbow and the first-generation (Apache) and second-generation (Comanche) infrared systems in potential combat environments led to the conclusion that a Longbow system would enhance warfighting capability

and should be installed on a limited numbers of Apaches and Comanches. Since the Comanche will be fielded post-2000 and remain in the fleet until 2030, we recommend that, for the Comanche, an emerging, new thin phased-array MMW technology Longbow be developed to increase Longbow's operational agility and mission performance and reduce the missile costs.

WD-6308-A Project Status: Anticipating Combat Ammunition Consumption. J. Marti, K. M. Beam. Dec. 1992.

This Working Draft discusses the progress in developing a decision-support system that provides a high-resolution view of high-cost, high-weight munitions consumption based on computer simulation. The document notes that given today's focus on contingency operations, many of the assumptions about using high-cost, high-weight munitions must be modified, and that the computer combat simulation approach being developed provides the best means of anticipating consumption rates on a battle-by-battle basis. The document then focuses on the four components of the Anticipating Combat Ammunitions Consumption (ACAC) decision aid: the OPLAN translator, which takes as input English-like text and outputs directives to the simulation system; the combat planners, which convert operational descriptions into low-level activities, providing detailed directives to individual fighting vehicles; the combat simulator, which provides the physics of the engagement (e.g., movement rates over terrain); and the consumption analyzer, which collects and organizes the data and produces a cogent analysis for the logistician. The document concludes with a preliminary consumption analysis of some small scenarios.

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WN-10394-A Nomograms for Calculation of Propagation Effects on Tactical Millimeter-Wave Radio Links. W. Sollfrey. January 1979.

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