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ASSISTANT SECRETARY OF THE ARMY
RESEARCH, DEVELOPMENT AND ACQUISITION
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(12)

ARMY SCIENCE BOARD

FINAL REPORT OF

1984 SUMMER STUDY

LEADING AND MANNING ARMY 21

NOVEMBER 1984

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FOREWORD

THIS DOCUMENT CONSTITUTES THE FINAL REPORT OF THE ARMY SCIENCE BOARD (ASB) STUDY OF LEADING AND MANNING ARMY 21. THE STUDY IS A DIRECT OUTGROWTH OF, AND RESPONSE TO, THE TWO PERSONNEL RELATED GOALS OF THE ARMY'S SEVEN GOALS - LEADERSHIP AND HUMAN - PROMULGATED BY GENERAL MEYER AND SECRETARY MARSH.

THESE GOALS ARE DEFINED AS FOLLOWS:

LEADERSHIP:
TOTAL ARMY WHOSE LEADERS AT ALL LEVELS POSSESS THE HIGHEST ETHICAL AND PROFESSIONAL STANDARDS COMMITTED TO MISSION ACCOMPLISHMENT AND THE WELL-BEING OF SUBORDINATES.

HUMAN:
A TOTAL ARMY COMPOSED OF MILITARY AND CIVILIAN PROFESSIONALS WHO LOYALLY SERVE THEIR NATION IN REWARDING CAREERS.

IT IS A LOGICAL EXTENSION OF ASB SUMMER STUDIES (SS) 1981, EQUIPPING THE ARMY 1990-2000; 1982, SCIENCE AND ENGINEERING PERSONNEL; AND 1983, FUTURE DEVELOPMENT GOALS AND DRAWS UPON THE FIVE ARMY THRUSTS.

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TERMS OF REFERENCE
MANNING A READY FORCE

- ASSESS THOSE STEPS WHICH THE ARMY MIGHT TAKE TO IMPROVE THE PERSONNEL MOBILIZATION AND READINESS OF THE TOTAL FORCE. WHAT ARE THE "MISSION STOPPERS" IN TERMS OF MOBILIZING THE RESERVE AND NATIONAL GUARD COMPONENTS? WHAT ARE THE THINGS THAT NEED TO BE DONE IN THE NEAR TERM TO HELP SOLVE ANY SUCH PROBLEMS?

- EVALUATE THE CONTRIBUTION MADE TO FORCE READINESS BY QUALITY OF LIFE FACTORS. ARE THERE PARTICULAR FACTORS THAT HAVE OR COULD HAVE SIGNIFICANT IMPACT ON READINESS?

- CLARIFY THE TECHNOLOGICAL THRUSTS THAT WILL SIGNIFICANTLY ALTER MANNING CONSIDERATIONS FOR ARMY 21. HOW CAN THOSE THRUSTS MOST CONTRIBUTE TO MANNING REQUIREMENTS? WILL THOSE THRUSTS REQUIRE SIGNIFICANTLY DIFFERENT HUMAN ASSETS FROM CURRENT ACCESSIONS?

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TERMS OF REFERENCE (CONT'D)

PERSONNEL FACTORS IN WEAPONS SYSTEM PERFORMANCE

- FOCUS THOSE METHODOLOGIES THAT RESULT IN HIGH INDIVIDUAL AND HIGH GROUP PERFORMANCE.

- EVALUATE MEANS FOR THE ARMY TO BETTER INTEGRATE HUMAN CAPABILITIES CONSIDERATIONS INTO NEW SYSTEMS DESIGN AND PRE-PLANNED PRODUCT IMPROVEMENT (P^3I) EFFORTS. WHAT NEEDS TO BE DONE TO MAKE HUMAN CONSIDERATIONS A KEY FACTOR IN SYSTEM CONCEPT DEVELOPMENT AND SYSTEM DESIGN?

- DETERMINE THE EFFECTIVENESS OF METHODS THE ARMY USES TO ASSESS MENTAL AND PHYSICAL PROCESSES/CAPACITIES WHICH LEVERAGE WEAPON SYSTEMS AND UNIT PERFORMANCE. ARE SPECIFIC HUMAN CAPABILITIES REQUIRED TO OBTAIN PLANNED HARDWARE PERFORMANCE? IS A MIX OF PARTICULAR CAPABILITIES REQUIRED WITHIN CREWS AND UNITS TO ACHIEVE PLANNED SYSTEM PERFORMANCE?

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TERMS OF REFERENCE (CONT'D)

LEADERSHIP

- ASCERTAIN THE MOST EFFECTIVE APPROACH TO LEADERSHIP DEVELOPMENT FOR ARMY 21, TO INCLUDE PRACTICAL LEADERSHIP ASSESSMENT TECHNIQUES, NEW WAYS TO DEVELOP SYSTEM-THINKING SKILLS, AND MECHANISMS FOR EARLY IDENTIFICATION OF OFFICERS WITH SENIOR OFFICER POTENTIAL.

- CLARIFY THOSE CULTURAL, ECONOMIC, AND TECHNOLOGICAL CHANGES THAT WILL HAVE THE MOST IMPACT ON LEADERS IN ARMY 21, AND DESCRIBE HOW THE ARMY SHOULD LINK THOSE IMPACTS TO THE DESIGN OF FUTURE LEADERSHIP DEVELOPMENT PROGRAMS.

- ANALYZE HOW LEADERS AT DIFFERENT ECHELONS (PLATOON, COMPANY, BATTALION, ETC.) WOULD FUNCTION ON THE ARMY 21 BATTLEFIELD (AIR-LAND BATTLE DOCTRINE), PARTICULARLY IN THE "ISLANDS OF CONFLICT."

- ASSESS WHETHER THE NEW DOCTRINE WILL REQUIRE NEW AND UNIQUE LEADERSHIP PRINCIPLES, HOW CURRENT PRINCIPLES SHOULD BE APPLIED, AND HOW THE ARMY CAN CREATE A COMMAND CLIMATE WHICH WILL ALLOW EFFECTIVE LEADERSHIP WITHIN THESE "ISLANDS OF CONFLICT."

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STATEMENT OF CONFLICT OF INTEREST

EACH OF THE PANEL MEMBERS HAS REVIEWED THE REPORT AND CONFIRMS THAT THE PANEL'S RECOMMENDATIONS DO NOT LEAD TO REASONABLE ANTICIPATION OF SOME ADVANTAGE TO AN ENTITY IN WHICH HE/SHE HAS LISTED A FINANCIAL INTEREST.

VISITATIONS AND BRIEFINGS

PLENARY SESSIONS	
7-9 FEB 84	PENTAGON
4-5 APR 84	PENTAGON
20-21 JUN 84	PENTAGON
5-13 JUL 84	USAREUR (REPRESENTATIVE PAKTY)
17 JUL 84	PENTAGON (PANEL CHAIRS ONLY)
30 JUL - 9 AUG 84	WOODS HOLE, MA (SUMMER STUDY)

LEADERSHIP PANEL	
29-30 SEP 83	PENTAGON
29-30 NOV 83	FORT BENNING, GA
26-27 JAN 84	FORT MONROE, VA
28 FEB - 1 MAR 84	FORT LEAVENWORTH, KS
22 MAR 84	FORT LEE, VA
16 APR	FORT BELVOIR, VA
6-8 MAY 84	AWC/USMA/VALLEY FORGE MILITARY ACADEMY
20-22 MAY 84	FORT HOOD/SGM ACADEMY
5-13 JUL 84	USAREUR (1 MEMBER)

VISITATIONS AND BRIEFINGS CONT'D

HUMAN FACTORS PANEL	
15-16 APR 84	WASHINGTON, DC
5-6 APR 84	ALEXANDRIA, VA, ARI/AMC/FORT DETRICK, MD
16-19 APR 84	ST. LOUIS, MO/FORT LEWIS, WA
15 MAY 84	INSCOM
23-25 MAY 84	ABERDEEN PG, FORT MONROE, ARI, AMC, WALTER REED ARMY INSTITUTE OF RESEARCH
26 JUN 84	FORT HOOD, TX
5-13 JUL 84	USAREUR (2 MEMBERS)
12 JUL 84	WASHINGTON, DC
13 JUL 84	WARREN, MI/TACOM
23 JUL 84	WASHINGTON, DC
25 JUL 84	SRI INTERNATIONAL, MENLO PARK, CA (1 MEMBER)
26 JUL 84	ALEXANDRIA, VA/AMC
MANNING PANEL	
13-14 MAR 84	PENTAGON (NGB/USAR)
16 APR 84	PENTAGON/BDM
9-10 MAY 84	FORT MEADE/PENTAGON
19 JUN 84	PENTAGON
22-26 JUN 84	NATIONAL TRAINING CENTER/FORT HOOD
5-13 JUL 84	USAREUR (3 MEMBERS)
16 JUL 84	RCPAC/ARPERCEN
17 JUL 84	FORT LEAVENWORTH

MANNING

INTRODUCTION

SS81 concentrated on equipping the Army of the 90's. SS83 developed recommendations for equipping as a part of the Future Development Goal. It is fitting that the challenge given to our Manning Subgroup is Manning A Ready Force.

An evolving theme during our deliberations was "Improving the Total Army Readiness through better integration of personnel with the Total Army system," i.e., personnel recruiting, retention, and training of Active and Reserve Components - and mobilization should be done in an integrated way with the structuring and equipping of the force.

The Terms of Reference given to the subpanel consisted of three points:

- Assess those steps which the Army might take to improve the personnel mobilization and readiness of the total force.

- Evaluate the contribution to force readiness by quality of life factors.

- Assess how technological thrusts can significantly alter manning considerations for Army 21 both quantity and skills required.

A more detailed report covering the four issues discussed in this report is in the addendum. The more detailed report includes more details on rationale as well as some recommendations not covered in this report.

During the preparation for the Summer Study, a number of issues were discussed in regard to each of the Terms of Reference. Finally these were reduced to the four major issues treated in this report which were:

- Manning the mobilized forces,
- Recruiting and retention - Total Army,
- Impact of Quality of Life,
- Quality and quantity of manpower for the future.

INTRODUCTION

CHALLENGE:

Manning a Ready Force

EVOLVING THEME:

Improve total Army readiness through better integration of personnel with total Army system.

MAJOR ISSUES TREATED IN THIS REPORT:

- o Manning the mobilized forces.
- o Recruiting and retention -- total Army.
- o Impact of quality of life.
- o Quality and quantity of manpower for the future.

BACKGROUND:
Although much progress has been made, manning of the Army Reserve (USAR) and National Guard (NG) falls below mobilization requirements in numbers, skills, and ranks. These shortages along with equipment and training deficiencies make rapid commitment with the Active force a difficult if not impossible task. Further, over the years, units important to combat capability and logistics support of active elements have been moved to the Reserve Components (RC). Readiness of these units is particularly critical. If RC units are not ready, they become mission stoppers for Active Component (AC) units. The Army has significantly improved the attention given to USAR and Army National Guard (ARNG) problems but further means of improving the quality and quantity of the mobilization personnel are needed if worldwide commitments are to be met. The difficult alternatives are either a reduction in forces called for in contingency plans or a return of the most critical units to the Active Army.

Rapidly increasing the full time manning of selected Reserve and Guard units would significantly improve training and readiness. The Army should move as rapidly as possible to reach the optimum ratio between full-time personnel and "part time" soldiers in the RC, tailored to the needs of each type unit, including the balance between soldiers and DA civilians.

For soldiers leaving the AC, an enlistment voucher should be provided as an extra incentive for joining RC Troop Program Units (TPU). The voucher could be turned in for incremental cash payments at time of affiliation with the RC.

Individual Ready Reserve (IRR) assets are inadequate, in quantity, ranks, skills. Training is insufficient. More funding and training capacity are needed. Training should be mandatory.

Additional flexibility in annual training time is needed; 37 days is often insufficient. Many units need 21 days of annual field training instead of 14 days. The Federal Government must take the lead by granting 21 days leave for training for its employees. Once this is accomplished, then duplication by state, local governments, and private industry will be easier. Additional incentives will be needed if we are to realize even greater cooperation of employers. Suitable tax credits are one way of doing this.

Simulation, particularly of command and control, should be increased significantly — technology is available to make this possible. More maneuver training is necessary for both active and reserves. This will likely require additional instrumented facilities.

ARNG divisions should be assigned special readiness missions: arctic, desert, mountain, jungle, urban, light. Assignments should be based on geographical considerations and contingency plans.

These, and additional recommendations in the more detailed report, will go far to readying the RC for full combat readiness in a rapid mobilization. Nevertheless, the difficulties are so great, complete success cannot be assured, and all or some parts of the alternatives may have to be considered.

* See addendum for further discussion and recommendations.

ISSUE 1: There is a need to improve manning and training of Reserve and Guard to achieve necessary readiness.

DISCUSSION:

- o Contingency plans require immediate combat readiness of many important units on mobilization.
- o Manning and training are inadequate in many RC units.
- o Possible solutions include:
  - — Reduce contingency plan requirements.
  - — Return various critical units to the Active Army.
  - — Take measures to improve readiness.

RECOMMENDATIONS:

1. High leverage manning improvements can be achieved thru:
   - o DCSPER increasing full time manning of RC units.
   - o DCSPER providing an enlistment voucher at End of Term of Service (ETS) for separating soldiers which can be turned in for cash by joining RC TPU.
2. High leverage training improvements can be achieved thru:
   - o SA/Office Chief of Army Reserves (OCAR) funding and executing a tailored IRR involuntary training program to fill known vacancies.
   - o DCSPER providing flexibility for annual field training by seeking legislation to:
     - — Increase authorized annual training up to 21 days.
     - — Increase from 14 to 21 days military leave for federal employees.
     - — Permit tax credits for employers who employ RC TPU personnel.
   - o DCSPER/TRADOC - increasing use of simulators particularly for command and control training - integrate with increase maneuver training.
   - o DCSOPS and FORSCOM assigning specialized missions for Guard divisions.

BACKGROUND:
Recruiting and retention in the Active Army are generally satisfactory, but can be improved. In the RC both recruiting and retention fall well below needs, and important improvements must be rapidly implemented.

The Army should continue supporting the Education Assistance programs and work for repeal of the termination date of the Vietnam-era GI Bill. Benefits should be transferable to family members after a specific number of years of service. The Army should work for a new package of education benefits that would emphasize reward for loyal service and supplemental benefits for soldiers with critical/hi-tech skills. This package should also include benefits for the RC.

Non-ETS attrition is high in the RC and this wastes money, strains limited recruiting and retention resources, and reduces the effectiveness of particular units. As a result, the ability of the RC to meet their mobilization mission is in doubt. However, it can be overcome, and must be solved at unit level by well established leadership principles. The effectiveness of squad leaders, platoon sergeants, and retention personnel in identifying potential sources of attrition and then commanders dealing with those problems will do more to lower non-ETS losses than any other means. The quality and content of training and hands-on experience are basic factors in RC attrition and retention.

A proper balance between mobilization of RC's and mobilization of industry is necessary. It is easier to get the people than to get the surge production to provide the weapons troops need in a prolonged war. Yet the two are not unrelated. There is much concern as to whether enough information is available and enough planning has been done to know whether there are serious conflicts between the needs of the Army and industry for personnel during mobilization. Overlapping of key personnel may negatively impact on either the RC or industry's ability to respond during mobilization and should be checked during mobilization exercises.

While Selected Reserve pay and bonuses are high enough to be attractive to the soldier, additional compensation must be considered for the additional demands on key personnel and junior leaders. (RC junior leaders are the same personnel who are beginning to move up in their civilian jobs. More and more time is being demanded by their employer, family, civic, social, or religious organizations.) If we expect to attract and keep the best leaders, be they officer or non-commissioned officer (NCO), and ask of them additional time for administration and/or training, then we must pay them.

There appears to be an exodus from the Army of nurses after their initial tour of duty. They are being lost to the civilian sector. This has the effect of creating a void in the mid-term, career professional nurse corps. Increased promotion opportunity along with incentives similar to those for the military doctor must be established to retain this target group and reverse the trend. Raising the maximum commissioning age for RC medical personnel should be considered. Training of career nurses at the Uniform Services University of Health Sciences should be reappraised.

* See addendum for further discussions and recommendations.

ISSUE 2: There is a need to improve recruiting and retention of forces - emphasis on RC's.

DISCUSSION:

- o Retention of high quality soldiers is particularly important.
- o Non-ETS attrition is high in RC.
- o There is a lack of data on who might be affected by joint mobilization of industry and RC.
- o More uncompensated time is being demanded of RC key personnel and junior leaders.

RECOMMENDATIONS:

1. DA/DCSPER push legislation to extend and improve GI Bill and place high priority on continuing education assistance programs.
2. TRADOC/FORSCOM increase leadership and command training for all RC TPU commanders, and leaders. Also, improve the effectiveness of junior leaders to identify and solve problems of subordinate personnel.
3. DCSPER/FORSCOM/NGB ensure that personnel key to civilian industry during mobilization are not the same personnel also key to RC mobilization - check in mobilization exercises.
4. DCSPER seek additional compensation for the additional administration and training time required of RC TPU personnel.
5. DCSPER/TSG significantly increase nurse recruiting for the RC and improve incentives for retention of all nurses.

BACKGROUND:

The importance of job and quality of life factors is attested to by the fact that the United States Army Research Institute for the Behavioral and Social Sciences (ARI) research in USAREUR indicates that between 70% and 80% of the enlisted personnel and officers gave job or family reasons for saying they would not extend. Knowledgeable officers and NCO's are, in general, strongly convinced of the positive effects of quality of life efforts on readiness. Furthermore, although relationships are complex and cause and effect relationships are difficult to ascertain, it appears that as quality of life expenditures increase at several sites, indices which indicate unsatisfactory behavior on the part of military members are going down. Research should be done on a continuing basis so that the impact of quality of life factors can be ascertained.

One of our most important recommendations is that quality of life be institutionalized so that programs will receive long range support. The Army cannot become complacent. We were pleased to see the Army Family Action Plan and the effort to develop a DCSPER Long Range Plan. These plans must provide for integrating quality of life programs, e.g., medical, dental, education, child care and development, and transportation. These must be related to acquisition, distribution, and separation programs. Therefore, it will be necessary to have a strong centralized organization or center with policy guidance from DCSPER.

Surveys show that retention is affected even for Army personnel with families as much or more by the condition of the work place. Therefore, we recommend that DCSPER develop and coordinate a Work Place Action Plan. We recognize and are encouraged to find that much is being done on specifics such as providing hard stands and work facilities and providing contract service to do non-professional jobs. In general, the objective should be to provide those facilities and organizations that will permit more time for training and the development of the professional soldier.

Not all programs need additional money, such innovative self-help activities as the Mayoral Program and Women's Center should be encouraged and a clearing house established to share new ideas. It is also important to have a balanced quality of life program for the Total Army taking into account differences such as between the Active, Reserve, and Guard and geographical such as CONUS, Europe, Korea, etc., and giving balanced attention to married and single.

* See addendum for further discussion and recommendations.

ISSUE 3: Impact of quality of life factors contributing to force readiness - need to be evaluated, improved, and assessed.

DISCUSSION:

- o Some data show that quality of life enhances retention, reduces unsatisfactory behavior, and improves readiness.
- o The Army has a good family action program, but this program needs to be institutionalized.
- o Surveys indicate job satisfaction is equally important to family life for retention.
- o The Army needs to have balanced quality of life program for the Total Army:
  - -- Single and married
  - -- CONUS and overseas
  - -- Active and Reserve

RECOMMENDATIONS:

1. DCSPER should plan for and establish a quality of life center as soon as possible.
2. DCSPER should develop and support the R&D community programs to assess periodically the impact of quality of life factors on readiness.
3. DCSPER should continue to support strongly the family action plan, especially those areas of the plan that support:
   - o Housing
   - o Medical and dental faciliities with augmented staffs
   - o Continuing education
   - o Child care and development
   - o Telephone and transportation in USAREUR
4. DCSPER should develop and implement new programs as soon as possible to include:
   - o A work place action plan
   - o A clearing house for innovative self-help programs (i.e., mayor's programs, women's center)

BACKGROUND:

At present the Army does not systematically require that personnel concerns in system designs receive equal billing with hardware concerns. To gain maximum effectiveness the equipping and manning of the Army should be approached in an integrated fashion at an Army-wide level.

The SS81 development of the five thrusts for Army 21 (then Air Land Battle 2000) was strongly given by the objective of multiplying the effectiveness of our total Army through the use of superior technology. Examination of the five thrusts during this present study indicates that three of these thrusts, namely Very Intelligent Surveillance and Target Acquisition (VISTA), distributed command, control, and communications Distributed Command, Control, and Communications (DC^3), and Self-Contained Munitions will probably have the most impact upon Army 21. These thrusts are driven by new and continuing improvements in Very High Speed Integrated Circuits/Very Large Scale Integration (VHSIC/VLSI), signal processing, data processing, automatic target recognition, artificial intelligence, and robotics as key technologies also identified in Defense Science Board (DSB) studies. Certain system studies indicate that significant manpower savings and greater effectiveness can be gained by taking a system approach to conceptual implementation of Army 21. The success of the Blackhawk Helicopter Program shows how sophisticated design can yield systems that are easier to operate and maintain.

We observed that the current personnel system components of the Army are not well integrated and seems to be composed of a number of stove-piped, unrelated operational systems which report directly to the DCSPER. Consequently, below the level of ODCSPER the impacts of Army 21 manpower quality and quantity requirements cannot be assessed in an integrated way, and little work focused on the Army 21 manpower requirements is underway. TRADOC needs to state future organizational and manpower requirements in an iterative manner. Conceptual system studies stating manning demand requirements need to be assessed under wartime scenarios as opposed to peacetime conditions. Trend analyses applied to such factors as immigration, birth rate, and national attitudes and policies can help firm up manpower supply requirements.

The Army personnel community needs to develop techniques through R&D to minimize the manpower quality and quantity demand requirements. This research should help answer a number of questions pertinent to the demand side of the problem, such as: Where should the brightest, most innovative people be assigned in Army 21? To what extent can clever equipment, systems, or training design reduce qualitative as well as quantitative manpower requirements? The supply side of the manpower problem for Army 21 should also be addressed by developing techniques and processes that will give reliable predictions of future manpower availability. The Army personnel community will need to assess the balance of future manpower supply to meet long range (10-20 years) total Army demand. The Army will need to assess the significance of any imbalance, gage its impact, and take appropriate measures.

We recommend that DCSPER develop a plan for a strong, integrated personnel operations organization as soon as possible. This system should integrate the various personnel-oriented field operating agencies (FOAs) and should provide the operational component both to implement the development of techniques to assess Army 21 manpower supply and demand and to assess the future manpower supply/demand balance.

* See addendum for further discussions and recommendations.

ISSUE 4: There is a need to develop techniques and processes for determining quality and quantity of manpower required and available for the future.

DISCUSSION:

- o Manning cannot be considered in isolation from equipping.
- o The examination of technological thrusts indicate that those driven by VHSIC/VLSI, signal and data processing, automatic target recognition, AI/robotics will likely have most significant effect for Army 21.
- o A total system approach to development of new classes of weapons can impact manpower required.
- o The Blackhawk Program shows how sophisticated design can yield equipment easier to operate and maintain.
- o Thrust demonstration program can help develop future personnel needs.
- o R&D is required to explore the manning implications of various Army 21 characteristics.
- o There is a lack of integration of operational components of the personnel system.

RECOMMENDATIONS:

1. TRADOC must state future organizational and manpower quantity and quality requirements based on characteristics of Army 21 — this is a continuing process.
   - o Conceptual system studies can indicate significant shifts in numbers and types of personnel.
   - o Trend analyses should be undertaken to develop organizational and manpower requirements.
2. The Army personnel community should develop techniques to:
   - o Determine quantity and quality of future manpower requirements.
   - o Determine ways to minimize quantity and optimize quality.
   - o Predict availability of manpower.
3. The Army personnel community should assess balance of future supply of manpower and take action to meet long range (10-20 years) total Army demand.
   - o The Army should institutionalize this process of forecasting future manpower quantity and quality requirements.
4. DCSPER develop a plan for a strong integrated personnel operations organization as soon as possible. This plan should:
   - o Integrate personnel oriented FOA's.
   - o Implement recommendations #2 and #3 above.

SUMMARY:

Our most important recommendations for mobilization had to be with expanding RC manning and training to improve readiness of those combat and support units deploying in the first 30 days.

The most important recommendation in quality of life is to institutionalize it. Establishing a quality of life center will be a major step.

It is very important to integrate personnel operations for both immediate and long range improvement in providing the needed quantity and quality of personnel. Establishing an integrated personnel system will be a major step.

The manning subgroup concluded that an integration of personnel acquisition with weapon acquisition is a must. This will be treated by the sub-group on Personnel Factors in Weapons System Performance.

SUMMARY

- Resource expanded RC manning and training to improve readiness of early deploying units.
- Institutionalize quality of life programs and establish quality of life center.
- Integrate personnel operations for both immediate and long range improvement in providing needed quality and quantity of personnel.
- Integrate weapons/personnel acquisition.

PERSONNEL FACTORS IN WEAPON SYSTEM PERFORMANCE

INTRODUCTION

Building military systems to optimize the performance of both soldiers and equipment is not exactly a new idea.

In 430 B.C., Wu Ch'I, an associate of Sun Tzu, declared to the Marquis Wen of Wei:

"At present, My Lord, during the four seasons you cause animals to be skinned and lacquer their hides and paint them vermilion and blue. You brilliantly decorate them with rhinoceros horn and ivory.

"If you wear these in the winter you are not warm, and in the summer, not cool. You make spears twenty-four feet long, and short halberds of half with leather; they are not pleasing to the eyes, and when used for hunting they are not light.

"I do not comprehend how you, My Lord, propose to use them.

"If these are made ready for offensive or defensive war and you do not seek men able to use such equipment it would be like chickens fighting a fox, or puppies which attack a tiger. Though they have fighting hearts, they will perish." (Sun Tzu, The Art of War, translated by Griffith. S.B. Oxford University Press, 1963, pp. 151-152.)

In Army 21, soldiers and equipment must be integrated as a total system involving system hardware, system software and the force the Army will actually be able to access, train, sustain, and retain. (See Appendix A for a discussion of total system development.) The requirement for the Army to move toward such a total system development process in force modernization has been articulated by several previous Army Science Board Summer Studies: Equipping the Army 1990-2000 (1981); Acquiring Army Software (1983); and The Future Development Goal (1983). The 1981 study, for example, noted that "Without operators and maintainers who can properly execute system functions, the high leverage technological advances in hardware -- the major force equalizer the U.S. is counting on -- will be lost."

- The Army's weapon system acquisition process must be better organized, managed, and resourced in order to maximize the capability of new systems by optimizing the performance of both their human and materiel components.

- Personnel policies need to catch up with the Army's technological initiatives.

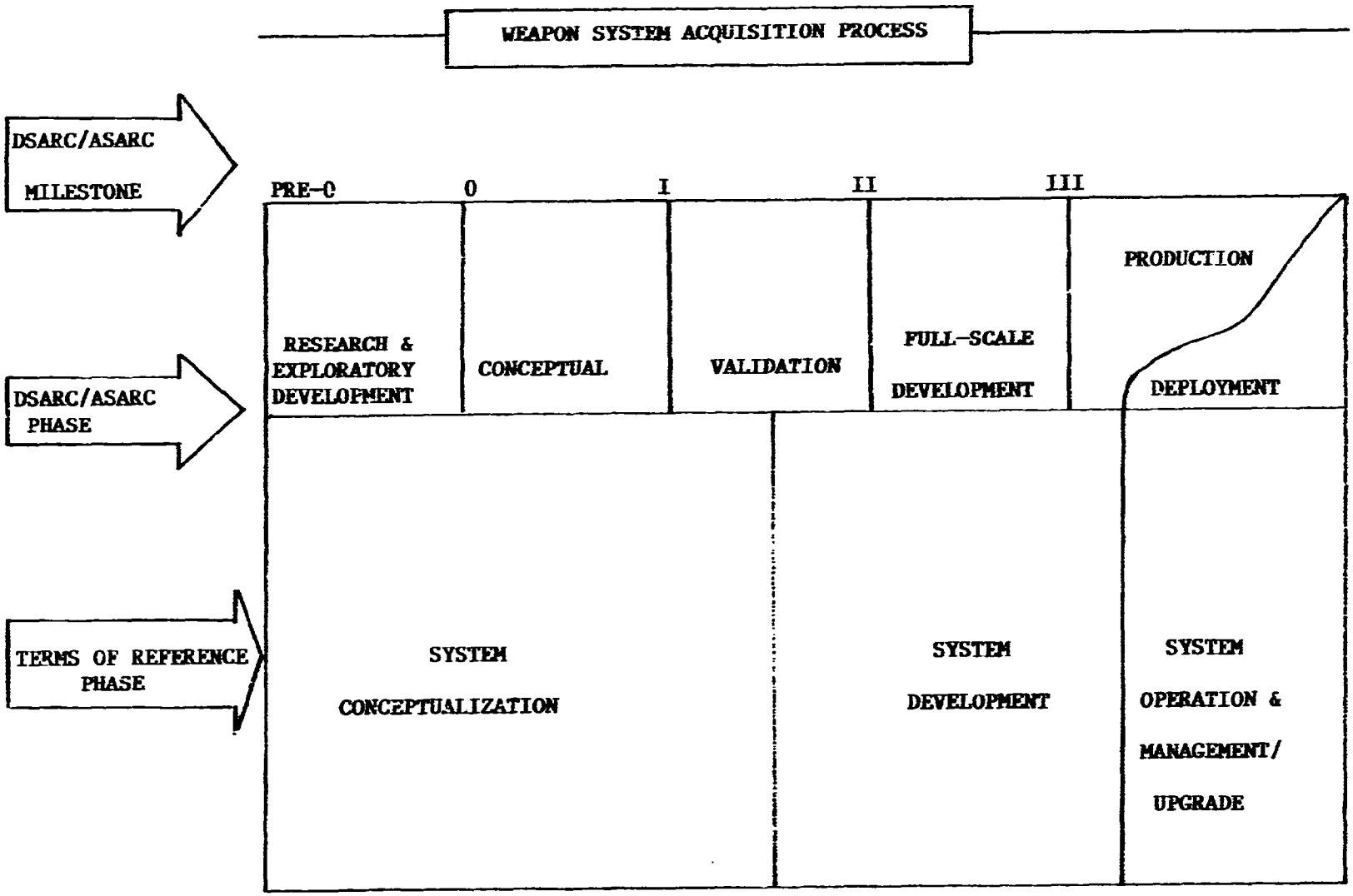
TERMS OF REFERENCE:

The Terms of Reference for this subpanel addressed these personnel factors in weapon system performance throughout the system's life cycle (See Figure below). Specifically, we were asked to:

- Determine the effectiveness of methods the Army uses to assess mental and physical processes/capacities which leverage weapon systems and unit performance. Are specific human capabilities required to obtain planned hardware performance? Is a mix of particular capabilities required within crews and units to achieve planned system performance? [System Conceptualization Phase]

- Evaluate means for the Army to better integrate human capabilities considerations into new system design and P³I [preplanned product improvement] efforts. What needs to be done to make human considerations a key factor in system concept development and system design? [System Development Phase]

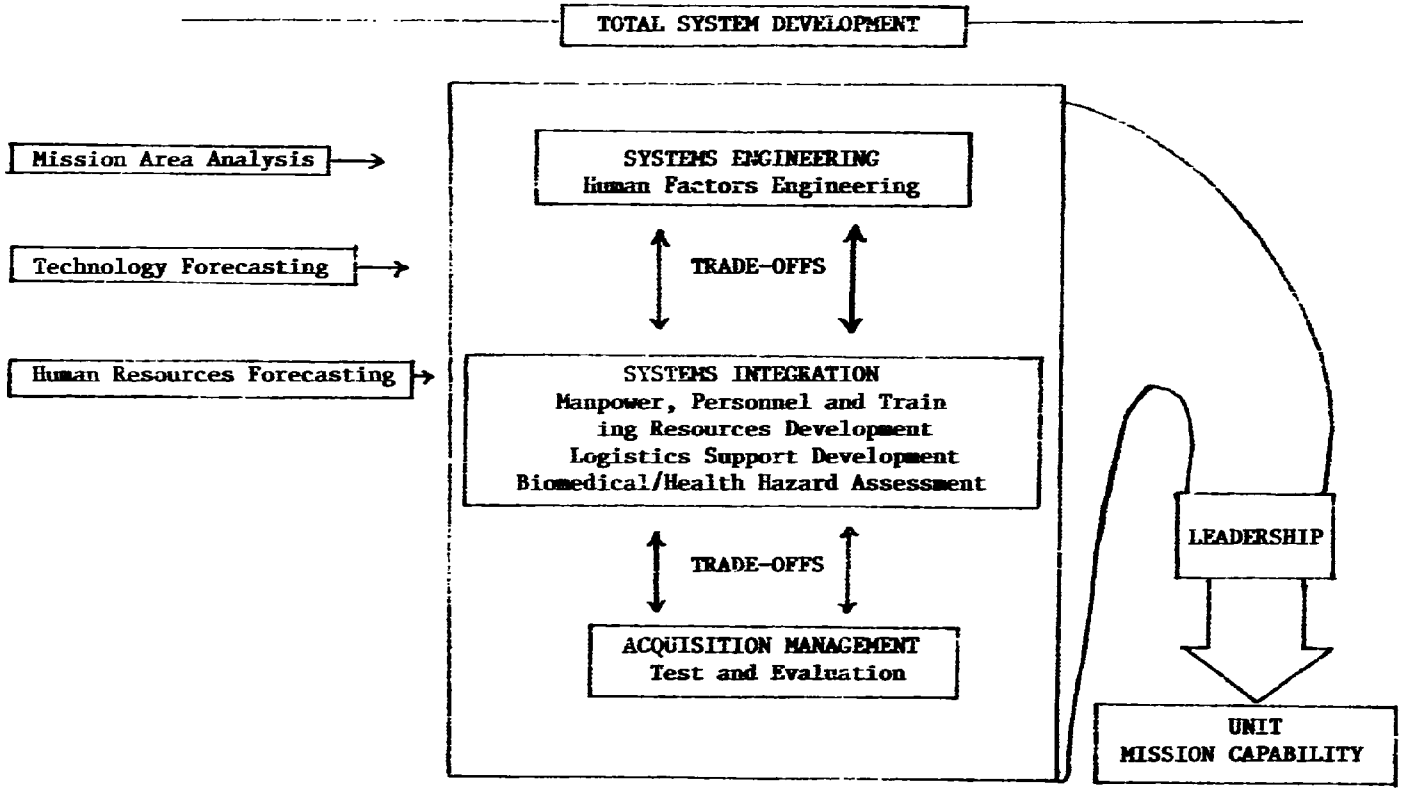
- Focus those methodologies that result in high individual and high group performance. [System Operation and Management/Upgrade Phase]


WEAPON SYSTEM ACQUISITION PROCESS
DSARC/ASARC
MILESTONE
PRE-0
0
I
II
III
DSARC/ASARC
PHASE
RESEARCH &
EXPLORATORY
DEVELOPMENT
CONCEPTUAL
VALIDATION
FULL-SCALE
DEVELOPMENT
PRODUCTION
DEPLOYMENT
TERMS OF REFERENCE
PHASE
SYSTEM
CONCEPTUALIZATION
SYSTEM
DEVELOPMENT
SYSTEM
OPERATION &
MANAGEMENT/
UPGRADE

The design objectives of a total system are achieved by integrating into the engineering design process the elements of human factors engineering, manpower, personnel, training and training equipment (HMPT). Also inherent in HMPT are many biomedical aspects and health hazard assessments, as well as test and evaluation. These factors interact with each other and with the design and should not be considered separately.

The integration of engineering design and HMPT must not only occur throughout system design, development, production, modification, upgrade and fielding but also from the earliest phases of component/system conceptualization. The fact is that systems acquisition often does not follow a standard model; new systems may arise in unpredictable ways. In any event, failure to incorporate HMPT in the technology programs, tech demonstrators and prototypes of industry and the US Army Materiel Development and Readiness Command's (AMC) subordinate commands results in systems which unnecessarily burden Army resources. HMPT must be integral to the total system, not bolted on later as an unplanned and thus costly retrofit.

The Army's Life Cycle System Management Model can be an effective process for total system development. However, the current process must be operated and managed with a different perspective and commitment. Heretofore, the imperatives in system development have been cost, schedule, and materiel performance. In total system development, the focus is on achieving mission capability rather than on materiel procurement. The project manager (PM) must be held responsible for building a system which can perform its specified mission when operated and maintained by well led soldiers. The combat developer must be charged with ensuring that the system is matched to the soldier the Army is likely to access, train, sustain, and retain. These mutually supportive obligations must be bonded in an interactive fashion which, in turn, yields the necessary total system perspective (See Figure below).


TOTAL SYSTEM DEVELOPMENT
Mission Area Analysis
Technology Forecasting
Human Resources Forecasting
SYSTEMS ENGINEERING
Human Factors Engineering
TRADE-OFFS
SYSTEMS INTEGRATION
Manpower, Personnel and Train
ing Resources Development
Logistics Support Development
Biomedical/Health Hazard Assessment
TRADE-OFFS
ACQUISITION MANAGEMENT
Test and Evaluation
LEADERSHIP
UNIT
MISSION CAPABILITY

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Over the past several years, the Army has significantly improved soldier-machine integration in system design. The following actions are recommended to provide the authority, focus and resources necessary to institutionalize and extend this total system development strategy in the Army:

- Institute a single HMPT authority equal to materiel throughout the system design and decision process;
- Focus and resource soldier research for improved total system performance;
- Establish HMPT initiatives with staying power in Army organizations and processes.

These broad recommendations are detailed below and keyed to the Terms of Reference.

BACKGROUND:

Effective and efficient development of total military systems requires that human factors, manpower, personnel, training, health hazard and biomedical activities (HMPT) be managed, resourced, and accomplished as a co-equal element with materiel during all phases of the weapon system acquisition process.

Total system development is a strategy for acquiring a unit's required operational capability rather than equipment or materiel. Within the Army, total system development is accomplished only with the genuine integration of humans and machines. In effect, the design performance of the system is dependent upon the performance of its human operators and maintainers as well as its equipment.

The missions of and the relationships among the numerous organizations with HMPT responsibilities in system development require clarification. For example, as the user representative in the development process, TRADOC is responsible for ensuring HMPT supportability of specific systems. The DCSPER establishes HMPT policy and provides assessments of the total force impact of specific systems (AR 1000-1, Basic Army Policies for Systems Acquisitions (1 May 1983), and AR 70-1, Research, Development and Acquisition Policy and Procedures (1 February 1983)). Technical support for HMPT and health considerations in systems design is provided by the ARI, Human Engineering Laboratory (HEL), Medical Research and Development Command laboratories, Health Services Command (HSC) and the Academy of Health Sciences.

All of the above organizations must operate as useful members of the PM's team for total system development to work. However:

o AMC PMs often view their HMPT support as too little, too late;

o TRADOC lacks the resources as well as sufficient trained and experienced staff to perform its HMPT mission adequately;

o DCSPER lacks the organizational structure, resources and sufficient trained and experienced staff to develop and provide the required guidance; and

o ARI and HEL lack the staff assets and/or field representation on the PM's team required to provide the necessary level of support.

Industry must be a key participant in total system development. However, great variability exists in HMPT capability and effectiveness in industry. As a result, many systems do not receive appropriate HMPT input during materiel acquisition.

ISSUE 1: To produce effective systems, HMPT must be an equal element with materiel considerations during the acquisition process.

DISCUSSION:

- o Total system/unit performance is a function of both human and materiel performance.
- o Numerous organizations are involved in HMPT activities; their responsibilities need clarification.
- o All HMPT-related organizations must support the PM; yet most organizations lack necessary resources and authority.
- o Industry must also be a key participant in total system development; yet, considerable variability exists in its HMPT capability.

RECOMMENDATIONS*:

1. TRADOC provide the Soldier Support Center (SSC) with focus/resources/authority to integrate personnel in all phases of total system development.
2. Expand the capability of the DCSPER to provide HMPT policy/guidelines for system development.
3. Resource HEL, ARI, and appropriate medical commands to provide on-site, dual reporting support to AMC subordinate commands.
4. AMC establish and protect funding for HMPT activities in system development process.
5. Army continue efforts to communicate HMPT goals to industry and provide incentives for industry HMPT efforts.

* See Appendix F for further discussion of recommendations.

BACKGROUND:

Human technologies hold considerable promise for improving soldier performance. For example, an accelerated learning program at a major command (MACOM) has demonstrated the feasibility of significantly enhancing the performance of a small group of soldiers. This project qualified 12 out of 12 soldiers in .45 caliber pistol marksmanship in 14 hours, compared to 8 out of 11 in 27 hours for a control group. Other human technologies have been employed to enhance the performance of select groups of skilled professionals. The potential application of some form of the relevant methodologies to broader groups of soldiers remains to be studied. Research and study in this field, however, is currently fragmented and pursued at a very low level of effort. Hence, it lacks the direction and critical mass required for effective development and transfer to the Army.

Robots, with varying degrees of artificial intelligence (AI), have the potential to enhance individual and collective soldier performance. However, there is concern that Army in-house research and developments in AI and robotics are not well linked or resourced. Further, the same rigorous standards of HMPT integration proposed above for total systems development should be adhered to in robotic/AI developments.

The Army Development and Employment Agency (ADEA), together with the 9ID (Motorized) (MTZ), represents a potentially high yield source of HMPT test data. ADEA's short development cycle and the Division's proximate field training site make possible the timely testing of analytical tools, techniques, and research products for soldier-machine integration and the collection of system-related HMPT data.

ISSUE 2: Improvements in soldier performance are required to achieve enhanced system performance.

DISCUSSION:

- o Human technologies hold considerable promise for improving soldier performance. Research and study in this area is fragmented and pursued at a low level of effort.
- o Robots, with varying degrees of AI, have the potential to enhance individual and collective soldier performance.
- o ADEA and 9ID (MTZ) represent a potential high yield source of HMPT test data.

RECOMMENDATIONS*:

1. DCSPER establish a general officer (GO) director for soldier research, within ODCSPER.
2. AMC ensure that current robotics and AI research, development, test, and evaluation (RDTE) programs provide an adequately resourced, coherent, comprehensive development strategy for intelligent robots.
3. Expand mission of ADEA to accomplish testing and evaluation of tools for soldier-machine integration and collection of HMPT data. Resource ARI, HEL, The Surgeon General (TSG), and HSC to support ADEA.

* See Appendix G for Further Discussion of Recommendations

BACKGROUND:

A range of applied methods exists to accomplish both supportability assessments and new system designs. Further, the soldier-machine interface can be improved by utilizing the knowledge accumulated by the disciplines of cognitive psychology, human factors engineering, and from biomedical/health hazard assessment. At present, many of these methods and the lessons-learned from their application are not well documented and thus remain largely unknown to potential users.

Research is required to extend the capability of current applied methods in systems design in the areas of: simulation, test and evaluation, and soldier-machine tradeoff and sensitivity analyses. Particular attention should be given to design simulation and training simulation to include the concept of trainability.

Capital investment in facilities is required to transfer these methods and tools to the user. Such tools as design simulation can provide, on a quick reaction basis, the quantitative results for effective soldier/-machine design.

The Army does not have a career pattern for officers and civilians engaged in HMPT programs. Consequently, many positions are regarded as non-career enhancing, and much expertise is lost to ongoing programs through personnel turnover. A similar finding regarding career paths for scientists and engineers was noted in the 1982 ASB Summer Study, Report of Panel on Science and Engineering Personnel.

ISSUE 3: The increased awareness of and attention to personnel factors in weapon system performance require institutionalization.

DISCUSSION:

- o Existing methodologies applicable for supportability assessment, system design, and improved soldier-machine interface are not widely used nor well documented.
- o Research is required to extend the capability of current methods in systems design in simulation, test and evaluation, and soldier-machine trade-off and sensitivity analyses.
- o Capital investment in facilities is required to transfer these methods and tools to the user.
- o No career pattern for officers and civilians engaged in HMPT.

RECOMMENDATIONS*:

1. DCSPER establish a clearing house of lessons-learned and documentation for HMPT tools and technologies to be used by Government and industry personnel.
2. DCSPER focus soldier/machine RDTE programs on tools and data bases for simulation, test and evaluation, and trade-off and sensitivity analyses.
3. AMC provide capital equipment necessary to support HMPT design input at subordinate commands.
4. DCSPER establish career tracks for officers and civilians engaged in HMPT activities.
5. Establish a GO total system development steering committee to encourage HMPT initiatives in system design.

* See Appendix H for further discussion of recommendations.

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LEADERSHIP

INTRODUCTION:

Army-21 envisions a dispersed future battlefield with extremely mobile forces, highly lethal weapons systems, and an intense electronic environment potentially capable of severe disruption of C^3. The battle scenario produces a rapid pace of events, extensive intermixing of forces, and "islands of conflict" as units are isolated and forced to operate independently. In this environment, leaders at all levels will need better thinking and leadership skills than ever before.

First, leaders must be tactically and technically competent and have highly developed analytical skills. The time frame of the battlefield will be so compressed that decisions must be made quickly, and the results of those decisions are so consequential that they must be made correctly.

Second, since land forces on future battlefields will depend on technology and be intensely interdependent, leaders in the future must understand and be cognizant of the factors entering into making decisions and the effects (both first and higher order) of those decisions. They must understand that the smallest parts of the Army are systems which interact synergistically to become the entire system. (And, secondarily, that the Army is also part of a larger system.)

Third, since Army-21 predicts independent action as the norm, leaders must know and trust their subordinates to a greater extent than was necessary in previous eras, empowering those subordinates to make relatively independent decisions. Leaders must also have communicated their personal ethos and intent well, since subordinates may be forced to operate independently but in concert with the commander's intent. Also, leaders must earn the implicit loyalty and trust of subordinates in order for the expected independent action to lead to successful mission accomplishment.

Fourth, and finally, since Army-21 envisions the future battlefield as being "information rich" and dependent on long distance communication, individual leaders must be able to manage time and information to a greater extent than ever before. They must also develop more intimate knowledge of their subordinates, working closely with and developing them so that communication in the electronic environment is made more facile.

In general, then, Army-21 leaders must be able to analyze information, make decisions, and communicate more efficiently and accurately than was necessary in previous eras; however, such leadership qualities are not radically different from those necessary to leaders today or in earlier times. More, they differ in intensity and emphasis and the development of leaders for Army-21 must be more carefully managed than was necessary previously.

TERMS OF REFERENCE — LEADERSHIP:

The Terms of Reference given to the subpanel consisted of four points:

- Ascertain the most effective approach to leadership development for Army-21, to include practical leadership assessment techniques, new ways to develop system-thinking skills, and mechanisms for early identification of officers with senior officer potential.

- Clarify those cultural, economic, and technological changes that will have the most impact on leaders in Army-21, and describe how the Army should link those impacts to the design of future leadership development programs.

- Analyze how leaders at different echelons (platoon, company, battalion, etc.) would function on the Army-21 Battlefield (Air-Land Battle Doctrine), particularly in the "islands of conflict."

- Assess whether the new doctrine will require new and unique leadership principles, how current principles should be applied, and how the Army can create a command climate which will allow effective leadership within these "islands of conflict."

The philosophic basis for the practice of leadership in the Army is anchored in the profession of arms. The mission of the profession of arms is the management of the use of force in the conduct of war. The mission of the US Army, as part of the profession of arms, is to ensure the security of the Nation by "deterring any attack on US national interests, and, if deterrence fails, to engage and defeat any enemy in any environment." In judging leader behavior, we posit that ethical behaviors are those which support that mission; unethical behaviors are those which detract from it.

Our visits to units and installations throughout the United States and in Germany made the committee cognizant of much that is worthy of praise, but also much worthy of concern and continued inquiry. Army senior leadership must accept responsibility for both the strengths and weaknesses of the Army, and must legitimize the profession of arms through self-regulation of ethical behavior.

It is imperative that means be found to maintain the accomplishments of recent efforts in the areas of leadership and ethics and to affect solutions which directly solve the problems which make the Army more ready to accomplish the mission. Success in this regard depends on strong and obvious commitment by senior leadership to the ethical conduct of the profession.

Leading the Army is the moral charge given to the Army civilian and military senior leadership. The ASB can assist in that task by suggesting several changes to the leadership development program which will improve the ethical climate, total readiness, and mission accomplishment.

We, as a panel, restated those four into a single question: "How can the Army most effectively develop leaders now and for Army-21?" Then, limiting the problem to one which could be studied within the time allotted, we concentrated on leadership development in the Army Officer Corps, touching only tangentially on the NCO Corps and ignoring, entirely, the civilian sector.

ISSUES: The leadership development structure for officers within the Army consists of three parts: formal, precommissioning education for which TRADOC/Reserve Officer Training Corps (ROTC) and DCSPER/United States Military Academy (USMA) are responsible; formal, post-commissioning education for which TRADOC and DCSOPS/Army War College (AWC) are responsible; and an informal program for which assignment units are responsible. While the formal education components are extremely important in developing technical and managerial expertise, it is the informal officer development program, the process of "learning by doing" and "learning by example" and the process of evaluation, which most effects an officer's development. It is also the development process which is least susceptible to change.

We will, therefore, structure our recommendations beginning with those centered on the informal leadership development process and follow with those aimed at the formal education process for officers; and finish with those directed toward better structuring of leadership training, according to the following outline:

ISSUES:

1. Informal Leadership Development
2. Formal Leadership Development
   a. Pre-commissioning formal education
   b. Post-commissioning formal education
3. Leadership Training Integration
4. GO Development

BACKGROUND:

The Army-21 battlefield is envisioned as an extremely lethal arena, dotted with "Islands of Conflict" in which commanders must make timely, independent decisions which will ensure that units complete missions. Thus, commanders at all levels must not only be able to engage in creative decision-making, but they must possess the confidence, skill, and understanding of command intent to do so independently. Understanding of command intent and having command trust will become even more critical as battlefield communications become more problematic and the pace of battlefield events accelerates. (Even if communication capability is available for command and control, the pace of battlefield events would cause overload of command nets if decision-making is heavily centralized.) Thus the peacetime environment must be designed to intensify superior/subordinate relationships and produce the shared understanding required for disciplined independent action.

Given a strong professional knowledge base and adequate intellectual skills, Army leaders develop the traits necessary for leading soldiers and accomplishing mission in the Army-21 environment through informal development under the mentorship of superiors as provided in AR 350-1. Peacetime training environments must leave room for error and learning by experience or association. A "zero defects" Army, as it is now perceived by some, does not allow for the opportunity for comprehensive training which develops the leadership qualities so essential to the future battlefield. Necessary is a healthy "command climate" which avoids the "zero defects" perceptions and attitudes, fostering an environment which promotes learning through practical experiences, with margin for error. The majority of such training and related experience occurs on an informal basis on and off duty at unit level. Informal leadership development of subordinates varies with the background of the unit commander as well as the type of unit, mission, and priorities. Additionally, application of an evaluation system determines directly which traits are developed and which are discouraged.

AR 623-105 prescribes how and when Officer Evaluation Reports (OER) will be made (DA Form 67-8). Regulations also provide for utilization of OER support form (DA Form 67-8-1) which is helpful to officer communications and to the counseling on an officer's manner of duty performance. This procedure, when followed, enhances professional development of subordinates as required in support of the Army-21 scenario. Training of leaders in constructive counseling and evaluation methods is also important to the process of informal development. Additionally, it is essential that promotion and other selection boards give recognition to those officers who possess the professional talents and commitment to developing their subordinates. Such efforts contribute to unit cohesion and to commander-subordinate relations built on mutual respect and confidence.

An informal, structured, Army-wide professional self-development program would contribute to informal officer/leader development. Such does not now exist, but depends upon the initiative of the individual. While training devices, battle game kits, and other instructional means often exist in units, there is little focus on their use by the individual seeking self-development. Some service schools and other activities have recommended professional reading lists, maximum use should be made of these incident to professional development. We must promote opportunities for leaders to train and develop themselves as well as their subordinates.

ISSUE 1: The current Army informal leadership development system does not enhance the qualities necessary for leaders (on the Army-21 battlefield and in peacetime) — independence, creativity, and flexibility in battlefield decision-making.

DISCUSSION:

- o Many officers report that superiors fail to spend time mentoring and developing subordinates, in spite of guidance given in AR 350-1.
- o Many officers view the Army as a "zero defects" Army, especially as concerns the approach taken to evaluation of their duty performance in units. This stymies initiative and individual professional development.
- o Many officers report they are seldom or never formally counseled concerning standards of duty performance and that evaluations (OERs) are less based on success in assignment, quality of work, and creativity than on getting along, not "making waves," and not making mistakes.
- o Training of leaders in constructive counseling and evaluation methods is important to the informal development process but is not now available in the Army.
- o Many officers indicate that the OER support form (DA Form 67-8-1) is not used early in the OER reporting period, and, in some cases, is filled out only just before the OER is rendered. Professional development would be increased by adherence to established procedures.
- o Some means to facilitate informal leadership development in units are available (simulators, battle game kits, and classroom instruction means) but are often not fully utilized due to other commitments and unit priorities.
- o An informal, structured Army-wide professional self-development program does not exist. Efforts are largely dependent on individual and collective initiative.

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RECOMMENDATIONS:

1. SA and CSA place emphasis upon the role and importance in both units and headquarters of informal officer leadership and other professional development.

2. DA and all subordinate commands reinforce leader training of subordinates by:
   - o DA/DCSPER and MACOMs place emphasis on appropriate use of the OER support form and the concept of counseling for officer development.
   - o TRADOC develop a concept which defines mentoring and produce training packages to train mentors. DCSPER develop policy to support mentoring in personnel management.
   - o DCSPER change AR 623-105 to require the rater to meet with the rated officer within the first two weeks after reporting for duty and to:
     - oo Clearly define duty requirements/job description for rated officer.
     - oo Clearly articulate rater's organizational goals.
     - oo Establish deadline for rated officer to complete OER support form NLT 30 days after assigned and schedule follow-on meeting.
     - oo Insure that additional meetings occur at least once each quarter.
   - o DCSPER change the DA Regulation to require that Senior Rater receive a copy of the completed OER Support Form within 45 days of the start of the rated period.
   - o DA/DCSPER place particular emphasis on realistic evaluation of leaders on contributions to the development of their subordinates.
   - o TRADOC provide training for officers in constructive counseling and evaluation.
   - o DCSPER give promotion boards guidance to select for promotion those officers who are clearly committed to subordinate development.

3. TRADOC develop an Army-wide, informal professional development program for officers at all levels by:
   - o Setting forth guidelines for informal development programs in units.
   - o Developing and/or compiling, and making available, materials appropriate for self-development.

BACKGROUND:

Commanders on the future battlefield will be forced to make decisions quickly and accurately while managing a broad range of variables. The quality of these decisions depends on experience, technical and tactical knowledge and ability, and a shared understanding of unit mission.

Essential knowledge, skills, and abilities include the ability to apply analytical processes to decision-making; general problem solving skills; mathematical skills; and written and oral communication skills. Foundations for these skills are developed in pre-commissioning education (USMA, ROTC). The skills are then enhanced and honed through post-commissioning experience and education.

Also essential to good leadership is having a conceptual and historical perspective of the military as a profession. This perspective is developed during pre-commissioning education in history, military history, and political science courses.

Responsible for pre-commissioning education are DCSPER/USMA, TRADOC/ROTC, and the American system of higher education. TRADOC schools are subsequently responsible for maintaining and enhancing basic skills while imparting professional/technical competencies. A disciplined, systematic acquisition of basic intellectual skills in pre-commissioning education enables post-commissioning education to achieve a higher quality, reduce time and energy expended in remedial work, and enhance the officer's professional development. We believe that, within the present system, skills acquisition is not adequately required, tested, or tracked through pre- and post-commissioning.

ISSUE 2: Pre-commissioning preparation in basic intellectual skills (mathematics, written and oral communication, and historical perspective) required of future officers is not standardized.

DISCUSSION:

- o Basic intellectual skills serve as the foundation for post-commissioning professional development.
- o In general, TRADOC schools (Officer Basic Course [OBC], Officer Advanced Course [OAC], Command and General Staff College [CGSC]) indicate that officers lack adequate written and oral communication skills.
- o Testing of basic intellectual skills is not consistently executed either in pre-commissioning education or in the TRADOC school system.
- o For pre-commissioning preparation in basic intellectual skills and historical perspective, ROTC requirements include only single courses in written communication, human behavior, national security policy, military history, and management. USMA requirements are more extensive.
- o Course standards are not comparable across schools with ROTC programs.

RECOMMENDATIONS:

1. TRADOC/ROTC and DCSPER/USMA require college-level skills courses for future officers to include two courses in written communication, one course in oral communication, one course in logic, mathematical skills through statistics and/or calculus, and three additional courses which have significant writing components. All courses must attain acceptable standard levels.

2. TRADOC/ROTC and DCSPER/USMA institute the use of the Officer Selection Battery (or some other appropriate test) to enforce appropriate skill levels for Military Science III (MSIII) candidates and junior year West Point cadets, and provide diagnostic and remediation possibilities for those not meeting standards.

3. TRADOC schools institute a consistent, comprehensive evaluation program for basic intellectual skills and provide developmental experiences to maintain those skills at appropriate standard levels.

4. TRADOC/ROTC and DCSPER/USMA require two courses in World History, one course in US History, and one course in Military History as the foundation for understanding the military as a profession.

BACKGROUND

The "islands of conflict" concept of the Army-21 Battlefield will require a far greater quality of leadership from our younger officers. The products of our TRADOC branch schools will be expected to possess technical and tactical expertise and interpersonal skills not previously expected from junior leaders.

TRADOC Branch Basic and Advanced Schools are responsible for developing those qualities but are understaffed. Platform instructors are overutilized and are frequently of equal or lesser rank and have less command experience than many of the student group.

In addition to the heavy teaching load, these same instructors also develop course material and write branch doctrine. (The formulas used to compute the manning requirements in TRADOC are not adequate for providing the required instructor faculty. Doctrine development, training development, and instruction is currently the responsibility of the instructional faculty. Current student/faculty ratios are not adequate for quality instruction. A result is student evaluation largely through true/false or multiple choice testing. Written, oral, and thinking skill development suffers.) Finally, there is little continuity or institutional memory in the TRADOC system because military instructors are transient.

All of the above factors help lower the quality of instruction at the TRADOC schools, the problems caused by them are further intensified as officers view teaching assignments at the schools as "non-career" enhancing and actively avoid them.

We believe that these problems can be solved by altering the structure of the TRADOC schools, altering the assignment procedures, and altering the manner in which Service school assignments are factored into promotion decisions.

ISSUE 3: The TRADOC School System is not staffed or structured to fulfill the military/professional education and doctrine development mission for Army-21.

DISCUSSION:

- o Branch doctrine development and small unit leader training is critical for Army-21.
- o Faculty turbulence results in lower quality training. No permanent military faculty exists. Military expertise is wasted by use of military instructors to teach subjects which civilians could teach.
- o The TRADOC schools are understaffed. Instructors are overutilized.
- o Some platform instructors are less experienced and of lesser rank than their students.
- o TRADOC schools are not manned adequately in order to achieve student/faculty ratios necessary to provide adequate training.
- o Instructors write doctrine, develop instruction, and teach. This load forces short cuts in training and evaluation technology such as use of true/false, multiple choice testing in inappropriate situations.
- o Instructors lack requisite command experience. TRADOC instructor assignments are not considered career-enhancing.

RECOMMENDATIONS:

1. TRADOC develop and implement a plan for its school system (including CGSC) to add a permanent military faculty core responsible for the quality of instruction, for mentoring those faculty members who are transient, and for developing doctrine.

2. US Army Military Personnel Center (MILPERCEN) identify senior field grade officers as candidates for permanent faculty. TRADOC establish formal selection boards to evaluate and select senior officers for permanent military faculty positions.

3. DCSPER develop new staffing guides in order to ensure adequate staffing of TRADOC service schools and maintain staffing levels at 100% of requirements.

4. TRADOC upgrade the quality of instruction at branch schools by:
   - o Establishing criteria for instructor selection.
   - o Lowering the student/faculty ratio to enhance instruction.
   - o Ensuring school commandants make instruction the highest priority.
   - o Not using uniformed military to teach such subjects as remedial English where military expertise is not required.

5. CSA instruct promotion boards to regard instruction at Service Schools as a key professional development assignment, encourage senior officers to volunteer for permanent military faculty positions, and encourage rating officers to identify potential candidates for TRADOC instructor positions.

BACKGROUND:

Quality of leadership in Army-21 will be so important that leadership training (both pre- and post-commissioning) should be as efficient, effective, and in-depth as possible. While many leadership traits develop as the result of experiences and individual mentoring, some talents and abilities are developed in guided exercises, classroom experiences, and formal leadership training. Formalized leadership training and informal leadership development are interactive and each enhances the other.

Formal training occurs during both pre- and post-commissioning through TRADOC/ROTC, DCSPER/USMA, and TRADOC schools as advised by the Center for Army Leadership (CAL) at Fort Leavenworth. Informal leadership development can occur anywhere in the organization and indeed should occur everywhere throughout an officer's career.

Coordination of leadership curricula throughout pre- and post-commissioning and development of the sequential, progressive nature of that training is essential to adequate leader development. Such coordination is not now occurring. Strong emphasis must be placed on mechanisms for dissemination of "leadership" knowledge among the formal and informal leadership training environments and between the two. Additionally, developmental evaluation of the effectiveness of leadership training is necessary.

ISSUE 4: Leadership training in pre- and post-commissioning is not coordinated, sequential, and progressive throughout all aspects of training and professional development.

DISCUSSION:

- Pre-commissioning leadership education differs in quality and substance between ROTC and USMA, since leadership curricula were developed by two significantly different groups (USMA/Behavioral Sciences and Leadership [BS&L] and ARI/Deputy Chief of Staff for Reserve Officer Training Corps [DCSROTC]).
- The Leadership Test-Bed at Fort Hood does not have a formal, direct relationship with either CAL or other organizations within the Army.
- Post-commissioning leadership education is not integrated with that of pre-commissioning.
- Integration and sequencing of post-commissioning leadership education has not yet occurred because the Center for Army Leadership is relatively new and understaffed for its mission.
- There exists little formal connection between the Center for Army Leadership (CAL) and the USMA/Department of Behavioral Sciences and Leadership, the two centers of leadership knowledge.
- Formal and informal post-commissioning leadership development are not coordinated or integrated.
- Although it exists, pre-commissioning ROTC development evaluation in leadership (Leadership Assessment Program) is seldom used.

RECOMMENDATIONS:

1. DA place USMA and ROTC under a single authority to enhance the coordination of the pre-commissioning leadership curriculum. (DCSPER Lead)

2. DA formally establish Fort Hood as the Leadership Test-Bed. (DCSPER Lead)

3. DA and TRADOC adequately staff and fund the Center for Army Leadership to:
   - Establish a leadership assessment center at the Combined Arms Center (CAC).
   - Develop and integrate a pre-/post-commissioning sequential, progressive formal leadership training program (ROTC, USMA, and TRADOC).
   - Develop leadership and ethics doctrine.
   - Coordinate leadership and ethics training development.
   - Coordinate research and studies which identify and examine leadership issues.
   - Establish a "CAL Cell" at the Fort Hood Leadership Test-Bed to capture the "lessons learned" for dissemination throughout the TRADOC school system and to units in the field.
   - Establish formal feedback mechanisms for leadership developments from the Army in the field.
   - Provide a capability to act as the integrating center for leadership doctrine development, program evaluation, and assessment.
   - Coordinate study and development of a pre-command assessment battery to assist command selection boards.

4. USMA and ROTC develop the Leadership Assessment Program (LAP) so that it is easily used throughout the four-year curriculum to develop officer candidates' leadership qualities. (DCSPER Lead)

BACKGROUND:

The challenges of Army-21 will require that our senior leaders have the skills and competencies to deal with the increased complexities of that environment. The General Officer Personnel Management System is the vehicle designed to make this happen. Its responsibilities include selection, assignment, and professional development. There is general agreement that today's selection process is adequate to meet the challenge; however, the entire area of professional development offers major opportunities, but is now neglected. New GO's are seldom given time to prepare for first assignments and continuing GO's are often not prepared for the significantly different challenges presented by new assignments. Additionally, GO's are seldom mentored or counseled by superiors.

Several initiatives are on-going in this area: The Bagnal Study Group is gathering survey data to determine what GO's do and how they do it; a Senior Leadership Coordinating Committee (SLCC) has been established to determine continuing education requirements of GOs and Senior Executive Service (SESs), a reference manual for GOs is being drafted, and longitudinal data is being gathered on new Brigadier Generals.

All of these activities suggest that we will soon be in the position to improve the professional development component of GO management, but it must be accomplished in a systematic way. Toward that end, several areas demand immediate attention.

ISSUE 5: Personal and professional development needs of GO's (in particular BG designees) are not satisfied by current programs.

DISCUSSION:

- BG designees require more than the BG/SES Orientation Course to transition into GO rank and prepare properly for their first assignments.
- All new GOs attend a two-week BG/SES Orientation Course.
- Attendance at the Center for Creative Leadership is offered to all new GOs (66 have attended and recommend it in terms of identifying personal development needs). Key to its success is the quality of the professional test assessor/counselor.
- Additional development is occasionally available in the areas of individual executive development, inter-assignment orientations, specialized training and periodic information updates.
- GOs are not systematically prepared for new assignments. The greatest obstacles seem to be time and the knowledge of what is required to "hit the ground running."
- There is no data base that defines what skills and competencies are required for each GO assignment and there is no system to identify the skills and competencies individual GOs possess. Thus, there is no system to select or to design specific professional development packages.
- There is no formal obligation for senior GOs to mentor subordinates, thus this aspect of professional development may or may not happen.
- There are several studies ongoing that will gather GO professional development data. These data and the resulting recommendations are not being centrally analyzed or coordinated.

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RECOMMENDATIONS:

1. DCSPER design a systematic general officer orientation program which includes:
   - o Continuing and improving development of the BG/SES Orientation Course.
   - o Directing expansion of GO attendance at the Center for Creative Leadership simultaneously developing an internal capability for similar training so that all new GOs attend prior to their first assignment.
   - o Establishing a systematic professional development program for all GO's based on assignment by taking the following steps:
     - oo Develop a data base that identifies skills and competencies necessary for each GO position.
     - oo Develop a capability to assess skill/competency voids in individual GOs and design courses that develop those skills.
     - oo DCSPER design job specific development programs for all GO positions so that assigned GOs can be properly prepared for their next assignments.
     - oo Establish a policy that directs all GOs being reassigned to meet with the new superior to determine specific job requirements. Then, using the superior's evaluation of the skills/competencies necessary for a given job and the superior's evaluation of shortfalls in the subordinate's background, structure a content development program, allotting a minimum of six weeks for the GO to attend job specific course(s) prior to reporting to new assignment. Time expansions will occur if language training or some more lengthy course is required.

2. DCSPER formalize the mentoring requirement for senior GOs and provide training if required.

3. CSA establish the SLCC as the DA level vehicle to coordinate all GO initiatives. Data currently being obtained by the Bagnal Study Group and the Officer Personnel Management System (OPMS) Study Group should be passed to the SLCC and any recommendations for changes in GO personnel management should be coordinated with them. (DCSPER lead)

ADDITIONAL ISSUES REQUIRING INVESTIGATION

A. Formal testing of officers prior to promotion and/or command selection.

Promotion/Command Selection Boards base selection upon OERs and little else. A method of certification could be developed by TRADOC to provide an indication of professional competence. Those officers reticent to undergo such an exam possibly aren't prepared for advancement.

B. NCO Leadership Development.

An investigation of NCO development processes would be of value. There is some indication that NCOs aren't perceived by lower ranking soldiers as job knowledgeable. In Army-21 "islands of conflict" the NCO leadership role will increase in importance. Such items as the NCO professional school system, mentoring methods, technical training, and the relative roles of commissioned and non-commissioned officers could be assessed and improved.

C. Unit Performance/Leadership Assessment.

Leaders provide their units with the vision necessary to accomplish missions. Successful leaders know the combinations of unit resources needed to reach goals. Investigations of the relationships between leader performance and unit performance at National Training Center (NTC) and other field exercises would provide indicators/measures of the unique contributions of leadership to unit effectiveness. This would allow leader training, development, and evaluation to be clearly focused on unit mission accomplishment.

D. Academic Evaluation Reports.

Consistent with the proposal for qualitative improvement in the formal instruction presented by the TRADOC school system is the matter of Academic Evaluation Reports. Individual academic reports could include specific comment on the extent of students' academic achievement, potential for further formal schools, and leadership potential. Students' relative class standing could be included in the academic report.

ADDITIONAL ISSUES REQUIRING INVESTIGATION:

- o Formal testing of officers prior to promotion and/or command selection.
- o NCO leadership development.
- o Unit performance/leadership assessment.
- o Academic evaluation report.

SUMMARY

This constitutes the first ever ASB Summer Study sponsored by DA DCSPER. It marks a major juncture in amount of emphasis and attention given by the Army to human dimensions as key elements in total system development and deployment. Its focus is Army 21. There are reoccurring themes that run through all three subpanels' findings and recommendations. These constitute the salient points made in the detailed issues, discussions, and recommendations.

The Army has a real opportunity to take the lead in the military services in leadership matters, in addressing key quality of life dimensions and in integrating HMPT limiters with system hardware and software.

Significant progress has been made. Nevertheless, in the months of this Summer Study, we found that there is much room for improvement in these critical human dimension arenas.

This Summer Study's theme is "Confidence." The key concepts that crosswalk between all three panels are urgent and require action. They must not be lost in the Army's bureaucracy.

CREATING CONFIDENCE:
The Army's quality of leaders from E-5 to four star general sets the tone for everything the Army does. If leadership is flawed, there is little hope of creating confidence. We urge a systems approach to leadership development.

The current efforts to improve quality of life dimensions in both OCONUS and CONUS have raised expectations of the force — enlisted and officer alike. The Army needs to deliver on these. The Army needs to demonstrate — in how it spends its money — a clear commitment to improving the lot of its personnel world-wide.

However, it is noted that the Army still has a way to go in demonstrating causal relationships between resources devoted to these matters and improvements in both readiness and retention of desired personnel. We are persuaded of the correctness of the Army's intuitive professional judgment that quality of life is critical to readiness.

SUMMARY:

- Creating confidence
- Enhancing confidence
- Sustaining confidence

ENHANCING CONFIDENCE:

Confidence is enhanced by knowing you are ready to fight - and win. It is knowing you can win because of superior personal readiness, reliable weapons systems deployed in cohesive Active component units backed up by ready Reserve and National Guard Components.

There is an urgency in sorting out the realistic roles of the Active, Reserve, National Guard, and civilian components. This could be the Achilles heel in the rapid deployment force (RDF) and early deploying units. As an example, either boost the training time to the point where USAR and NG units are able to do the job prescribed for them or move those functions back into AC. Don't do this on a one-time basis. Continue this reassessment as the Army moves toward Army 21 becoming Doctrine with its consequent force structure charges.

We see the HMPT arena as having high leverage now and as the Army moves toward Army 21. This leverage potential can have real battlefield payoff in improving unit readiness, both Active and Reserve, and by making systems easier to operate and maintain.

We acknowledge that the jury is still out on the need for higher quality soldiers as we deploy higher technology equipment.

As the present concept of Army 21 matures into Doctrine, it will be necessary to develop allocation methods for employing the available talent with the Army's highest force multiplier systems.

SUSTAINING CONFIDENCE:

To preserve progress made in leading and manning issues, and to set the foundation for continuing improvement, it is absolutely essential for the Army to institutionalize those processes and changes.

Throughout all three panels the theme of institutionalizing these matters has been repeated. Some of the recommendations made by the subpanels have addressed specific fixes for specific problems. But there is a larger issue which calls for a more far-reaching approach.

During this Summer Study we found that over the last several years the Army has adopted programs that sought to redress and solve people-related problem arenas. These tended to become adjuncts to the DCSPER functions. This has placed the more recent DCSPER's in the role of being both the focus of policy development and operational accountability. The DCSPER is the only DA Staff principal in which this is the case. These accountabilities are delivered through more than ten field operating agencies — an awesome span of control.

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NEED FOR A PERSONNEL COMMAND:

It is time to create a Personnel Command. Move these field operating agencies under the command and make it the headquarters of the operational arm for personnel functions. This would permit the DCSPER to focus on policy issues as do the other Army Staff principals.

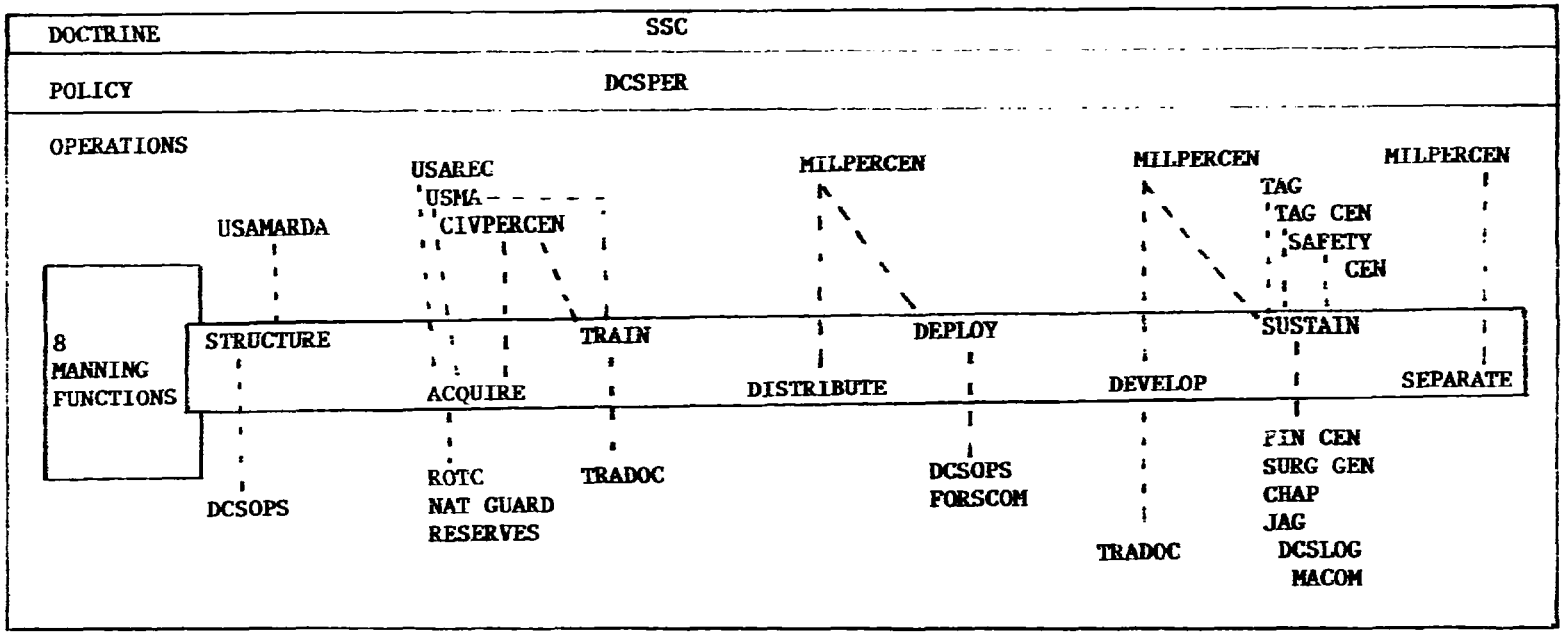
Putting these elements into such a command creates a single, coherent effective personnel operations entity. Such an operating command would streamline the current field operating agencies and permit better cross-leveling of resources among them. Further, it would be able to pull together programs and efforts, in the right priorities, that cut across the current structure.

The establishment of this command:

- Centralizes accountability and provides a single focal point for all personnel operations.
- Combines all current DCSPER field operating agencies into an integrated whole.
- Provides the integration, continuity, and priority currently lacking.
- Institutionalizes gains made in recent years.
- Does not include Surgeon General, Chaplain Corps, and Judge Advocate General.

STRUCTURE

CURRENT PERSONNEL SUBSYSTEM



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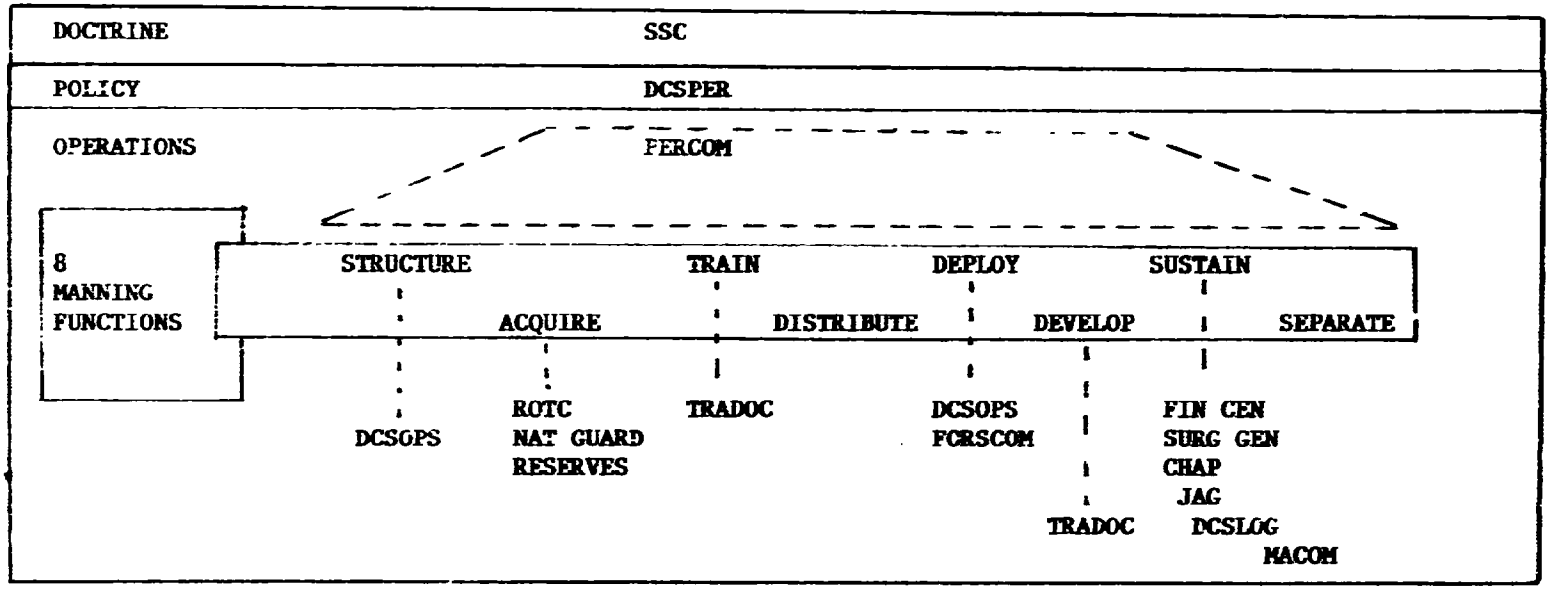
STRUCTURE
PROPOSED PERSONNEL SUBSYSTEM



This command is a logical extension of what already exists for the other staff elements of the Army. Note that each element has a key TRADOC integration center to articulate doctrine, a staff element to focus policy and operative commands to implement that policy and conduct the business of the Army — being prepared to fight and win.

PROPOSED STRUCTURE

DOCTRINE	LOGCEN	CAC	SSC
POLICY	DCSLOG	DCSOPS	DCSPER
OPERATIONS	AMC	TRADOC FORSCOM USAREUR	(PERCOM)

IN CONCLUSION

This Summer Study has surfaced, investigated, reviewed, and, in some instances, revisited prior human consideration concerns of the Army. Some of the issues may have been articulated before. But, out of the mass of data and array of matters having major impact on human performance effectiveness, and after our selective investigation, these stand out:

First - Concentrate on developing leaders in whom soldiers have confidence because those leaders are competent at their trade and care about those they lead.

Second - Elevate human factors to genuine parity with hardware and software technology so that soldiers have justified confidence in their tools.

Third - Make a reality the wiseness of the soldier's confidence in the Army as an institution that takes care of its own -- in the work place, in home life, and in maintaining wellness and in rejuvenating him/her.

Fourth - Institutionalize this new and renewed awareness to assure long term commitment, permanency of notable gains made and integration of war winning or losing human force multiplier factors.

Because this Army...

...is good at <u>who</u> it is (competent and well motivated)

...and <u>what</u> it is (combat ready and capable of winning)

...and <u>shows</u> it (through confidence).

ADDENDUM AND APPENDICES - INDEX

ADDENDUM

INTRODUCTION - FOUR ISSUES

1. Establish and maintain proficiency in the Reserves and Guard so as to provide necessary readiness. Are there sufficient "mission stoppers" to make this an impossible task?

2. Improve the selection, recruiting, and retention of forces with emphasis on the Reserve and Guard.

3A. Improve quality of life factors contributing to force readiness.

3B. Quantify and continually assess the impact of quality of life factors.

4A. Integration of weapons and equipment acquisition with personnel acquisition and training to optimize soldier-machine interface - in the near term, and the long term.

4B. Develop techniques and processes for determining quantity and quality of manpower required in the future.

INTRODUCTION

Both manning and equipping Army 21 pose great challenges to Army leadership. If the Army plans well and works toward proper manning and equipping of Army 21, it will be able to make incremental improvements resulting in increased performance in the nearer term as well as provide for Army 21.

SS 81 was aimed toward recommendations for equipping the Army to meet Air Land Battle 2000 concepts while SS 84 is aimed, at least partially, toward recommendations for manning Army 21. SS 81 resulted in a number of recommendations which in turn led to five Army Thrusts:

- VISTA
- Distributed C^3
- Brilliant or Self-contained Communications
- Bio-technology
- Soldier-Machine Interfaces

SS81 attempted to use technology to provide more intelligent equipment that would be easier to operate and maintain, and that would reduce numbers of personnel required for a given mission performance.

The theme of SS81 was "Remove the 'Fog of Battle' for us and thicken the fog for the enemy through Precision Fighting (Target Acquisition and Precision Weapons)."

In our considerations of Air Land Battle 2000/Army 21 manning requirements, we find that one of the most important qualitative implications is that leaders, particularly at company and battalion level, must think faster and make decisions more rapidly. Technology such as interactive displays, fed by data from VISTA and DC^3, can certainly aid in more precise thinking and in speeding up the decision making process. However, the Army is going to need intelligent, decisive leaders at various levels to accomplish the precision fighting required in Army 21.

There are also quantitative implications for manning to Army 21. We believe that the application of technology and the systems approach to both equipping and manning can lead to decreasing numbers for accomplishing certain missions. Whether this leads to a smaller or larger overall Army, an analysis is still required of the t reat for various time periods and what this implies regarding needed combat and support capability. The obvious implication for quality of life considerations is that we must continue to put more emphasis on attracting, retaining and stimulating intelligent quality soldiers.

We are convinced that some of the newer weapons systems such as Blackhawk, M-1, etc., demonstrate that when proper attention is given to fundamentals in design, plus the application of some sophisticated technology, the result is easier to operate, easier to maintain equipment. We believe that common sense approaches to the fundamentals of design for reliable, easy to operate, easy to maintain equipment, can be used in the future to make significant improvements in soldier performance.

We also note that increases in weapon systems performance are already stretching the skill of the present soldier to achieve the full potential of his weapons. What the Army learns in regard to selection, recruiting, retention, training, and assignment in the context of Army 21 will almost certainly be important in improving near-term manning and readiness performance.

Another implication of our consideration is the necessity for much greater utilization of simulation (especially C^3) and the essentiality of maneuver areas to assure readiness of Active and Reserve Components to do precision fighting. There will be little room for trial and error on-the-job learning on the real battlefield.

Manning considerations lead to far reaching implications for selection, organization, training, and wartime assignments of reserve components.

Just as Long-Range Planning for Research Development and Acquisition (RDA) has been important toward equipping the Army, the Long-Range Planning initiated recently by DCSPER can be important for manning the Army of the future.

Although much can be accomplished by common sense approaches, a considerable amount of critical personnel R&D is required in preparing for Army 21.

Our conclusions and recommendations for the most part apply an across-the-board set of scenarios from high intensity European conflict to the more likely, but far less intense actions such as Grenada. However, in the area of mobilization some of our conclusions and recommendations apply only to a protracted high intensity conventional war. Inherent in a protracted scenario is that sufficient time exists for execution of mobilization. Any intensive conventional strike that develops rapidly would not allow for the mobilization mechanism to respond in time. We recognize that technology can possibly result in increased conventional war capability that will raise the nuclear threshold and that possibly the protracted high intensity war will be more likely.

Although we have discussed such issues, we have confined our report to the Terms of Reference which implies that we assume a broad set of scenarios including protracted conventional warfare.

During the preparation for the Summer Study, we discussed a number of issues associated with the Terms of Reference. We concentrated on six issues. Later in presenting the results of our studies, we combined 3A and 3B into one issue; and we also combined 4A and 4B into one issue. In this detailed report, we are treating 3A, 3B, 4A, and 4B as separate issues so that the reader can better see how the rationale developed for our final recommendations.

ISSUE 1: Establish and maintain proficiency in the RC to provide readiness.

BACKGROUND:
Although much progress has been made, manning of the USAR and NG falls below mobilization requirements in numbers, skills, and ranks. These shortages along with equipment and training deficiencies make integration with the Active force an awesome task, particularly for units that would deploy early. The spectrum of conflict imposes different requirements, but all types impose priority requirements on early deploying units.

Over the years, units important to combat capability and logistics support of active elements have been moved to the RC. Readiness of these units is particularly critical. Historically, we have had the luxury of time in mobilization. Now instant response is needed. If RC units are not ready, they become mission stoppers for AC units. The Army has significantly improved the attention given to USAR and ARNG problems but the short time available for training (37 days) puts a premium on the quality of leadership, the type of training and the availability of equipment needed to do the job. RC shortcomings will rapidly become mission stoppers if not properly planned for. A list of such potential shortcomings is as follows:

- IRR inadequate in numbers, ranks, skills, and training
- Not enough time for training
- Inadequate funding
- Enough equipment, including all support spares, test equipment, etc., to train with
- Old equipment
- Not enough Military Occupational Specialty (MOS) qualified personnel
- Adequate training seats, especially hi tech
- Limited OCONUS training funds
- Limited and incompatible data systems and software
- Big change in structure (Ex elimination of 173 medical units)
- Change in active structure as it impacts on RC
- CAPSTONE does not look at units below corp
- No Active Guard Reserve (AGR) to support training
- Lack of employer support for training
- Provision of casualty replacements

Dissimilarity of Reserve, National Guard, and Active units in both organization and equipment further complicate readiness. Unless more long range planning is done, this dissimilarity problem will grow even larger and have more far reaching impact on mission effectiveness than any other issue.

Every opportunity for improving the quality and quantity of the mobilization base is needed. If these needs are not met then the ability of the country to meet its worldwide commitments is questionable.

To train effectively for rapid deployment, additional annual training time is needed by the RC. Many units need 21 days of annual summer training. The Federal Government must take the lead in the recognition of the importance of making their personnel available for additional military training. Once this is accomplished, then recognition by state, local governments, and private industry will be easier. While there is much pride in having Guard and Army Reserve personnel employed with an organization or company, additional incentives will be needed if we are to realize even greater cooperation of these employers.

IRR assets are inadequate, in quantity, ranks, skills. Training is insufficient. More funding and training capacity is needed. Obtaining good addresses from Internal Revenue Service is essential. Training should be made mandatory. Army training capacity must be increased accordingly. The plan to replace casualties in overseas units during first 30 days of combat can be improved by rescinding the policy which now prohibits use of IRR for this purpose.

Basic arms training for contract ROTC graduates is inadequate. Such training has been made mandatory, but may not be fully implemented due to funding, training capacity, and difficulty in absence from new civilian employment.

For soldiers leaving the AC an enlistment voucher should be provided as an extra incentive for joining RC TPU. The voucher could be turned in for incremented cash payments at time of affiliation with the RC.

Army should develop a crash plan for filling highest priority RC units with AC soldiers from post/camp/station Table of Distribution and Allowances (TDA's) upon mobilization. RC units now report vacancies daily and in the event of mobilization, Army Reserve Personnel Center (ARPERCEN) would fill to the limit of the IRR capability. More use could be made of retired personnel. Remaining vacancies could be filled on an emergency basis by individuals from the post/camp/station TDA's. As this cross leveling of people occurs it must be coordinated with cross leveling of equipment, supplies and support.

NG divisions should be assigned special readiness missions: arctic, desert, mountain, jungle, urban, light. Assignments should be based on geographical considerations. (See Appendix C).

Mobilization fill can be improved through a volunteer veteran recall plan, particularly for those who have learned a useful skill in in civilian life - a "skill for stripe" program.

Rapidly increasing the full time manning of selected Reserve and Guard units would significantly improve training and readiness. The Army should move as rapidly as possible to reach the optimum ratio between full-time personnel and "part time" soldiers in the RCs.

Such increases should be tailored to the needs of each type unit, including the balance between soldiers and DA civilians.

ISSUE 1: Establish and maintain proficiency in the Reserves and Guard to provide readiness - are there sufficient "mission stoppers" to make this an impossible task?

DISCUSSION:

- o Integration with active forces is awesome responsibility - particularly for units used early in support operation.
- o Spectrum of conflicts imposes differing requirements - but all types impose priority requirements on early deployed support units. RC RDF units could be mission stoppers for active forces. Special mission assignments for Guard Divisions would improve training.
- o Army has significantly improved attention given to Reserve and Guard problems - but
  - oo Short time available per year (37 days) puts premium on high quality units and maximum time for training.
  - oo Availability of equipment, including particular attention to spares and repair parts - especially important for longer time high intensity conflicts and for training.
  - oo Administrative burdens detract from training.
  - oo IRR is inadequate in numbers and skills.
- o An enlistment voucher for joining the RC is needed for soldiers leaving the AC.
- o Mobilization exercises are particularly important to improving readiness.
- o Simulation, particularly of command and control, should be increased significantly - technology is available to make this possible. More maneuver training is necessary for both active and reserves. This will likely require additional instrumented facilities.
- o Mix and structure peace time medical does not match war time medical structure.
- o A Volunteer Veteran recall program will help mobilization.
- o Cross leveling of people and equipment must be done in a coordinated manner.

RECOMMENDATIONS:

1. Accelerate improvements in combat readiness of RC units having immediate mobilization missions as determined by contingency plans - selected AR and NG units.
   - o DCSOPS develop for Guard Divisions specialized mission assignments and training, geographically oriented and integrated with contingency plans: desert, arctic, jungle, urban, light.
   - o SA/OCAR fund, keep current and execute for the IRR a tailored involuntary training plan designed to fill known vacancies. This should be above the current Program Objective Memorandum (POM) levels of funding.
   - o DCSOPS develop and keep current the plan to increase draw of soldiers from post, camps and stations to fill remaining vacancies in the selected RC units.
   - o DA enhance quality, intensity, and time devoted to training
     - oo Do not limit to 37 days - increase annual field training to 21 days.
     - oo Develop and disseminate data base of training information.
     - oo Increase use of simulators - integrate with increased use of maneuver training, especially at instrumented sites.
   - o DCSPER improve logistic and administrative conditions by moving quickly to optimum average ratio between full time personnel and "part-time" soldiers tailored to each type of unit.

2. Seek and execute improvements in mobilization readiness for all RC units.
   - o DA seek legislation to amend federal law to allow up to 21 days military leave.
   - o DA seek legislation to permit tax credits for employers who provide military leave.
   - o DCSPER develop incentives to motivate employers to grant extended military leave.
   - o DCSPER establish an enlistment voucher for all eligible soldiers leaving active duty that can be turned in for incremental cash payments when they join an RC unit.
   - o ARPERCEN - As IRR strength increases, execute tailored involuntary training plan designed to fill vacancies in RC units mobilizing later as well as the training establishment.
   - o TRADOC utilize junior colleges/tech schools for advanced individual training.
   - o DA change policy to permit use of recently separated personnel of the of IRR as casualty replacements.
   - o DA increase utilization of Active Guard and Reserve personnel in support of Total Army training.
   - o DCSPER Implement a Volunteer Veteran mobilization program.

ISSUE 2: Improving the recruiting and retention of forces with emphasis on the RC.

BACKGROUND:
While a Rand Corp study indicates the Army should be able to maintain both quality and quantity recruiting in the out years, this can only be accomplished through good planning and increased automation. US Army Recruiting Command (USAREC) has a good strategic plan for both the AC and USAR, but ARNG planning is limited to the very near term. Increased market analysis and then market penetration will be needed if the ARNG manpower objectives are to be met. Rapid turnover of recruiting personnel, especially those that understand a specific market, may adversely impact on good strategic planning. Much has been learned from industry and, in some cases, taught to industry in personnel marketing by the Army. However, one noticeable exception is that reassignment and rapid turnover of recruiting personnel may make the Army's recruiting objective a mission impossible in a tight market.

The Army should continue supporting the Education Assistance programs and work for repeal of the termination date of the Vietnam-era GI Bill. The Army should work for a new package of education benefits that would emphasize reward for loyal service and supplemental benefits for soldiers with critical/hi-tech skills. Benefits should be transferable to family members after a specific number of years of service. This package should also include benefits for the RC. (See Appendix A).

There appears to be an exodus from the Army of nurses after their initial tour of duty. They are being lost to the civilian sector. This has the effect of creating a void in the mid-term, career professional nurse corps. Increased promotion opportunity along with incentives similar to those for the military doctor must be established to retain this target group and reverse the trend. Raising the maximum commissioning age for RC medical personnel should be considered.

Non-ETS attrition is high in the RC and this wastes money, strains limited recruiting and retention resources, and reduces the effectiveness of particular units. As a result, the ability of the RC to meet their mobilization mission is in doubt. However, it can be overcome. It must be solved at unit level by well established leadership principles. The effectiveness of squad leaders, platoon sergeants, and retention personnel in identifying potential sources of attrition and then commanders dealing with those problems will do more to lower non-ETS losses than any other means. The quality and content of training and hands-on experience are basic factors in RC attrition and retention.

While Selected Reserve pay and bonuses are high enough to be attractive to the soldier, additional compensation must be considered for the additional demands on key personnel and junior leaders. (RC junior leaders are the same personnel who are beginning to move up in their civilian jobs. More and more time is being demanded by their employer, family, civic, social, or religious organizations.) If we expect to attract and keep the best leaders, be they officer or NCO, and ask of them additional time for administration and/or training then we must pay them.

A proper balance between mobilization of RC and mobilization of industry is necessary. It is easier to get the people than to get the surge production to provide the weapons soldiers need in a prolonged war. Yet the two are not unrelated. There is much concern as to whether enough information is available and enough planning has been done to know whether there are serious conflicts between the needs of the Army and industry for personnel during mobilization. A desired relationship between civilian work and RC assignments should be helpful in increasing recruiting and retention potential. However, too much commonality may negatively impact on the RC or industry's ability to respond during mobilization if they are both counting on the same personnel. This potential mission stopper should be checked during mobilization exercises.

A positive social atmosphere along with increased family involvement can have a direct positive impact on attitudes towards the RC. The unit that plays hard as well as works hard stays together. Finding the proper balance is difficult but the payoff in morale and cohesion is high. This along with more contact between units and families can reduce non-ETS losses as well as improved reenlistment in the RC.

ISSUE 2: Improving the Recruiting and Retention of Forces with Emphasis on the RC

DISCUSSION:

- Rand Study indicates the Army should be able to maintain quality.
- USAREC has good strategic plan.
- ARNG recruiting planning is only near term.
- Reassignment and rapid turnover of recruiting personnel may impact on good planning.
- Important to continue Education Assistance Program and the GI Bill.
- Pay and bonuses are high enough to attract personnel.
- Nurse attrition must be reduced.
- Non ETS attrition is high; as a result RC may not meet mobilization mission.
- Non ETS attrition can be overcome through more effective leadership, particularly squad leaders and platoon sergeants.
- Proper balance of mobilization between people and industry is necessary. The lack of data on who might be affected by joint mobilization of industry and RC could lead to unexpected loss of RC availability.
- Relationship between civilian work and RC assignments are helpful.
- Pride in employing personnel with Guard and Army Reserve affiliation is justified.
- More and more uncompensated time is being demanded of RC key personnel and junior leaders.
- Positive social atmosphere along with increased family involvement impacts on attitudes of the RC. Proper balance between work and play will reduce attrition.

ISSUE 2: Improving the Recruiting and Retention of Forces with Emphasis on the RC

RECOMMENDATIONS:

RECRUITING:

1. DA continue support of legislation to repeal the termination date of the GI Bill and continue education assistance programs.
2. DCSPER decrease reassignment and rapid turnover of recruiting personnel.
3. DCSPER/TSC significantly increase nurse recruiting for the RC and improve incentives for retention of all nurses. Training of career nurses at the Uniform Services University of Health Sciences should be reappraised.
4. DCSPER increase maximum age for commissioning professional medical personnel.
5. DCSOPS/FORSCOM/NGB ensure that personnel who are key to civilian industry during mobilization are not the same personnel who are also key to RC mobilization.

RETENTION:

1. Reduce Non-ETS attrition by improving the effectiveness of squad leaders and platoon sergeants in identifying problems of junior personnel, and then act upon or pass on to unit commanders for resolution.
2. DA seek additional compensation for the additional admin and training time required of RC TPU personnel and junior leaders.
3. TRADOC increase leadership and command courses for all RC TPU commanders, leaders and senior NCO's.

ISSUE 3A: Improve quality of life factors contributing to force readiness.

BACKGROUND:
Because of demands for high quality soldiers and because of the changing life styles and patterns of the Army populace it is particularly important that commanders at all levels be concerned about the environment in which the soldier works, lives, and plays.

The Army is to be commended for the increasing attention it has been giving to quality of life factors. There is evidence that this has improved readiness, retention, and the quality of our soldiers.

In an all volunteer Army it is particularly important: (a) that pay including benefits be competitive. (b) that the soldier get job satisfaction by being provided first class equipment and adequate work facilities where he can develop and maintain his professionalism and (c) that soldiers whether married or single have adequate living conditions. Since approximately half the Army is now married with an increasing number of service members married to other service members this means far more attention must be given to the quality of life of the family than has been given in the past. Society has been changing and the Army has been reflecting the change in some of its policies and programs. More changes can be expected in the 90's.

It is important to have a balanced approach to the Total Army taking into account differences such as between the Active, Reserve, and Guard and geographical such as CONUS, Europe, Korea, etc., and giving balanced attention to married and single.

One of our most important recommendations is that quality of life be institutionalized so that there will be long range support. The Army cannot become complacent. We were pleased to see the effort to develop a DCSPER Long Range Plan and input from this should become a part of the Total Army Plan. This plan must provide for integrating quality of life programs, e.g., medical, housing, financial, and relating them to acquisition, distribution, and separation programs. Furthermore, to implement this plan, it will be necessary to have a strong centralized organization (Quality of Life [QOL] Center) with policy guidance from DCSPER.

We have seen varying emphasis by commanders on QOL. Emphasis by the command structure at all levels is essential. QOL emphasis should be a part of the training base and special attention should be given to selection of assistant community commanders.

We recommend that building of family housing be expedited as much as possible. In Europe waiting lists for military housing can be up to 80 weeks. Build-to-lease housing is an ideal situation in many cases. American living in the housing are more integrated into the host nation, while still living near other Americans.

We recommend that the Family Action Plan include as a top priority an issue of improving medical care and that more doctors, nurses, and medical aids be assigned to Europe. If a shortage develops in CONUS, it may be made up temporarily by contract medical personnel. However, special emphasis needs to be placed on providing an adequate long term supply of career oriented medical personnel, particularly nurses.

More child care centers should be built and these centers should be open during alerts, pre-school and developmental care should continue to be emphasized.

The Army and its commanders should strongly support continuing education for military members. This includes making its availability compatible with training time.

The Army should increase availability of local transportation in overseas posts as much as possible. Army members and their families should have military transportation to post facilities, especially in Europe where unfamiliarity with language, neighbors, bus systems and products can be so difficult.

More telephone lines are needed into the military posts in Europe. For family members trying to dial the health care center, transportation office or their sponsor, is now very frustrating. It is also an issue in the work place.

DCSPER should continue to put equal emphasis on quality of life for single personnel including adequate barracks and furnishings.

Surveys show that retention is affected even for Army personnel with families as much or more by the condition of the work place. Therefore, we recommend that DCSPER develop and coordinate a work place action plan. We recognize and are encouraged to find that much is being done on specifics such as providing hard stands and work facilities and providing contract service to do non-professional jobs. In general, the objective should be to provide those facilities and organizations that will permit more time for training and the development of the professional soldier.

Not all programs need additional money, such innovative self-help activities as the Mayoral Programs and Women's Centers should be encouraged and a clearing house established to share new ideas.

ISSUE 3A: Improve quality of life factors contributing to force readiness

DISCUSSION:

- o Army commanders at all levels have to be concerned about the environment in which soldiers work, live, and play.
- o Adequate quality of life must be a concept integrated into all Army policy and planning. Army to be commended for developing Army Family Action Plan and in overall consideration being given to quality of life factors. Has improved readiness, retention, and quality of soldier.
- o Changing Army life patterns impose changes in provisions for quality of life. Important factors:
  - oo Salary plus fringe benefits must be competitive
  - oo Job satisfaction and pride in profession -- first class equipment -- adequate work facilities
  - oo Family life
- o More specific factors:
  - oo Housing
  - oo Medical and dental
  - oo Continuing education
  - oo Child care
  - oo Home leave travel
  - oo Local transportation overseas
  - oo Telephone system in Europe
- o Adequate funding essential but dollars don't solve all the problems. Attitudes and self-help are important.
- o Must have balanced approach to total Army
  - oo Active, Reserve, Guard
  - oo Geographically - CONUS, overseas
  - oo Single and Married
- o ARI has done some very good work on quality of life issue. They should be center for study and developing a data base.

ISSUE 3A: Improve quality of life factors contributing to force readiness.

RECOMMENDATIONS:

1. DCSPER institutionalize quality of life to assure stable long range support for both married and single.
   - o DCSPER institutionalize QOL by forming a Quality of Life Center (Non-appropriated fund [NAF]) in conjunction with TAG as an implementation agency for both Quality of Life and Family Action Plan. DCSPER continue to set policy and monitor.
   - o Make part of command structure
   - o Integrate quality of life programs with other personnel programs.

2. DCSPER continue to support strongly and monitor family action plan.
   - o Provision of family housing
   - o Improved medical and dental facilities and augmented staffs
   - o Child care and development
   - o Continuing education
   - o In Europe, improved telephone service
   - o Local transportation overseas

3. DCSPER develop and coordinate a work place action plan. Examples of this are:
   - o Providing hard stands and wash facilities
   - o Providing contract service to do non-professional jobs
   - o Office automation
   - o In Europe, adequate telephone service into and out of bases.

4. DCSPER develop a clearing house for innovative self-help programs - such as
   - o Mayor's programs
   - o Women's centers

ISSUE 3B: Quantify and continually assess the impact of quality of life factors.

BACKGROUND:
The importance of job and quality of life factors is attested to by the fact that ARI research in USAREUR indicates that between 70% and 80% of the enlisted personnel and officers gave job or family reasons for saying they could not extend. Knowledgeable officers and NCO's are, in general, strongly convinced of the positive effects of quality of life efforts on readiness. Army quality of life could have a greater influence for retaining the "quality" soldier and his family because of the strong appeal of a wholesome environment in which to work and live. Furthermore, although relationships are complex and cause and effect relationships are difficult to ascertain, it appears that as quality of life expenditures increase at several sites, indices which indicate unsatisfactory behavior on the part of military members are going down. For example, for the 8th Infantry Division the AWOL rate in 1984 is one half of that for 1982. Further research, beyond this cursory examination of data, is necessary. Furthermore, such research should be done on a continuing basis so that the impact of quality of life factors can be ascertained. We believe such research can result in demonstrating casual relationships.

Quality of life, like any other U. S. Army objective, must be defined in a way so that it can be measured and its impact on readiness assessed. Until this is done, little progress toward reaching that objective and assessing its impact can be made. Research in private industry has indicated that the most feasible way to measure quality of life is through the use of carefully designed questionnaires.

Although quality of life and job satisfaction both contribute to retention and, hence, readiness, initial research indicates that they should be separated in concept and treated separately in any research effort. However, the research and any subsequent action on these two concepts should be closely coordinated.

Periodic surveys involving refined quality of life and job satisfaction measures are necessary. Importantly, feedback must be such that that improvement in both of these factors, as appropriate, can be effected. Coupled with the survey should be an information system documenting retention data and other impact data, as appropriate, so that longitudinally the effects of changes in quality of life can be monitored.

ISSUE 3B: Quantify and continually assess the impact of quality of life factors

DISCUSSION:

- Although relationships are complex, there are data which support that quality of life enhances retention, reduces unsatisfactory behavior and improves readiness.
- Knowledgeable and experienced people in the Army believe that improvements in quality of life have made major improvements in soldier readiness.
- It is important that the leadership of the U. S. Army be aware on a continuing basis of how military members view their jobs and the quality of military life, including family life.
- Quality of life must be cast in a measurable form before cost effectiveness of relevant programs can be determined. Measurement is complex as there may may be different factors which affect quality of life for different groups, e.g., married - single.
- Job satisfaction and quality of life are conceptually distinct, but their relationships are such that research, development, and action on the two should be consolidated.
- Research, development, and action on quality of life should be closely coordinated. ARI has made significant strides in evaluating quality of life and other programs. This work should be supported,extended, and integrated with action programs.
- A strong, centralized personnel research and development activity with adequate dissemination and implementation arms is essential not for effective quality of life/job satisfaction plans, but for all Army programs involving people.

ISSUE 3B: Quantify and continually assess the impact of quality of life factors.

RECOMMENDATIONS:

1. DCSPER develop programs thru ARI:

   - o Assess periodically the quality of life, including family life, of military members.

     - oo Define quality of life, using refined surveys and other methods.
     - oo Distinguish between quality of life and job satisfaction, but coordinate research and action plans.
     - oo Provide feedback to officers and officials concerned.
     - oo Provide a longitudinal information system for monitoring trends and determining future actions.
     - oo Conduct continued research to evaluate the contribution to readiness of quality of life/job satisfaction and other organizational programs such as New Manning System and Army Family Program.

2. DCSPER:

   - o Consolidate all personnel research and development activities, including quality of life and job satisfaction research and provide better research dissemination and implementation capabilities.

ISSUE 4A: Integration of weapons and equipment acquisition with personnel acquisition and training to optimize soldier-machine interface - in the near term and the long term.

BACKGROUND:

At the present, the Army does not systematically require that personnel concerns in system designs require equal billing with hardware concerns. Examples of integration only occur to a limited extent at the individual equipment level. Overall system planning for the total Army is needed.

From a total systems point of view, a well-designed system should not only meet its technical design requirements but should also be easy to operate, easy to maintain, easy to support, and easy to learn. Such systems reduce manpower requirements by reducing training needs and logistical support requirements, as well as needs for operations and maintenance personnel. Greater attention to opportunities for standardization of hardware and software across systems would permit more interoperability and further reductions in training and logistics requirements.

The use of non-developmental items (NDI) purchased more or less off-the-shelf in the civilian economy has been advocated as one way of acquiring equipment already designed and proven to satisfy human factors concerns — to be user oriented. The use of NDI is also less expensive and, with much of the development cycle eliminated, permits quicker fielding of systems. On the other hand, the promiscuous, uncontrolled use of competitive NDI products from several suppliers can impede efforts at standardization and thereby increase training, logistics, and maintenance problems.

To make systems user-oriented, user input provided under controlled conditions with proper orientation and pretraining is needed at all stages of the design and development process. Not only direct users but other representatives of the user community, such as trainers, documentors, and personnel suppliers, should also contribute to this design and development process.

A twofold approach needs to be considered in order to improve the soldier-machine interface. First, the systems should be designed to make it easier to use by personnel of low level skills. The high technology components must be designed to be transparent to this level of user. Second, training systems must be developed and implemented to transition the soldier to these systems. During the acquisition of new systems, tradeoffs are needed continually between design and training considerations for system optimizations.

We are recommending that DCSPER take steps both through its long range planning and through involvement in thrust demonstrations programs to facilitate overall system planning to integrate personnel acquisition and training with weapons and equipment acquisitions. In addition, we are recommending two efforts to improve the twofold approach to optimize the soldier-machine interface. First, DARCOM should be encouraged to use the NDI acquisition, where possible, to shorten the development cycle and obtain high technology equipment more familiar to the soldier. Second, we recommend that TRADOC expand simulation training applications and integrate these simulation training devices with maneuver training as a means of improving personnel training on weapons systems.

ISSUE 4A: Integration of weapons and equipment acquisition with personnel acquisition and training to optimize soldier-machine interface - in the near term, and the long term.

DISCUSSION:

- o Seems to have very little integration - except sometimes at the individual weapon level.
- o Overall systems planning is required.
- o Start of DCSPER long range planning is an important beginning.
- o Relating this to long range RDA plan can help to effect better integration.
- o Equipment acquisition and manning need to be treated in a systematic way.
- o Twofold Approach: (1) "Design to make equipment easier to use and to maintain by low-level personnel and recruit as bright as possible" - may be all we can do in near term - but there must be a better way for the long term.

  (2) Increase use of training simulators for maneuvers, combat, support, and combat service support.

ISSUE 4A: Integration of weapons and equipment acquisition with personnel acquisition and training to optimize soldier-machine interface - in the near term, and the long term.

RECOMMENDATIONS:

1. DCSPER should strongly support its long range planning effort - relating to the other long range planning efforts particularly RDA and organizational structure planning.

2. DCSPER become involved in thrust demonstration program to get equipment developers, users, and users representatives, and personnel suppliers and personnel developers together early in new concepts, equipment, and organizational development.

3. DARCOM should use NDI acquisition approach, when possible, to free resources by reducing equipment costs and the time of the development cycle and to utilize a larger portion of the civilian talent pool - and obtain equipment more familiar to the soldier.

4. TRADOC should expand computer driven training simulations applications (e.g., command and control, combat support, and combat service support simulations.)

5. TRADOC should encourage the utilization of NTC data to:

   - o Accelerate data base analysis;
   - o Disseminate lessons learned; and
   - o Integrate simulations training with maneuvers (e.g., Army Training Battlefield Simulation System [ARTBASS] and NTC)

ISSUE 4B: Developing techniques and process for determining quality and quantity of manpower required and available for the future.

BACKGROUND:

The SS81 development of the five thrusts for Army 21 (then Air Land Battle 2000) was strongly driven by the objective of multiplying the effectiveness of our total Army through the use of superior technology. The essential thought was that smart weapons and sophisticated C^3 systems could be designed for easier operation and maintenance so that fewer numbers of lesser skilled troops could still achieve tactical and strategic superiority over the Soviets. Examination of the five thrusts during this study indicates that three of the thrusts, namely, VISTA, Distributed C^3, and Self-Contained Munitions will probably have the most impact upon Army 21. These thrusts are driven by new and continuing improvements in VHSIC/VLSI, signal processing, data processing, automatic target recognition, artificial intelligence, and robotics. DSB studies have also identified these technologies as key elements.

Certain system studies indicate that significant manpower savings and greater effectiveness can be gained by taking a system approach to conceptual implementation of Army 21. The success of the Blackhawk helicopter shows that attention to proper design can yield equipment that is easier to operate and maintain. Sophisticated design of both systems and equipment can save manpower in terms of both quantity and quality, without sacrifice of effectiveness.

The manpower requirements for Army 21, in terms of quantity and quality are as yet, not known. Nor can the availability of manpower for Army 21 be predicted with much certainty. The Army needs to research both the demand and supply sides of the manpower problem for Army 21. On the demand side, such research can build upon the work of the All Volunteer Force Conference, November 1983. (See bibliography).

The need to investigate the manpower problem for Army 21 arises from the characteristics of Army 21 and type of war it is designed to fight. Army 21 will fight on an integrated nuclear, biological, chemical (NBC) battlefield with weapons that are very precise and very lethal. Highly mobile units heavily dependent upon command, control, communications, and intelligence (C^3I) will clash in around-the-clock operations, frequently in cut-off "Islands of Conflict." The environment will be extremely stressing and demanding - particularly upon leaders. The manning requirements, especially the qualitative requirements, need to be assessed under such wartime scenarios as opposed to peacetime conditions.

We observed that the current personnel system components of the Army are not well integrated. The personnel system seems to be composed of a number of stove-piped, unrelated operational systems which report directly to the DCSPER. For example, the impact of quality of life programs, compensation, and socio-political environment are not directly related to the acquisition and retention system. Consequently, the impacts of Army 21 manpower quality and quantity requirements cannot be assessed in an integrated way.

Little work focused on the Army 21 manpower problem is underway. System studies like those mentioned above can help determine manpower requirements. The concept validation testing and exercising of the application of the five thrusts in Army 21, the so-called thrust demonstration programs, can also give us an indication of the quantity and quality of soldiers needed for Army 21. Trend analysis applied to such factors as immigration, birth rate, and national attitudes and policies can help firm up manpower supply predictions. All three of these types of investigations deserve strong support.

The Army R&D community should be tasked to research both the demand and the supply aspects of the manpower problem in further detail and should be resourced to do so. This research should help answer a number of questions pertinent to the demand side of the problem, such as: Where should the brightest, most innovative people be assigned in Army 21? Will more such people be needed in Army 21 than in the present Army? How many more? To what extent can clever equipment, system, or training design reduce qualitative, as well as quantitative manpower requirements? Can various information processing devices, such as decision aids, shift some of the information processing requirements from the soldier to the machine?

The supply side of the manpower problem for Army 21 should also be addressed by developing techniques and processes that will give reliable predictions of future manpower availability.

A compensation of the manpower requirements for Army 21, as deduced from various information sources, some described above, with the prescribed availability of manpower will probably show some imbalance. The Army will need to assess the significance of this imbalance, gauge its impact, and take appropriate measures. The manpower supply and demand data should be updated frequently and routinely to keep the assessments current. The Army needs to institutionalize the process of forecasting future manpower quantity and quality requirements in an integrated fashion bringing together the various components across the Army in order to coordinate future manning policy, doctrine, operations, and R&D implications.

We recommend that DCSPER develop a plan for a strong, integrated operations system as soon as possible. This system should integrate the various personnel-oriented FOA's and should provide the operational component to implement the development of techniques to assess Army 21 manpower supply and demand as well as the assessment of the future manpower supply/demand balance.

ISSUE 4B: Developing techniques and process for determining quantity and quality of manpower required and available for the future.

DISCUSSION:

- o Manning cannot be considered in isolation from equipping.
- o Technological thrusts driven by VHSIC/VLSI, signal and data processing, automatic target recognition, AI and robotics will have greatest impact on Army 21.
  - oo VISTA - Very Intelligent Surveillance and Target Acquisition.
  - oo Distributed C^3 - Distributed Command, Control and Communications
  - oo Self-Contained Munitions
- o Total system approach to new classes of weapons can impact manpower requirements.
- o Blackhawk program shows sophisticated design can yield equipment easier to operate and to maintain.
- o R&D is required to explore the manning implications of various Army 21 characteristics.
  - oo Highly real time, information oriented Army
  - oo Precision fighting capability
  - oo Integrated battlefield with "Islands of Conflict"
  - oo Continuous around-the-clock operations
- o Thrust demonstration program can help develop future personnel needs.
- o Observed lack of integration of operational components of the personnel system.

ISSUE 4B: Developing techniques and process for determining quantity and quality of manpower required and available for the future.

RECOMMENDATIONS:

1. TRADOC state future organizational and manpower quantity and quality requirements based on characteristics of Army 21 - a continuing process.
   - o Conceptual system studies that can point to ways for significant shifts in numbers and types of personnel.
   - o Trend analyses

2. Army personnel community pursue/accelerate programs to determine implications of Army 21 characteristics.
   - o Develop techniques to determine quantity and quality of future manpower and ways to minimize the requirements.
     - oo Mental abilities - how much and what kind is needed where?
     - oo Specify selection tools and training procedures to select and prepare soldiers for "Islands of Conflict" engagements.
     - oo Optimize soldier-computer interfaces to accommodate different levels of soldier skills and training.
     - oo Specify decision aids, image processing procedures, and information processing aids needed to help leaders in high information load environments.
     - oo Evaluate impact of biological and environmental stresses in Army 21 scenarios.
     - oo Conceptual training required to allow personnel to continue to perform their mission when automated systems fail.
     - oo Specify possible uses of automation to replace personnel.
   - o Develop techniques for predicting availability of required manpower.

3. Army personnel community assess balance of future supply of manpower to meet projected, long range (10-20 years) total Army demand.
   - o Take early actions in terms of policy, doctrine, operations, and R&D.
   - o Maintain the process of keeping manpower supply and demand forecast current.
   - o Institutionalize the process of forecasting future manpower quantity and quality requirements.

4. DCSPER develop a plan for a strong, integrated personnel operations organization as soon as possible.
   - o Integrate personnel-oriented FOA's.
   - o Implement recommendations #2 and #3 above.

APPENDICES

GI BILL (ISSUE 2):

One of the best ways to attract quality recruits to the Army would be a new GI Bill. Studies and surveys have shown that today's young person is seeking self-improvement, even more than employment. Thousands of top quality people join the Army to receive educational benefits. The current program requires contributions by the servicemember and is not really a GI Bill.

The GI Bill has a proud history in our country, especially after World War II when so many went to college under the GI Bill after serving in the war. These men came from every walk of American life.

For years after World War II, the captains of industry and government in this country had military experience and had been educated thanks to the GI Bill. This was good for the country.

Now we are in a period when a narrower band of American society chooses to service in the military. We no longer have the draft, and even when there was a draft, many were exempted.

In order to have in adequate numbers the kind of intelligent, motivated soldiers sought for the Army now and in Army 21, we must have a program that multiplies quality recruits. Quality begets quality. The program is the GI Bill. When more and more quality people sign up from all walks of American life to eventually receive money for a college education, their friends join too. Thus, the Army has more quality members who will later receive their college education because of the Army and will carry their military experience into their civilian jobs. Such an effect broadens America's understanding of and involvement with the military for many years.

The ASB knows that Congress is grappling with the GI Bill issue. If Congress does not enact a comprehensive, non-contributory GI Bill (similar to Rep. Montgomery's version), we recommend that the Army press vigorously for it. It is expensive but it pays huge immediate and future dividends.

Write-up on Surveys for Issue 3B

Survey data are an excellent means of illustrating the impact of quality of life on retention. Surveys also can be helpful in understanding quality of life impact on readiness. Following are several findings from surveys:

- 7-9% first-term soldiers leaving the Army cited quality of life factors (medical/dental; care of housing/barracks) as "most important" in decision to leave. (1983 ARI Exit Survey)
- 4-5% of first-terms and 3-4% of careerists overall cite same factors as "most important" reason to stay. (Feb 83 Soldier Survey)
- 70% of married soldiers cited "Army doesn't take care of my family" as important reason for leaving; 60% reported "I can't take care of my family in the Army" as important. (ARI, 1983)
- 57% of married and 52% of single soldiers cited "poor quality of medical and dental care" as important reason for leaving. (ARI, 1983)

If 7-9% of first-termers left because of quality of life factors, the cost to recruit and train replacements can be quantified. If figures could be obtained for other segments of the Army (career enlisted, junior officers, senior officers), the losses in dollars could begin to be quantified, though the expertise loss and readiness impact cannot be quantified.

To have 70% of married soldiers leaving the Army say the Army does not take care of their families is very telling. It probably means that while they were in the Army, they had to spend time away from the job taking care of the family, or they stayed on the job preoccupied with family matters. Readiness clearly suffered. Undoubtedly many servicemembers who are not leaving also spend work time worrying about or taking care of family concerns.

We recommend that surveys be conducted continuously of people leaving the Army and at least annually of those still on active duty. These surveys should be done in such a way that the Army learns what still needs fixing in quality of life; the questions and responses should be stated such that they are easily and usefully cited in Congressional testimony.

For surveying those leaving the Army, we suggest:

- General questions about whether and how much quality of life was a factor in leaving and whether the Army took good care of the family.
- Asking whether concern over quality of life or family well-being detracted from ability to do the job well. Ask whether the impact was in time away from the job, concentration at work, or both.

For surveying those on active duty, we suggest:

- Questions about whether quality of life is a factor, whether the Army takes care of the family adequately, and whether the family is better off this year than last year.
- Asking whether concern with quality of life or family well-being detracts from job performance.
- Specific questions about specific quality of life factors, such as:
  - Is medical care adequate?
  - Is housing adequate?
  - Are you satisfied with your workplace?

The information gleaned from surveying active duty members should be useful to the Army in preparing the budget, especially if the surveys are done systematically and annually.

Write-up on Specific Quality of Life Issues - Issue 3A

The Army has always had a contract with its people. From the earliest time, soldiers expected care by the Army in the form of food and lodging, however simple. Over time, the contract has evolved and expanded to include educational opportunities, medical care, professional satisfaction, and a good quality of life. The contract no longer involves just the soldier and the Army - his family is included too.

As the number of married Army personnel have increased, so has Army concern for the family. In recent years, the Army has been particularly progressive in programs to emphasize and care for family units and individual family members. Quality of life has improved enormously; and current emphasis and outyear programs indicate improvement will continue in many areas.

Improvement and concern must continue. The Army has moved to meet cultural changes, in the Army and society. Some of these trends are single parents, married military couples, intense desire to education, more emphasis on family life, less desire to move, and developmental care (not just custodial care) for young children. The changes are continuing and the Army must be open-minded and dynamic in responding to them if it is to recruit and retain quality people.

The ASB believes the Army should emphasize continued improvement in the following areas, without losing the momentum in all other areas of quality of life.

- Housing
- Medical care
- Childcare
- Education
- Transportation to post
- Improved phone service (Europe)

Housing. Quality and quantity of housing are issues both for single soldiers and families. In Europe, particularly, more housing is needed, as in some areas as many as 50% live on the economy. This can be a lonely, frightening experience for many who do not speak the language, have no transportation, know no other Americans nearby, and are homesick. Waiting lists for military housing can be 80 weeks. Build-to-lease housing (local investors finance it; the US Government leases it) is an ideal solution in many cases, as the Americans living in the housing would be more integrated into the host nation, while still living near other Americans. However, build-to-lease is often difficult to attain, so the Army must continue to build barracks and family housing. When soldiers are unhappy about something as basic as a place to live and the soldier realizes the isolated plight of his/her family, readiness cannot possibly be unaffected. On the quality point, barracks furniture needs improvement.

We recommend that building of family housing and barracks be expedited and that barracks furnishings be improved more rapidly.

Medical care. The value of good medical care is not health alone; it is also peace of mind. If an Army member doubts the quality of his care or actually receives poor or untimely care, his readiness suffers. If his family members are not being promptly and well cared for, the servicemember worries and is preoccupied on duty. His own leadership and confidence in the Army suffer. Ultimately, he may leave the Army.

Medical care is crucial in the contract between the Army and its members and, unfortunately, the care is not always adequate.

Understanding that the Army's medical system must function ultimately in wartime, we observe that currently in peacetime the quality of care is frequently cited by users as a problem.

Europe particularly has a problem, with long waiting times and long distances to travel to specialists, too few doctors in some places, difficulty in getting appointments (phone system, requirement to make appointments in person), and lack of confidence in the care by some. People hesitate to go outside of the military system for care because of the language barrier.

We recommend that a greater share of the Army's doctors, particularly family practitioners and other specialists be assigned overseas. If there is then a shortage in CONUS, it can be made up by Civilian Health and Medical Program for the Uniformed Services (CHAMPUS).

We recommend that the Family Action Plan include as a top priority an issue of improving medical care and that more doctors be assigned to Europe.

Childcare. Childcare is a major issue with single parents, married military members with children, working spouses, and non-working spouses. Availability and quality of childcare impact on well-being of the family and, especially in the case of single parents and military couples with children, on readiness.

We recommend building of childcare centers be expedited, centers be opened during alerts, and pre-school and developmental care continue to be emphasized. Army families should feel their children are being given at least as many educational opportunities in the early years as they would have in civilian life.

Continuing Education: Educational opportunities draw thousands of fine soldiers and officers into the Army every year. The Army must keep faith with these people by continuing and expanding (not cutting back) current programs. Education is a key to self-esteem, and to job knowledge and performance. It is a quality of life factor.

For those who did not necessarily join the Army for educational opportunities, the Army should work to create an interest. Where basic skills fall short, the Army must require classes. Where no high school diploma exists, the Army should require work toward GED.

In short, we recommend the Army and its commanders strongly exphasize and support education. This includes making its availability compatible with training time.

A new GI bill is strongly recommended in Issue 1. The importance of this cannot be overemphasized, and a key feature should be transferability of benefits to a family member after the servicemember has a certain number of years in service.

Transportation to post. Isolation can be one of the cruelest features of life for a military family member. Isolation can be frightening and cause tension and depression, by cutting people off from everything familiar. If not dealt with, it can ruin quality of life for the family and severely impact on the servicemember's readiness.

Transportation to post can help enormously to relieve the tensions of isolation. Army members and their families should have military transportation to the post facilities, especially in Europe where unfamiliarity with language, neighbors, bus systems, products can be so difficult.

It is not possible to send military transportation to every little town where one American family lives, but we recommend that the Army should increase availability of transportation as much as possible. There will be a high payoff in loyalty to the Army and fewer family problems, such as child abuse.

Where the Army is able to obtain build-to-lease housing on the economy, it is important that transportation to post be provided.

Improved telephone service (Europe). Often only a few telephone lines into the military system exist in Europe. For family members trying to dial the health clinic, child care center, transportation office, or their sponsor, this can be very frustrating and even dangerous. We recommend more lines. This is also an issue in the work place.

APPENDIX B

The USAR and ARNG have normally 37 training days a year. Needless to say, all of this time is not available for training. Usually a couple of days are lost when a unit moves to its active duty for training (ADT) station. This also does not recognize the many hours that the leadership cadre gives without compensation.

The active unit has 365 days in the year to train, but given weekends, holidays, field training, etc., usually this is closer to 270 days. Granted that 1/3 (90 days) may be tied up with post support functions, but still the ratio of active training time to Reserve training time in on the magnitude of 6 to 1 or more.

The USAR/NG Battalions are supposed to be held to the same training standard as the active units and train on the same Army Training and Evaluation Program (ARTEP) tasks. Needless to say there is not enough time for the USAR/NG to train on all the individual and collective tasks. As a result of this, the entire training program suffers and the RC/NG units may be familiar with all the tasks, but certainly not proficient (nor should they be expected to be).

The question that has to be asked is how best to improve training readiness given the resource constraints. There appear to be only three choices: increase training time, reduce the number of individual and collective tasks to be trained on, or some combination of the two. The reduction in the number of training tasks merits consideration.

Several methods exist by which to reduce training tasks, all of which have associated advantages and disadvantages. The alternatives follow: restrict the level of collective training tasks (no training above platoon level), restrict training to a specific area of the world, restrict training to specified missions, make better use of available time through concurrent, multi-echelon training, or a combination of the above.

The problem that a training manager has to solve prior to analyzing what has to be taught, setting priorities and allocating resources, is narrowing the scope of the world with which he has to deal. Generally this starts with an analysis of the wartime contingency plans to determine where the unit will most likely go, what the likely threat force will be, and what the unit's initial and subsequent missions will be. Once this analysis is complete, the chain of command can make an assessment as to what the unit's strengths and weaknesses are and what is to be trained.

Superficially, it would appear that a higher state of training readiness would exist if the unit could intensely focus its training efforts. The up-front cost to the National Military Command Authority is loss of flexibility. Units that are broadly trained can be deployed world-wide for any possible contingency. Units that are trained only for special areas of missions cannot be deployed to another area with the same degree of confidence. The question, however, is can we improve the current readiness posture of the RC combat units?

The Army has a number of specialized missions that RC central forces could focus on. This would eliminate the need for some training tasks, e.g., unit trained for military operations urban terrain (MOUT) operations, desert operations, jungle operations, mountain operations. Currently, a few reserve units train as a Battalion Task Force and none conduct brigade or higher field exercises. An evaluation of the units which train at the Battalion Task Force level points out the need for far more training, but the problem is time. Given the requirements for individual soldier skill level training, squad and platoon collective training, there is little time left.

The unit will always have to maintain proficiency on those tasks which are required to protect and sustain the unit (NBC, Air Defense, Defensive Operations, etc.). The question is with the little time remaining (if there is any, and in some units there won't be) — what to have the commander focus on.

APPENDIX C

INTRODUCTION

One of the most important highlights of this group's activities in preparing for SS 84 was the visit to the NTC. Because it gives commanders and troops the closest experience to combat that is available in peacetime, the NTC is critically important to improving readiness of the Army. Those of the Group who had seen the NTC in its early formative stage were pleased to see the progress that has been made toward developing an outstanding facility and capability. It has great potential for upgrading and maintaining higher standards not only throughout the active Army but also in the Guard and Reserves. It was encouraging to learn that selected units of the Reserves and Guard will receive some training at NTC.

As we observed what was being done at NTC, we could not help but note the severe problems caused by the "Fog of Battle." This reminded us of GEN Blanchard's statement at the introduction to SS 81, which in summary said: "No one, who has not been in the heart of battle, can imagine the awful fog of battle which exists when one does not know where the enemy is and has poor information on the location and condition of one's own forces."

It was largely this discussion that led to the theme for that summer study - "Eliminate the 'Fog of Battle' for enemy forces" through precision fighting (i.e., precision target surveillance and target acquisition, precise information on friendlies, and precision weapons) - and countermeasures (electronic warfare, decoys, and deception) to increase the fog of battle for the enemy.

Following this theme led to recommendations in SS 81 part of which resulted in the Army thrusts:

- VISTA with emphasis on development of automatic target recognition, systems for fusion of information collected above and on the ground — all in near real time. The power of VHSIC/VLSI makes possible signal processing never considered possible before, and the data processing at the sensor can greatly reduce the amount of data so that the necessary information can be sent over narrow bandwidth communication equipment, greatly reducing vulnerability.
- Distributed C^3 for better survivability. The use of equipment such as position location reporting system/joint tactical information delivery system (PLRS/JTIDS) can give very good location of friendlies in real time. Display/microprocessor technology is beginning to make possible interactive displays which can given commanders needed information plus alternatives to help him in his decision making. The expression $V(INT)^2$ was coined to describe a concept for accomplishing this. Obviously a commander can be easily inundated with too much information. An objective of $V(INT)^2$ was to sort out and filter so needed information could be presented in the most understandable form.

- o Brilliant or self-contained munitions, including missiles, artillery rounds, mortars, and mines. If automatic target recognition can be properly developed self-contained munitions can be used in precision destruction of enemy forces. This has very great implications for reduction in logistics and consequently on required manpower.
- o Attention to soldier-machine interfaces early in the conceptual design phase and throughout the development and production of weapons systems. This obviously did not get the detailed study that it is getting in SS 84.

In addition SS 81 and 83 put heavy emphasis on (a) treating the Army as a system and getting away from stovepipe thinking, and (b) demonstration or concept validation programs early in development of new weapons system or concepts to get early information on how well concepts will work out in meeting needs and taking into account the limitations imposed by soldier-machine interfaces.

All of this has implications for the present summer study. If the thrusts are implemented for Army 21, this implies that commanders, at various levels will have more precise information available on both enemy and friendly forces. Because of this and the nature of "Island of Conflict," expected enemy air, higher performance of ground weapons, and air weapons, it will be necessary to have soldiers (particularly commanders at all levels) who think faster and more precisely. Bravery will always be important, but bravery with smarts will be increasingly important.

Also, the commanders and troops can be greatly affected by the conditions of the integrated battlefield (NBC). Commanders who want to always ride around with the hatch open scanning with binoculars will not likely live long on a chemical battlefield. Discipline in the soldier-machine interface will be particularly important. Not only are the stresses of being "buttoned up" greater, but, also, the stresses caused by dispersion on the integrated battlefield will be of a different kind. There will be a premium on self-reliance, and the ability to depend upon and trust ones instruments, weapons, machines, and the buddy next to you.

As stated earlier, the commander in Army 21 will not only have more precise information and greater quantities of information available than ever before, but technology will make it possible to sort, filter, process, and display the information in a manner best suited to commander's capabilities. There is at present a paucity of understanding of what information and how much should be displayed to commanders. Research is needed in this area. Research properly carried out in this field may well result in a better understanding of how the present command functions can be better performed. For instance, we do not have any good data on what the ratio of led to leader should be. On one side we have experience of some efficient fighting forces which says it should be smaller. On the other hand we see emerging experience in industry which is beginning to say we should be able to cut out layers of management because information systems permit the ratio to be higher. May not the communication concepts implicit in the thrusts remove the tyranny of communications centers?

Almost certainly the implementation of the five thrusts and considering the Army as a system will have significant implications on both the quantity and quality of personnel needed. Certainly higher intelligence capable of quick decisive thinking would be useful particularly for commissioned and non-commissioned officers and to a lesser degree the troops. We do not have good information for predicting whether they will be available, or whether we can get them into the Army. Also, we do not

really know how far developers can go toward making weapon systems that can be operated and maintained by lesser skilled personnel. Certainly this was a driving factor in thinking during SS 81. We have tried to find whether in the present modernization program the attempts that had been made during the development of programs to make equipment easier to operate and maintain had really paid off. The one example, for which we have been able to get data on in some detail, has been an outstanding success. This is the Blackhawk. The emphasis in the early design phases to use technology effectively to improve reliability and maintainability has led to an engine and aircraft which is superior in essentially all respects in terms of maintenance compared to earlier aircraft. For instance the maintenance man hours/flight hour is only 80% of that for a UH-1H and for an aircraft with far greater performance capability. We believe that with the proper emphasis, technology and sophistication can be used to make equipment easier to operate and maintain. However, there is very little data on what will be needed in terms of quantity and quality and whether such personnel can be available to the Army. Therefore, strong incentives and adequate funding to developers to make equipment easier to operate and maintain and requiring fewer personnel are needed.

The above considerations have implications for quality of life issues. Certainly the Army is going to require at least the intelligence level that is being recruited today and probably a higher level will be required for Army 21 - at least in the commissioned and non-commissioned officers level, because of the need for faster, more precise and more decisive thinking. This means we must be developing the facilities, techniques, practices, and funding support to acquire and retain personnel with a high level of intelligence and standards - and recognizing the changing patterns of lifestyle. The "Year of the Family" is important, but the concept must have long range follow through.

These considerations also have implications for the structure and organization of the Guard and Reserves, the way they are trained, their limitations, their strengths, and the resulting readiness we can expect from them.

We have been pleased to see the start of long range planning in DCSPER and we were pleased to see a long range planning activity being started at Fort Hood. Such activities should lead to greater stability in moving toward Army 21 - and lead to significant improvements along the way. It is obviously important to be working toward Army 21 now. Some of the commanders of that time period are in the Army now. Others will be coming in during the ensuing years. The inductees of that time period are about to start into school. They will fortunately be growing up in a much more highly information oriented society. Also, hopefully they will be growing up in a school system that puts more emphasis on science and mathematics. During the past few years the deficiencies of our educational systems have become better understood. Hopefully the U.S. will maintain a strong effort to correct these deficiencies. If so, the Army's job in recruiting and maintaining quality people should be easier. If not, the Army's training job will be even more difficult than now.

APPENDIX D
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APPENDIX E

Soldier-Machine Interface: Critical in High Tech Systems

In 1982, the US Army established five central thrusts to its on-going force modernization program: distributed command, control, communications, and inteligence (C^3I); self-contained munitions; very intelligent surveillance and target acquisition technology; biotechnology; and the soldier-machine interface. This prioritization was based on the Service's judgment that these were high leverage technologies with the potential for substantially increasing combat power and force effectiveness. The inclusion of the soldier-machine interface in this select group underscored the Army's growing awareness of the critical relationship between soldier capabilities and the field performance of new and often very sophisticated military systems. This consideration is especially important in light of the Armed Services' increasing reliance on high technology in defense systems, and the declining size and technical preparation of the American force.

The soldier-machine interface stretches across the boundaries of several technical disciplines and is now used to describe any number of often disparate approaches to systems design and analysis, logistics support analysis, and manpower planning. The designation as a thrust area notwithstanding this proliferation of meanings has caused some to question the usefulness of the soldier-machine interface concept and others to relegate it to the imprecision of slang. The term, however, does meaningfully describe a specific methodology for improving systems design in the defense system development and acquisition process. This strategy fully integrates an emerging system's hardware, software, human, and other support subsystems in order to achieve specified mission capabilities. In essence, the approach strives for total system development. Hence, soldier-machine interface is a robust yet precise concept, always useful and often required in order to optimize defense systems' design and ultimately their performance in the field.

Why Soldier-Machine Interface - coincidence of trends

The Department of Defense (DOD) has grown increasingly reliant on advanced technology to counter the threat from a numerically superior potential adversary. By almost any measure, the density of high technology is up in the Armed Forces. For example, the number of pages of technical manuals required to support the Army's M-1 tank is almost three times greater than that required by its predecessor, the M-60. Perhaps even more important, the Army is experiencing a "skill creep" as more sophisticated systems demand more capable and better trained operators and maintainers. The DIVAD System Mechanic (MOS 24W), for example, requires 39 weeks of training while its "predecessor," the Vulcan System Repairer (MOS 27F), required 23 weeks. Similarly the Navy has seen its training requirement for 15 ratings increase 580 percent during its transition from the SUMNER class to the new SPRUANCE class destroyer. Further, a background in science or mathematics is now desirable in more than 70 percent of the Air Force's enlisted force. In effect, the advanced operational capability of high technology systems has been purchased, at least in part, with greater demands for human resources.

Yet the absolute size of the American workforce is shrinking. For the DOD, this situation means a 22 percent decrease in the size of its primary recruiting pool (18-24 year old males) between 1980 and the mid-1990s. The latest census, moreover, reveals that the country's recovery from this steep decline in its working population will be much slower than originally forecast. Nothing can be done to change these numbers. Hence, in order to sustain its recent recruiting successes, DOD will have to attract a greater proportion of the available labor force throughout the remainder of the century.

There has also been an alarming dip in the quality or capability of this smaller pool. Estimates provided in the DOD Profile of American Youth indicate that the median reading grade level of persons 18-23 years of age is now 9.6; it is two to three reading grade levels lower for some minority groups. This situation is particularly troublesome for DOD, as minority representation in the primary recruiting pool will grow from 20 to 30 percent by the year 2000.

Equally as disturbing, the country has now experienced over 25 years of "significant declines" in the average scores in science and math achieved on such national tests as the American College Test (ACT) and the Scholastic Aptitude Test (SAT). Further, the lack of student interest in science, based upon nationwide surveys, is now identified as a major problem by 50 percent of teachers. Thus, as Dr. Joseph I. Lipson, a prominent researcher in the training field, has noted, the United States is one of the world's most advanced technological societies, yet it is "not providing the majority of our children with even the most rudimentary knowledge and skills necessary to contribute to, manage, and understand that society."

This coincidence of a smaller, less capable workforce and burgeoning high technology in defense systems is already creating severe problems in military human resources and systems acquisition management. It is also impacting negatively on the combat readiness of the Armed Forces. For example, the overall system performance of the Army's STINGER air defense system, defined as the probability of its successfully performing critical mission tasks, was designed to be 0.64; however, human performance limitations, as measured in system tests, have driven actual system performance down to approximately 0.44. Generals George S. Blanchard and Walter T. Kerwin described such situations as "a growing crisis" in their 1980 report for the Army Materiel Systems Analyses Activity: "There are not enough qualified people to perform the tasks required to effectively operate, support and maintain current Army systems...The problem is severe and will continue to get worse." More recently, General William E. DePuy and Dr. Seth Bonder have described the Army's requirement for additional manpower and skilled personnel, driven by its force modernization program, as "a demand beyond the accumulative capability of the Army to satisfy."

This mismatch between advanced machines and the people who will have to operate and maintain them has also been recognized elsewhere. The Naval Research Advisory Committee (NRAC) wrote in 1980: "Given present trends, the Navy will find itself unable to operate and maintain its systems, in either the short or long term, with the numbers of skilled personnel necessary to effective mission accomplishment." The Air Force is already confronting a national shortfall in both aircraft mechanics and avionics technicians, yet its

requirement for people with high electronic aptitudes will increase by about one third in the next fifteen years. Even industry is not immune to the problem. According to Fortune magazine, "Millions of new jobs will be created, mostly in information systems, but they'll be so different that today's laid-off workers will be hard pushed to fill them."

The data support these contentions. Twenty-nine of the Army's MOS's, now at only 90 percent operational strength, have increased manning objectives of 20 percent. Thirty-four percent of all MOS with increased manning objectives are potentially not supportable. The Air Force reported to the DSB in 1981 that it was projecting a shortfall of 9,300 aircraft/missile/electronic maintenance personnel in grades E-5 through E-7. The Navy is projecting similar shortages for such ratings as Boiler Technician, Data Processing Technician, Electronic Technician, Operations Specialist and Sonar Technician. Moreover, 30 percent of the Navy's aviation squadrons and 23 percent of its ships reporting their status as "not ready" (C-4) now cite quantitative and/or qualitative manning shortfalls as the cause.

Such shortages severely strain service personnel and training systems and inevitably diminish the readiness and mission capability of the Armed Forces. A 1981 report to the Congress by the General Accounting Office attributed fully half of all military weapons and support system failures to human error. Further, inadequate scientific and technical training is cited as the cause of a 90 percent failure rate in tests administered to 385 nuclear weapons maintenance specialists; a 77 percent failure rate for 1,633 Army computer programmers; and a 98 percent failure rate for 371 tank turret and artillery repair personnel. Too often, old as well as new military systems are not achieving their design capability or their readiness goals because soldiers cannot properly operate and maintain them.

Resolving the mismatch problem

In DOD, at least, the human-machine mismatch problem is as much a function of the way new defense systems are designed and developed as it is a product of shifts in the American population. Consequently, the solution requires a broad range of initiatives, involving both human resources and acquisition management. In order to increase total system effectiveness, DOD needs to simplify system operation and maintenance, and to reduce manpower requirements, training time, and cost.

The net result is best characterized as an effective and efficient fit at the soldier-machine interface. Hence, the term usefully serves as a unifying concept for all actions taken to optimize the performance of both soldiers and equipment in order to achieve overall effectiveness equal to the design capabilities of a total system and thereby to maximize its combat power. In effect, then, soldier-machine interface is a strategy for total system development.

In the short term, this strategy will involve ad hoc actions in the system design process to ensure that emerging equipment is both affordable and supportable from a human resource perspective. (Said another way, the Services must take steps to ensure that they can efficiently access, train, and retain adequate numbers of personnel to operate and maintain new systems effectively.) These actions include training developments, personnel management, systems engineering, human factors engineering, and medical science.

The initiatives are ad hoc in that they represent corrective and essentially independent efforts to redress immediate problems at the soldier-machine interface. For example, the Army has now developed a comprehensive format for reporting manpower personnel and training considerations during the management reviews conducted for new systems. Although not yet a development process requirement, the document is useful in drawing together and providing management visibility to all of the human resource considerations heretofore spread through numerous other system and program documents. In another instance, the Naval Training Equipment Center is developing guidelines for trainer acquisitions that will cost less than conventional training systems but provide equal training capability. To date, cockpit procedures trainers have been successfully designed and built for both the SH-3H and EA-3B aircraft for one-quarter the cost of conventionally developed systems of comparable training capability.

In another case, the Army's HEL is exploring the capabilities of commercially-available robotic systems for such labor-intensive tasks as ammunition handling and resupply. Relying on automation to alleviate manpower and training problems makes sense - providing, always, that the technology performs as advertised. Highly automated equipment far too often has insufficient reliability and actually increases the demand for quality personnel training and logistics support. Hence, as with the HEL demonstration project, automation must be proven to work in the field to be an acceptable approach to new system design.

Although the efforts described above focus management attention on advances in technology in a particular part of the total system (i.e., on the human resources component, or the logistics component), they are likely to have near to mid-term payoffs that meaningfully improve the soldier-machine interface and thereby contribute to operational readiness. In the longer-term, the soldier-machine interface must extend beyond these useful but disconnected efforts to an alternative concept of system design. This concept is best characterized as total system development. Total system development is not a strategy for accomplishing system design differently (e.g., computer-aided design) or an adjustment to conventional design practices (e.g., pre-planned product improvement); rather, it is an alternative philosophy of system development.

This philosophy begins with a different concept of the final product of design - the system. With total system development, that product is a means to an end. It is software, hardware, human beings and logistics support, all of which must be creatively brought together to provide a desired mission capability. The emphasis, then, is on achieving field performance, rather than improving equipment, because only the former is genuine defense capability.

The process of creating a comprehensive system that actually provides a desired capability requires a working integration of all technical disciplines involved with the system during its life cycle. Heretofore in system development the engineering community focused on system design and development while other disciplines such as behavioral science and logistics were employed to make the system (with its soldiers and support) work in the field. All the words and regulations aside, the traditional emphasis has not been on developing and providing an operational mission capability. It has been instead on providing hardware that meets performance specifications, or on providing people who are available and trained to designated standards. Alone, however, neither aspect of the total system provides much capability. Very sophisticated weapon systems are useless without skilled operators and maintainers, while well-trained soldiers without appropriate systems are terribly vulnerable in modern warfare. Either situation represents a mismatch at the soldier-machine interface and bleeds off mission capability. Both situations are the product of engineering and manpower planning and training development and logistics support analysis in a vacuum.

The total system development process extends responsibility for both system design and field performance to all of these disciplines. It breaks down the old compartmentalization of the system life cycle and brings engineering into the behavioral scientists' and logisticians' realms of system performance in the field and behavioral scientists and logisticians into the engineers' domain of system design. Understandably, this will be an uncomfortable and difficult process initially. Common languages and data bases, and interoperable analytical tools will have to be developed, so too will new working relationships. Some progress is being made in all of these areas, but more needs to be done.

Total system development will also require changes in DOD's investment philosophy. Dr. Harry M. West, III, Deputy Director for Army Manpower, Programs, and Budget, has hypothesized a total system acquisition strategy that involves "an intentional increase in capital investment expenditures to reduce manpower, personnel and training demands, as well as subsequent operating and support costs..." The return on that investment is expected to lower life cycle costs and an improved soldier-machine interface. Hence, the Army is spending approximately $2.6 million on soldier-machine interface research and development in its upgraded 155mm self-propelled howitzer improvement program. The resulting savings in personnel and annual school training requirements are expected to total $740 million over the life cycle of the system.

Ultimately, the traditionally horizontal approach to systems development (i. e., from concept definition, through concept demonstration and validation to full scale engineering development) will shift to a more integrated and vertical strategy. The total system design will mature iteratively: The constituent disciplines of the process will be applied concurrently, while interdisciplinary tradeoffs will integrate these activities to develop the concept which best satisfies the mission need. Test and evaluation will verify the total system mission capability, and the management will direct its procurement.

The concept of total system development also acknowledges the role of leadership in achieving total system mission capability. In light of the converging trends discussed earlier, leadership development is as critical a component of a sophisticated total system as is the design of its hardware, software, and training support subsystem. Indeed, leadership is the adhesive at the soldier-machine interface.

Fundamentally, total system development will necessitate a new way of thinking about systems, a philosophy which focuses on the system's purpose rather than on the specifications, standards, goals and objectives, however detailed, of its constituent components. A good fit at the soldier- machine interface pushes technology and human and other support resources to their collective limits in pursuit of mission capability. Hitachi has called this concept "humanication"; others have described it as "equipping the man." As a basic premise for force modernization in the future, it is best described as total system development.

APPENDIX F
HMPT AN EQUAL ELEMENT WITH MATERIEL

ISSUE 1: Effective and efficient development of total military systems requires that human factors, manpower, personnel, training, health hazard, and biomedical activities (HMPT) be managed, resourced, and accomplished as a co-equal element with materiel during all phases of the weapon system acquisition process.

RECOMMENDATION: Institute a single HMPT authority equal to materiel throughout the system design and decision process.

- o TRADOC provide SSC with the focus, resources, and authority to accomplish its charter of personnel integration in all phases of system development (Terms of Reference (2)).
  - oo For all Army System Acquisition Review Council (ASARC) programs, require Commander, SSC, to certify in writing to CG, TRADOC, that HMPT issues have been adequately addressed.
  - oo Resource SSC to provide supportability assessment support to Special Study Groups/Special Task Forces and to the PM for all ASARC programs.
  - oo For all ASARC program reviews, require that Commander, SSC, or his designated representative be a briefer on HMPT issues.
  - oo Include Commander, SSC, or his designated representative as a voting member on source selection boards for all major and designated acquisition programs.
  - oo To succeed in the above initiatives and to underscore their importance to the Army and to industry, elevate the SSC to a three-star command (viz the Log Center).
- o Expand the capability of ODCSPER to provide HMPT policy guidelines for system development programs. Acquire analytical tools, data bases, and personnel to support assessment of total force impact of all development systems (Terms of Reference (1), (2)).
- o Resource HEL, ARI, and appropriate medical commands for expanded <u>on-site</u>, <u>dual reporting</u> roles at AMC subordinate commands (Terms of Reference (2), (3)).
  - oo Expand mission and funding to field teams of experienced psychologists, biomedical scientists, and human factors engineers available for assignment to specific programs.
  - oo Upgrade strength and grade ceiling authorizations for quality professionals.
  - oo Use this experience to guide future ARI/HEL/medical commands 6.1/6.2/6.3A programs and ensure adequate funding for their growth.
- o AMC establish and protect <u>specific</u> funding levels for HMPT/soldier-machine integration activities in each program managed as well as in each project/product managed development program (Terms of Reference (2)).

- o Establish a working group to coordinate the Army's on-going efforts to: (1) better communicate to industry its HMPT goals and constraints, to include soldier performance limits. This communication should be composed of:
  - oo detailed HMPT guidelines, standards, and performance specifications in solicitation documents.
  - oo supplementary information and analytical tools (e.g., HARDMAN) useful in conducting design assessments and tradeoff analyses;

and to: (2) provide incentives for industry's efforts in HMPT integration. Incentives should include:

- oo significant HMPT source selection weighting (equal to materiel considerations);
- oo qualified assessment by the Army of contractors' HMPT efforts pre and post award;
- oo "fenced" funding support for contractor's HMPT activities during development; and
- oo support for HMPT involvement in producibility and quality assurance.

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APPENDIX G

SOLDIER PERFORMANCE

ISSUE 2: Enhanced system performance can be achieved with improvements in soldier performance. Hence, current and planned soldier research programs must be organized and resourced so as to maximize their contribution to the requirements and capability embedded in Army-21.

RECOMMENDATION: Focus and resource soldier research for improved system performance.

- o DCSPER establish a GO Director for Soldier Research, within ODCSPER. (Terms of Reference (3)).
  - oo Resource the Director for Soldier Research to act as the DCSPER's agent (per AR 70-1) in overseeing HMPT research in funding categories 6.1, 6.2, 6.3A conducted by ARI and HEL and in coordinating human resource-related RDTE programs in all Army laboratories.
  - oo Director for Soldier Research should also serve as the advocate for HMPT research and development in the budget progress in Department of the Army, DOD and the Congress.
  - oo Task Director for Soldier Research to inaugurate an aggressive research program in human technology.
- o AMC ensure that the current robotics and artificial intelligence RDTE programs provide an adequately resourced, coherent and comprehensive development strategy for intelligent robotics (Terms of Reference (3)).
- o Expand the mission and increase resources of ADEA to accomplish test and evaluation for soldier-machine interface/integration. Resource and fund ARI, HEL, TSG, and HSC to support ADEA in these activities to include (1) testing tools for supportability assessment and human factors engineering; (2) developing and communicating to AMC/TRADOC improved HMPT data, soldier performance limits and design guidelines and constraints for industry; and (3) identifying areas and/or issues requiring further research and development (Terms of Reference (1), (2), (3)).

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APPENDIX H

INSTITUTIONALIZING HMPT PROGRESS

ISSUE 3: The Army must institutionalize its increased awareness of and improved attention paid to personnel factors in weapon system performance.

RECOMMENDATION: Establish HMPT initiatives with staying power in Army organizations and processes.

- o Establish a Department of the Army Clearing House of lessons-learned and documentation for HMPT tools and technologies. Ensure that PM's and technical support staffs in Government and industry are aware of and have access to this resources. (Terms of Reference (2), (3))
- o Focus soldier/machine RDTE programs on tools and data bases for tradeoff and sensitivity analyses, soldier costs, and human factor test and evaluation. The systematic use of simulation for design to ensure equipment is operable and maintainable, and the interrelations of design simulation and training simulation to include the concept of trainability should be given particular emphasis. (Terms of Reference (1), (2))
- o Provide the capital equipment, such as design simulators, mock-ups, and light/sound measurement equipment, necessary to support HMPT design input at the AMC subordinate commands. The purpose is to provide on a quick reaction basis the quantitative inputs needed for design.
- o Establish explicit career tracks and other personnel management initiatives for officers and civilians who engage in HMPT activities and programs. These should be designed to improve their competency, enhance their professionalism and reinforce their commitment to HMPT and the Army. DCSPER evaluate designation of career tracks, either as a functional area or a skill consistent with the Army's recently approved OPMS initiatives (Terms of Reference (2)).
- o Establish a Total System Development Steering Committee chartered to set bold new HMPT goals and directions for system design (Terms of Reference (2)).
  - oo High among the Committee's agenda items should be to oversee the implementation of the DA-approved recommendations from the 1984 ASB SS Panel on Personnel Factors in Weapon System Performance.
  - oo Appoint general officers to represent MACOMs, Commanders-in-Chief, and the Army Staff.
  - oo Require that this Committee report semi-annually to the Under Secretary of the Army and VCSA on its initiatives.
  - oo Aggressively seek opportunities to advise industry of these initiatives via such forums as the Association of the United States Army (AUSA) and the National Security Industrial Association (NSIA).

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report addresses the conclusions and recommendations of the Army Science Board Summer Study on Leading and Manning Army 21. The study focused on three major areas: Manning a Ready Force, Personnel Factors in Weapons System Performance, and Leadership. Numerous issues and problems are cited with over 50 recommendations offered. The 19 ASB members visited over 30 Army installations during the course of the study. Included are recommendations for an Army Personnel Command, increases to the role and responsibilities of the Soldier Support Center, and the Center for Leadership.

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