List of U.S. Army Research Institute Research and Technical Publications

October 1, 1998 to September 30, 1999
With Author and Subject Index

U.S. Army Research Institute for the Behavioral and Social Sciences
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Foreword

The means of dissemination of the results of ARI's research and development/studies and analysis program vary widely depending on the type of work, the subject matter, and the sponsor/proponent. Typically, major findings with immediate policy and procedural implications are briefed to sponsors and proponents in order to enable timely implementation. This is followed up with complete documentation in the form of research and technical publications such as the ones listed here. In many cases, these documents represent the actual item handed off to the sponsor/proponent; this is particularly true of the Research Product category. In other cases, results are published in order to provide a complete record of the work done, and for future reference by researchers doing work in the same or similar areas.

This annotated list for FY99 provides an idea of both the depth and scope of the ARI research effort, and is a valuable resource for anyone interested in military psychology from either a scientific or operational perspective.

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Introduction

The primary responsibility of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is to maximize soldier effectiveness. ARI accomplishes its mission through research and development in the acquisition, training, utilization, and retention of Army personnel. ARI research and products affect every Army mission with a human performance component.

As convenient references for qualified agencies and individuals and sponsors, ARI publishes lists of its technical and research publications. This issue of the publication list describes reports published during the period October 1, 1998, to September 30, 1999. It contains the abstract of each publication and the bibliographic information needed to identify a publication. The abstracts have been written, as far as possible, to describe the principal research findings in non-technical terms; however, technical language is used to communicate efficiently the details of research analysis. Author and subject indexing provide access to individual reports and topics.

ARI Publications

ARI publications are divided into separate, consecutively numbered categories appropriate to their intended audience and function. During fiscal year 1998, the following types of research and technical reports were issued by ARI:

Research Note (RN). An interim or final report typically of limited interest outside of ARI. It is filed with the Defense Technical Information Center (DTIC) but is not printed. Research Notes usually fall into one of the following categories:

- An in-house report that is of limited interest outside of ARI but is considered worth submitting to DTIC to be part of the Department of Defense (DoD) archive of technical documentation.
- An interim contract report that is of limited interest outside of ARI but is considered worth submitting to DTIC to be part of the DoD archive of technical documentation.
- A final contract report that is of limited interest outside of ARI but must be submitted to DTIC in accordance with Department of the Army regulations to close a contract.
- Material related to a Research Report or

Technical Report (detailed tables, graphs, charts, sample forms, and sample training and testing materials) published as a Research Note to economize on printing and distribution.

Research Product (RP). A user-oriented report intended to aid Army personnel. Examples are handbooks, manuals, and guidebooks.

Research Report (RR). A report of completed research intended primarily for dissemination to military managers. Research Reports may deal with policy-related issues but typically do not include specific policy recommendations.

Special Report (S). A published report on a topic of special interest or in-house research intended primarily for dissemination to a select audience.

Study Report (SR). A published report briefly documenting studies and analyses.

Study Note (SN). A Study Note may contain or consist of technical text, computer code, diskettes or tapes with software, databases, codebooks or other documentation, raw data, data collection instruments, figures, tables, or any other products that do not concisely convey the import of a project but which must be archived for technical completeness.

Technical Report (TR). A report of completed research intended primarily for dissemination to researchers.

Research Reports and Technical Reports published by the U.S. Army Research Institute for the Behavioral and Social Sciences are intended for sponsors of research and development (R&D) tasks and for other research and military agencies. Any findings ready for implementation at the time of publication are presented in the last part of the Executive Summary. Upon completion of a major phase of the task, formal recommendations for official action normally are conveyed to appropriate military agencies by briefing or memorandum.

ARI Distribution

Initial distribution of these publications was made directly by ARI. Research Reports, Technical Reports, Study Reports, and Research Products were distributed primarily to operational and research facilities and their sponsors in DoD, to other interested Government agencies, and to DTIC; copies of some reports were also sent to the Library of Congress for distribution to libraries participating in the Documents Expediting Project. Research Notes and Study Notes were deposited with DTIC but were not published.

These publications are NOT available from ARI. DoD agencies and contractors can purchase paper copies or microfiche from:

Defense Logistics Agency
Defense Technical Information Center
8725 John J. Kingman Road, Suite 0944
Ft. Belvoir, VA 22060-6218
(703) 767-9030 or DSN 284-9030

Other Government agencies and the general public can obtain unclassified reports from:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4650

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NOTE: When requesting copies of these reports, use the DTIC accession number (AD - - - - - - -) *appearing in parentheses following the date of publication of each citation.*

TR1088
Enhancing the Resource Efficiency of Live-Fire Tank Gunnery Evaluation. Smith, M.D. and Hagman, J.D. October 1998. (AD A368641)

This investigation reports the development of a target engagement reduction methodology that supports resource-efficient, live-fire gunnery evaluation on Tank Table VIII (TTVIII), the intermediate-level tank crew gunnery certification exercise. Through a series of multiple regression analyses, it was determined that TTVIII can be reduced from its current 10 engagements to 7 engagements. Scores on these 7 engagements can be used to predict 10-engagement-based TTVIII total scores with greater than 85% predictive accuracy. For Army National Guard (ARNG) units, the 7 engagements can be selected randomly. For Active Component (AC) units, however, the predictive subset must consist of specific engagements. For the ARNG, subsets consisting of as few as two engagements can be used to identify tank crews with little chance of achieving first-run qualification (Q1), and subsets consisting of as few as four engagements can be used to identify crews with a high probability of firing Q1. Both predictions can be made with 95% accuracy. For both the ARNG and AC, short-cut scoring models allowed the prediction of 10-engagement-based TTVIII total scores, based on subsets of any size, with calculational ease. It was concluded that more resource-efficient live-fire tank gunnery evaluation is possible in both the ARNG and AC without sacrificing evaluative validity. The magnitude of resource savings to be anticipated from use of the recommended resource-efficient methods was estimated.

TR1089
Virtual Environments for Dismounted Soldier Training and Performance: Results, Recommendations, and Issues. Knerr, B.W., Lampton, D.R., Singer, M.J., Witmer, B.G., Goldberg, S.L., Parsons, K.J. and Parsons, J. November 1998. (AD A360109)

The U.S. Army has made a considerable investment in the use of virtual environments (VE) to train combat forces, to evaluate new systems and operational concepts, and to rehearse specific missions. While these simulations have predominately focused on training and simulation for mounted soldiers, there is also a need to train infantry and other dismounted soldiers. Although VEs have the potential to immerse dismounted soldiers directly in simulations, there are few successful examples of the use of VE to provide effective training. The effective use of VE for training requires identification of the types of tasks for which VE training is most appropriate, the characteristics of VE systems that are required to provide effective training, and the training strategies that are most appropriate for use with VE. This report presents recommendations for the use of VE for dismounted soldier training and mission rehearsal, and identifies needed future research. They are based on the results of an ARI in-house research program, related programs in which ARI scientists have participated, and the work of other VE researchers. Recommendations include types of tasks for which training in VE is and is not appropriate, interface design recommendations, and ways to reduce side- and after-effects.

TR1090
Problem Solving of Mid-Career Army Officers: Identifying Natural Reasoning. Pounds, J. and Fallesen, J.J. November 1998. (AD A359869)

Military officers face diverse problems on the battlefield, during training, and in garrison. Doctrine specifies stepwise procedures as guidance for problem solving. However, these models are often not appropriate for varying circumstances. Further, other research (Pounds & Fallesen, 1997) demonstrated that these models do not represent methods actually used by tactical leaders. This project focussed on identifying officers' actual problem solving processes. Phase One of this project identified how situational variables affected officers' approaches to problems. Phase Two elaborated on the influence of familiarity on strategy use. Strategy use was also examined related to conflicting tactical goals of force protection and mission accomplishment. Although most participants stated that the strategy of identifying a specific goal was important to their thinking, a content analysis of interview transcripts revealed that the specific goals identified were of very diverse content. Examination of transcripts also revealed a variety of new naturalistic strategies and organizing themes. These were defined and illustrated by examples. Recommendations are made for self-development and personal awareness to leverage existing knowledge to cope with novel situations.

TR1091
Impact of Information Technology on Battle Command: Lessons from Management Science and Business. Dodge, G.E., Webb, H.W., and Christ, R.E. February 1999. (AD A362144)

The possible effects of information technology insertion on organizations and their personnel are derived from an analysis of published management science and business literature. Two major points are developed. First, many factors other than the technical potential of a given information technology interact with one another and with the technology itself to determine the resultant nature, form, and functionality of the "digitized" organization. Second, the most significant impact on commanders and their staffs for the foreseeable future will not be quantum improvements in operational performance made possible by information technology but, rather, the technology insertion process, itself. Based on this analysis, we propose that implications for command in a digitized environment can be best described by reference to a continuum of organizational structures and associated behaviors. The extremes of this continuum are defined as digital mechanistic and digital organic. A third point between these two extremes is defined as digital adaptive. We discuss the nature of command over the range of the proposed continuum. The new competencies that might be required of commanders and their staffs regardless of the outcome of the technology insertion process are then discussed. The chapter concludes with suggestions for improving the technology insertion process.

TR1092
Optimizing Simulator-Aircraft Mix for U.S. Army Initial Entry Rotary Wing Training. Stewart II , J. E., Dohme, J.A., and Nullmeyer, R.T. March 1999. (AD A361814)

Early fixed wing research demonstrated that potential cost and training benefits could be derived from simulation-augmented primary flight training. Unfortunately, more recent research in this area has been the exception, not the rule. This is especially true in the case of rotary wing (helicopter) aircrew training research. The present report reviewed the research literature on military aviation transfer of training (TOT) research, and examined the current U.S. Army Initial Entry Rotary Wing (IERW) Program of Instruction. An in-depth review was also conducted on the recent IERW simulation research performed by the Army Research Institute (ARI) Rotary Wing Aviation Research Unit (RWARU). Review of the IERW TOT research showed that a combination of synthetic flight simulation and criterion-based training had the potential for saving training time and costs in the aircraft. Adaptive training aids such as the ARI RWARU Intelligent Flight Trainer, also showed promise. A research program, focusing on revising the current IERW program to optimize the use of simulation, was proposed. This program would include (a) criterion-based instructional strategies, (b) low-cost simulation, and (c) investigation of different combinations of simulator vs. aircraft training events, in order to determine the optimal simulator/aircraft training "mix."

TR1093
Tacit Knowledge in the Workplace. Sternberg, R.J., Forsythe, G.B., Hedlund,J., Horvath, J.A.,Tremble,T.,Snook, S., Williams, W.M., Wagner, R.K., Grigorenko, E.L. March 1999. (AD A362656)

This is the final product of a six-year effort to define, assess and measure tacit knowledge for leadership among U.S. Army officers. Tacit knowledge is defined as knowledge grounded in experience, intimately related to action, and not well supported by formal training and doctrine. Tacit knowledge for leadership was researched at three different levels of command and developed into assessment inventories for each level. The assessment inventories have been construct validated and proven to predict certain leadership effectiveness ratings at each level and to do so better than measures of verbal reasoning ability, tacit knowledge for business managers, or experience. The report describes the constructs of "practical intelligence" and "tacit knowledge", other research related to them, the general methods used in assessing tacit knowledge, and the development of the Tacit Knowledge for Military Leaders inventories. There is also a chapter on the practical implications for leadership development and training. An expanded version of this report will appear as a commercially available book entitled, Practical Intelligence in Everyday Life by the same authors.

TR1094
Prescreening Methods for Special Forces Assessment and Selection. Zazanis, M.M., Hazlett, G.A, Kilcullen, R.N. & Sanders, M.G. May 1999. (AD A365003)

The Special Operations Proponency Office (SOPO) at the U.S. Army John F. Kennedy Special Warfare Center and School requested help from the U.S. Army Special Operations Command Psychological Application Directorate and the U.S. Army Research Institute in identifying prescreening tools to determine which soldiers would have the greatest chance of success in the Special Forces (SF) selection and training pipeline. Two studies were completed examining different methods for predicting performance in SF selection and training. Analyses focused on junior level enlisted soldiers, who have lower success rates than the non-commissioned officers. Results indicated that Army Physical Fitness Test, previous branch type, Armed Services Vocational Aptitude Battery General Technical score, and airborne qualification provided optimal prediction of success in SF Assessment and Selection (SFAS). Soldiers in the highest prediction category achieved a select rate of 66%; whereas, soldiers in the lowest prediction category showed a success rate of only 24%. Two methods were proposed to generate order of merit lists that would identify recruits with the highest potential for success in SFAS. This would allow SOPO to minimize recruitment of soldiers who have little chance of completing SFAS.

TR1095
Training Through Distance Learning: An Assessment of Research Findings. Wisher, R.A., Champagne, M.V., Pawluk, J.L., Eaton, A., Thornton, D.M. & Curnow, C.K. August 1999. (AD A368592)

This report offers a review of the literature on the effectiveness of distance learning as applied to training. Most research in distance learning was found to be anecdotal, focusing on education rather than training. When effectiveness was measured, it was usually not supported by strong experimental or quasi-experimental designs, and comparative results (such as to the classroom) were reported only one-third of the time. When data were reported, there were analytic problems and errors in reporting which were often overlooked by researchers. An assessment of the completeness of information in reporting course design and instructional techniques in the literature showed 40% of the studies did not mention course design or conversion and 25% did not mention instructional techniques. When distance learning was demonstrated to be effective, it was difficult to resolve why it was effective: the effort in course design or reconversion, the instructional techniques used, or the methods of communication (technology) employed. Suggestions for improving evaluations are offered.

TR1096
Digital Procedural Skill Retention For Selected M1A2 Tank Inter-Vehicular Information System (IVIS) Tasks. Sanders, W.R. August 1999. (AD A368212)

The U.S. Army Force XXI program makes extensive use of digital communications technologies to speed the exchange of information among all operational levels. While digital communications offers great potential, anecdotal reports from field trials and testing repeatedly state that the basic procedural skills needed to operate these systems are highly perishable. The present research developed estimates of digital procedural skill retention for the tasks of creating and sending digital map overlays and reports, using the M1A2 Abrams tank Inter-Vehicular Information System. Twenty-eight soldiers received instruction based on the M1A2 New Equipment Training Team lesson plan, followed by an immediate evaluation of task performance, and a follow-on evaluation 30 days later. Results showed a 52 percent reduction in the number of soldiers able to create and send digital map overlays after the 30 day delay, and a 23 percent reduction in the number able to create and send digital reports. Methods for measuring skill decay are presented, and an approach to identify performance errors is provided.

TR1097
Applying Digital Technologies to Training: A Focus on Pictorial Communication. Lickteig, C.W. and Throne, M.H. September 1999. (AD A369262)

Digital technologies can help solve many of the training problems they create. The Army's investment in digital technologies assumes that

they will portray a common picture of the battlefield on the digital displays of warfighters and supporters, and improve training. This report focuses on the application of digital technologies, such as instrumented command and control systems and military simulation, to train the skills to understand and maintain a pictorial depiction of the battlefield situation on digital displays. Three main areas of research are identified that focus on common picture training and evaluation requirements: define, communicate, and maintain a common picture of the battlefield. For each of these areas, research issues are raised and corresponding training and evaluation methods are recommended to address each issue. Overall, the method recommendations repeatedly examine how a log of soldier-computer interactions from instrumented command and control systems can automatically provide an empirical base for assessing performance and giving feedback. Conclusions consider how integration and implementation of the training and research methods recommended in this report, in concert with digital technologies, might foster design and development of a digital training environment directed at the pictorial communication of battlefield situations on digital displays.

Research Reports

RR1729
Battle Staff Training System II: Computer-Based Instruction Supporting the Force XXI Training Program. Wampler, R.L. and Livingston, S.C. November 1998. (AD A359252)

This report documents the methodology and lessons learned in the development of the Innovative Tools and Techniques for Brigade and Below Staff Training II - Battle Staff Training System II (ITTBBST-BSTS II). This effort supported the Army's distance learning initiative by developing three computer-based training (CBT) courses of instruction on CD-ROM. An existing Brigade Common Core training support package (TSP) was converted from a text and computer-based TSP to a 100% CBT course with limited adjunctive text materials. In addition, TSPs were developed for the Training Developer and CBT Author to train them to update and maintain an existing library of courses. These TSPs were also 100% CBT. The ITTBBST-BSTS II Brigade Common Core course can replace the similar course in the existing BSTS library of courses for use by the Total Force. The Training Developer and CBT Author courses are designed for use at an institution with responsibility for updating and maintaining BSTS courseware. The Brigade Common Core and Training Developer courses are designed for use in a local area network, wide area network, or stand-alone computer mode. The CBT Author course is designed for stand-alone use only.

RR1730
Review of Battle Staff Training Research at Brigade and Battalion Levels. Sterling, B.S. and Quinkert, K.A. December 1998. (AD A359259)

This report provides a foundation for future research and development on battle staff training by providing examples of structured training programs for the battle staff. Critical deficiencies in battle staff training were highlighted for both individual and collective skills. Reviews were performed for (1) military articles on how to improve battle staff performance, centering on use of simulations in a structured training program, and (2) research and development programs to improve battle staff training. Also, possible future directions for battle staff training were discussed.

RR1731
Assessing Battle Command Information Requirements and the Military Decision Making Process in a Concept Experimentation Program. Lickteig, C.W., Sterling, B.S., Elliott, G.S., Burns, J.E. & Langenderfer, J.E. December 1998. (AD A359897)

This report describes a concept experimentation assessment of battle command information requirements and military decision making in the 2010-2015 timeframe. This research was the first in a series of concept experimentation programs (CEPs) planned by the Mounted Battlespace Battle Lab (MBBL) at Fort Knox, KY, to re-engineer command and staff operations. This report focuses on research methods, exploratory results, and recommendations on method improvements for assessing battle command information requirements and the military decision making process (MDMP). The exploratory results provide a benchmark for future efforts and suggestions for improving information systems and future evaluations. Limitations and lessons learned on research methods are considered. Method recommendations address measurement approach issues, such as mission, enemy, terrain, troops, and time (METT-T) structure for determining information requirements, and the applicability of the MDMP in a real-time information environment. Recommendations on manual measures address the timing and scope of assessment and respondent workload. Finally, recommendations on instrumented measures stress reducing respondent workload and increasing measurement scope and precision.

RR1732
The COBRAS Synthetic Theater of War Exercise Trial: Summary and Report of Findings. Campbell, C.H., Campbell, R.C., Ford, L.A., Pratt, D.M. & Deter, D.E. December 1998. (AD A359935)

This report gives an abbreviated summary of the development and implementation conditions and the findings for the Synthetic Theater of War (STOW) Exercise Trial, conducted at Fort Knox, KY in March 1998. The trial results indicate that there is potential for realizing training value from STOW-type training, and that training support materials can be developed using the same model and procedures used for other Force XXI Training Program exercises. However,

improvements to the simulation systems and linkages, the communications systems, and the physical layout are needed prior to further research on training value. Details about the full preparation process, reasons for decisions, and data that support the reported findings are contained in RR1734 (*The COBRAS Synthetic Theater of War Exercise Trial: Report on Development, Results, and Lessons Learned* Campbell, Pratt, Deter, Graves, Ford, Campbell, & Quinkert).

RR1733
Evaluation of Dismounted Infantry Simulation Technologies (E-DIST). Ford, P. and Andre, C.R. December 1998. (AD A360813)

This report describes the assessment of five simulators that train dismounted infantry tasks. Subject matter experts (SMEs) worked through leader, soldier, or team scenarios and rated how well each simulator supported performance of subtasks related to military operations in an urban environment. The SMEs also identified characteristics to be considered for future simulators and modifications that would improve the current systems. The recommendations are the basis for characteristics to be considered in the training Device Requirement for a Dismounted Infantry Module in the Close Combat Tactical Trainer.

RR1734
The COBRAS Synthetic Theater of War Exercise Trial: Report on Development, Results, and Lessons Learned. Campbell, C.H., Pratt, D.M., Deter, D.E., Graves, C.R., Ford, L., Campbell, R.C., and Quinkert, K.A. January 1999. (AD A359923).

This report details the design and development process for the Synthetic Theater of War (STOW) exercise produced in the COBRAS III project. The exercise was to serve as the vehicle for three primary research areas: training support package and resource requirements, technology and infrastructure requirements, and potential for training value. The multiechelon training audience of the Brigade Combat Team included the brigade commander and staff, the commander and staff of one battalion task force (TF), and the line company commanders, first sergeants, fire support team leaders, and scout platoon of that TF. The STOW environment linked constructive simulation (the Brigade/Battalion Battle Simulation [BBS] and Modular Semi-Automated Forces [ModSAF]) and virtual simulation (Simulation Networking [SIMNET]) and reconfigurable simulators). The trial implementation in February - March 1998 involved members of TF 1-101, 3rd Brigade, and 42nd Infantry Division of the New York National Guard, along with supporting participants from the Force XXI Training Program, contracted logistics support (CLS) staffs, and the COBRAS Team. Training support was found to be manageable but resource-intensive. Technology and infrastructure findings were mixed: the systems promise exciting training opportunities, but there were many suggestions for improvement from participants. From the unit members' point of view, the exercise provided valuable training, and there was strong support for continued STOW and reconfigurable simulator development and use.

RR1735
Development of a Refined Staff Group Trainer. Quensel, S.L., Myers, W. E., Koger, M. E., Nepute, J. T., Brewer, J.D., Sanders, J. J., Crumley, K.A., and Sterling, B.S. February 1999. (AD A359918)

This Staff Group Trainer (SGT) project was a research and development effort sponsored by the U.S. Army Research Institute for the Behavioral and Social Sciences in coordination with the Force XXI Training Program. As a follow-on effort to the previous SGT project, the goal was to refine a brigade-level staff training program to more effectively and efficiently coordinate the activities within and between the individual staff sections in the brigade command post. The program was designed to deliver training to newly formed, inexperienced staffs conducting the staff functions that support the military decision-making process within the execution phase of the brigade area defense mission. Program design and development were based upon lessons learned from the previous SGT effort, structured design methodology, instructional systems design techniques, adult learning principles, as well as team and mental model research.

The refined training program further demonstrated the capability of structured, computer-driven, collective staff training. It advanced the techniques for development of structured staff training and integration of technology into the training process. The program incorporated innovative features including automated performance measures and structured feedback.

This report provides details on the SGT background, design concept, technology development process, training support package development process, formative evaluation techniques, lessons learned, and conclusions.

RR1736
Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation III (COBRAS III): Report on Development and Lessons Learned. Campbell, C.H., Deter, D.E., Ford, L.A., Graves, C.R., Campbell, R.C., Pratt, D.M., Jenkins, S.N., and Quinkert, K.A. February 1999. (AD A359920)

This report describes development of the multiechelon Brigade and Battalion Staff Exercise (BBSE), a product of the third project entitled "Combined Arms Operation at Brigade Level, Realistically Achieved Through Simulation" (COBRAS III). The BBSE is a structured simulation-based exercise of three missions. It provided multiechelon practice opportunities for the commanders and staffs of the conventionally equipped brigade and its maneuver battalions. The focus is on multiechelon performance objectives that cross battlefield functions. Implementation conditions include 24 hour operations, deployed command posts, concurrent planning and execution. Program evaluation date were collected during a trial implementation with 3 Brigade, 2Infantry Division (Fort Lewis). The results of the data analysis indicated that the training support package (TSP) was adequate in content and organization. Training audience members and observers perceived the training as valuable, especially but not exclusively for experienced staff preparing for a deployment or combat training center (CTC) exercise.

RR1737
Structured Simulation-Based Training Program for a Digitized Force: Approach, Design, and Functional Requirements, Volume 1. Dierksmeier, F.E., Johnston, J.C., Winsch, B.J., Leibrecbt, B.C., Sawyer, A.R., Quinkert, K.A., and Wilkinson, J.G. February 1999. (AD A361534)

This report describes one of the Army's latest efforts to address the changing training requirements driven by advances in warfighter technologies. The modification of training delivery systems and training programs to incorporate the unique requirements brought about by digital warfighting technologies moves the Army closer to meeting the training challenges of battlefield digitization. The current research effort, the Training for the Digital Battlefield program, also known as the Close Combat Tactical Trainer-Digital (CCTT-D), was designed to ascertain the anticipated requirements associated with using the CCTT (or a similar training delivery system) to conduct training for digitally-equipped platoon through brigade units. The requirements analysis was two-fold. First, it focused on technology capabilities; tactics, techniques, and procedures; scenario design and development; and the structure of training materials specific to the CCTT. Second, it provided a training approach and an analysis of technology requirements that encompass the entire Army. This report spans two volumes. Volume I presents the methods and products of the research effort, featuring an overarching training approach and a training system analysis for delivering digital operations training to Force XXI. Volume II presents the supporting documentation related to this research effort.

RR1738
The Division Level Military Decision-Making Process (MDMP): Design and Development of a Prototype Computer-Based Training Product. Centric, J. H. and Salter, M.S. March 1999. (AD A361259)

This report documents the analysis, design, and development of the Division Level Military Decision-Making Process (MDMP) training product. The division level MDMP product is a computer-based, stand alone training support package envisioned to be used by the U.S. Army Command and General Staff College (CGSC) to augment existing CGSC instruction on the MDMP. The product, a computer disk, provides a self-paced, detailed discussion of the steps of the MDMP, focusing on the battle staff at the division-level. Field Manual 101-5 Staff Organization and Operations served as the doctrinal source reference. The course also contains selected tactics, techniques, and procedures (TTP) that aid the CGSC student in conducting staff integration and coordination during mission planning. This project was coordinated with the CGSC.

RR1739
The Commanders' Integrated Training Tool for the Close Combat Tactical Trainer: Design, Prototype Development, and Lessons Learned. Gossman, J.R., Beebe, M.E., Bonnett, M., Forrest, D., Shadrick, S.B., Dannemiller, B., Mauzy, R P., and Bonnett, M. April 1999. (AD A364066)

This report describes the design of the Commander's Integrated Training Tool (CITT) for the Close Combat Tactical Trainer (CCTT), a system of armored vehicle manned module simulators and workstations that allows units to train collective armor and infantry tasks at the platoon through battalion task force level. CITT will allow commanders and other unit trainers to select, create, or modify structured training exercises for use when the unit trains using the CCTT. Although the project focused on the CITT design, it also included the development and refinement of a CITT prototype in standalone and distributed internet accessible versions. Additionally, the project included the development of an information overview presented in the form of videotapes and included in the CITT prototype, and the development of an implementation strategy and fielding plan. This report describes the activities involved in the development of the listed products along with the lessons learned during project completion.

RR1740
Human Dimensions of the Task Force XXI Advanced Warfighter Experiment. Christ, R.E., Bliese, P.D., Escolas, S.M., and Castro, C.A. April 1999. (AD A364608)

This human dimensions assessment quantified the impact of changes in the work environment of soldiers and leaders who participated in the brigade-level task force (TF XXI) Advanced Warfighter Experiment (AWE). The TF XXI AWE investigated the potential for digitizing land combat forces through the fielding of new technology equipment and accompanying changes in organizational design, tactics, techniques and procedures. Surveys and structured interviews were used to assess soldier and leader perceptions of TF XXI, the work environment, and organizational outcomes. The major finding is that as soldiers and leaders became more familiar with the new technology and its use, they were less threatened by it, and appreciated more the positive impact it would have on them, their units, and the Army as a whole. The findings also underscore potential problems with a number of different but clearly interrelated human dimensions. One example is the new career opportunities created by this technology within but also outside the Army, and the possible impact of these opportunities on Army-wide personnel retention and recruitment programs. This study contributes to the requirement to define, quantify, and record empirical information to more fully understand and respond to the human dimensions of the Force XXI program.

RR1741
What Soldiers Say About Night Operations, Volume I: Main Report. Dyer, J.L., Pleban, R.J., Camp, J.H., Martin, G. H., Law, D., Osborn, S. M., and Gaillard, K. April 1999. (AD B243649)

A trend analysis of issues surrounding night operations, specifically the deliberate night attack, was conducted. The initial analysis was done in 1992-1993; the follow-on analysis in 1998. During this period, additional night equipment was fielded to units as a result of the Army's "Own-the-Night" effort. In each phase of the research, soldiers and leaders from different infantry units as well as the Joint Readiness Training Center (JRTC) observer/controllers (OCs) and opposing force (OPFOR) participated in surveys and follow-on interviews. The tasks and subtasks examined were based on the Mission Training Plan for the deliberate night attack. Areas that remained problems over the six-year period were identified, and soldiers' reasons for these problems delineated. There was high agreement over time regarding problems within each group surveyed and across groups. The JRTC OPFOR had the most unique perspective on problems. Most operational changes reflected the changes in equipment available to units. New equipment solved some operational problems, but often raised new training and employment issues. The difficulty with some areas was not a function of equipment, but related more fundamentally to soldier, leader, and unit expertise and discipline during night operations. Volume II (ARI Research Note 99-22) contains the appendixes.

RR1742

Dismounted Warrior Network Enhanced Restricted Terrain (DWN ERT): An Independent Assessment. Salter, M.S., Eakin, D.E., and Knerr, B.W. May 1999. (AD A364607)

This research encompassed the second in a series of experiments on the functional capabilities of a collection of four Virtual Individual Combatant (VIC) simulation technologies linked in the Dismounted Warrior Network (DWN). These experiments (user and engineering) provided enhanced restricted terrain (ERT), an improved database and VIC systems. The intent was to demonstrate a reliable low cost easy to use way to insert Dismounted Infantry into synthetic virtual environments. Multiple agencies collaborated over several months; experimentation occurred in July 1998. Data collection occurred at the U.S. Army Infantry Center's Dismounted Battlespace Battle Lab Land Warrior Testbed and the Fort Benning McKenna Military Observations on Urban Terrain (MOUT) site. The four VICs were networked and the individual soldiers in their VICs appeared (visually) to each other in the virtual environment. User exercises measured the VICs' ability to support the individual soldiers as part of a team performing a collective virtual task of room clearing. The MOUT data collection was an attempt to observe the soldiers in actual room clearing. The U.S. Army Research Institute provided man-in-the-loop observations, results of questionnaires and structured interviews.

RR1743

An Assessment of the Values of New Recruits. Ramsberger, P.F., Wetzel, E.S., Sipes, D. E., and Tiggle, R. July 1999. (AD number: to be determined)

The senior leadership of the Army realizes the important role values play in the Army. Values allow the operating norms and rules of the Army to become meaningful, stable, positive; and hence, capable of being internalized. In the past, the Army has collected data on the values of active duty soldiers. However there is only limited knowledge of the values new recruits bring to the Army or their relationship to the seven core values- Loyalty, Duty, Respect, Selfless Service, Honor, Integrity, and Personal Courage-emphasized by the Army leadership. In this effort, these core and other values were assessed among entering Active Army recruits so as to establish the basis for tracking soldier values from initial entry training through the first tour of duty.

RR1744

Weapon Zeroing with the Laser Marksmanship Training System (LMTS). Hagman, J.D., and Smith, M.D. August 1999. (AD A369654)

This research examined the Laser Marksmanship Training System's (LMTS's) capability to establish a valid weapon (i.e., M16A2 rifle) battlesight zero. A multi-phased approach was used to (a) examine the validity of an LMTS-established zero under live-fire conditions, (b) reexamine this validity using an alternative (presumably more accurate), manufacturer-recommended, LMTS zero calibration procedure, and (c) assess the degree of correspondence between LMTS point of aim and live bullet strike location under stabilized weapon conditions. Only 27% of LMTS-zeroed weapons were found to have confirmable live-fire zeroes, with no benefit resulting from use of the alternative zero calibration procedure. LMTS's aiming point also did not correspond to bullet strike location. Weapon quality was suggested to be a major factor contributing to this lack of correspondence. These findings indicate that an LMTS-established weapon zero may not always correspond to, and thus should not be substituted for, a live-fire-established weapon zero. Consequently, soldiers should not attempt record fire qualification with an LMTS-zeroed weapon without first confirming zero with live ammunition. Range time and ammunition savings resulting from the use of LMTS-zeroed weapons should be modest at best, given the relatively low percentage of LMTS-zeroed weapons found to have valid zeroes. Additional research is underway to examine the feasibility of using LMTS for marksmanship training and evaluation.

RR1745

Prototype Staff Training and Evaluation Models for Future Forces. Throne, M.H., Deatz R.C., Holden, W.T. Jr., Campbell, C.H. Sterling, B.S., and Lickteig, C.W. September 1999. (AD A369663)

The purpose of this report is to document the design, development, and demonstration of a prototype training package to improve staff

performance and a prototype performance evaluation package for staffs using advanced command, control, communications, computer, and intelligence (C^4I) systems. These prototypes were implemented in a simulation-based experiment to examine the impact of digital systems on future Battle Command at the battalion and brigade level. This report first presents a review of previous research and relevant literature on training design and evaluation issues. The design and development of the prototype training and evaluation packages are described and are followed by discussions of formative results and lessons learned. The major research products associated with training and evaluation for the implementation are presented in the five-volume set of materials entitled *Training and Measurement Support Package, Battle Command Reengineering III, Mounted Maneuver Battlespace Lab.* The formative evaluation provided valuable information for revisions and additional trials of the prototype training and evaluation package are required to validate its efficacy and utility. Future implementation should lead to further development of this prototype training and evaluation package that targets higher-order cognitive skills needed on the digital battlefield.

RP99-01
A Guide to Standardizing After Action Review (AAR) Aids. Meliza, L.L. November 1998. (AD A359843)

The After Action Review (AAR) is an interactive discussion conducted following collective training exercises to help units decide what happened, why it happened, and how to improve future performance. AAR aids can be employed to refresh memories regarding exercise events, provide new perspectives about exercise events, convince participants of the existence of performance problems, stimulate participation in the AAR process, and document the outcomes of the AAR. The AAR process is intended to apply in live, virtual, constructive, or mixed environments. The Standard Army AAR System (STAARS) concept includes the use of standardized AAR products/aids that can be used across training environments. This guide clarifies the concept of AAR aid standardization, describes the substantial benefits to be gained by standardization, describes general types of AAR aids, discusses the utility of each type of aid, and presents a technique for defining a standardized set of AAR aids for a specific unit type and echelon.

RP99-02
Number not used.

RP99-03

Development of the COBRAS III Performance Objectives for the Brigade and Battalion Staff Exercise. Jenkins, S.N., Graves, C.R., Deter, D.E. and Quinkert, K.A. April 1999. (AD A364558)

This research and development effort, called Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation III (COBRAS III), designed simulation-based, structured training for the staffs of the conventionally-equipped brigade combat team (BCT). The effort included designing a progressive approach to presenting and utilizing training objectives. The resulting product was a set of "performance objectives" that provides techniques and procedures for command and staff performance. The performance objectives resulted from and support the purpose of the training, which is to facilitate BCT preparation for combat training center rotations and deployment. The performance objective concept was an extension of the task analysis work conducted during the two preceding projects – COBRAS I and COBRAS II.

RP99-04
Joint Targeting Planning Training Guide. Love, J.F. December 1998. (AD A359943)

This guide resulted from an effort to develop a new approach to assessment and diagnostic training feedback in joint training. The guide resulted from a front-end analysis of joint targeting for an air campaign planning simulation. The analysis generated detailed training objectives, measurement instruments, and self-assessment procedures for each objective. For each phase of the joint targeting cycle, inputs, behavioral processes, and products were specified and incorporated in measurement tools. The measures were developmentally applied during Blue Flag 97-1. Blue Flag is a recurring cycle of air campaign planning exercises, managed by a numbered air force. Lessons learned from the application were combined with comments for Blue Flag participants to produce this joint training guide in its current form.

RP99-05
COBRAS Multiechelon Brigade and Battalion Staff Exercise Orientation Guide. Deter, D.E., Allen, J.D., and Quinkert, K.A. December 1998.(AD A359247)

This Orientation Guide acquaints leaders of armored and mechanized brigades with the Brigade and Battalion Staff Exercise that is part of the Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation (COBRAS) Program. It provides leaders with information to decide if and how to include this in their unit training program, by providing an overview, the intent, and requirements of the exercise. Additionally, it provides others interested in multiechelon simulation-based training with a description of the program, the performance objectives, and the implementation resources.

RP99-06
Number not used.

RP99-07
Tacit Knowledge for Military Leaders: Platoon Leader Questionnaire. Hedlund, J., Williams, W.M., Horvath, J.A., Forsythe, G.B., Snook, S., Wattendorf, J., McNally, J.A., Sweeney, P.J., Bullis, R.C. Dennis, M. & Sternberg, R.J. March 1999. (AD A362347).

Tacit knowledge is defined as knowledge grounded in experience, intimately related to action, and not well supported by formal training and doctrine. Tacit knowledge of leadership used by Army officers at three different levels of command have been identified, assessed, and developed into assessment questionnaires for each level. The questionnaires have been construct validated and proven to predict certain leadership effectiveness ratings at each level and to do so better than measures of verbal reasoning ability, tacit knowledge for business managers, or experience. This product contains the leadership tacit knowledge questionnaire for platoon leaders. Instructions are given for administering and scoring the questionnaire and recommended applications are described. The document begins with a brief summary of the development and validation of the questionnaire.

RP99-08
Tacit Knowledge for Military Leaders: Company Commander Questionnaire. Hedlund, J., Williams, W.M., Horvath, J.A., Forsythe, G.B., Snook, S., Wattendorf, J., McNally, J.A., Sweeney, P.J., Bullis, R.C. Dennis, M. & Sternberg, R.J. March 1999. (AD A362346)

Tacit knowledge is defined as knowledge grounded in experience, intimately related to action, and not well supported by formal training and doctrine. Tacit knowledge of leadership used by Army officers at three different levels of command have been identified, assessed, and developed into assessment questionnaires for each level. The questionnaires have been construct validated and proven to predict certain leadership effectiveness ratings at each level and to do so better than measures of verbal reasoning ability, tacit knowledge for business managers, or experience. This product contains the leadership tacit knowledge questionnaire for company commanders. Instructions are given for administering and scoring the questionnaire and recommended applications are described. The document begins with a brief summary of the development and validation of the questionnaire.

RP99-09
Tacit Knowledge for Military Leaders: Battalion Commander Questionnaire. Hedlund, J., Williams, W.M., Horvath, J.A., Forsythe, G.B., Snook, S., Wattendorf, J., McNally, J.A., Sweeney, P.J., Bullis, R.C. Dennis, M. & Sternberg, R.J. March 1999. (AD A352348)

Tacit knowledge is defined as knowledge grounded in experience, intimately related to action, and not well supported by formal training and doctrine. Tacit knowledge of leadership used by Army officers at three different levels of command have been identified, assessed, and developed into assessment questionnaires for each level. The questionnaires have been construct validated and proven to predict certain leadership effectiveness ratings at each level and to do so better than measures of verbal reasoning ability, tacit knowledge for business managers, or experience. This product contains the leadership tacit knowledge questionnaire for battalion commanders. Instructions are given for administering and scoring the questionnaire and recommended applications are described. The document begins with a brief summary of the development and validation of the questionnaire.

S39
Staying Sharp: Retention of Military Knowledge and Skills. Wisher, R.A., Sabol, M.A., Ellis, J., and Ellis, K. January 1999. (AD A366825)

This report reviews what is known about forgetting as it applies to military tasks. It includes research conducted by the Army Research Institute as well as related work performed by the Air Force and Navy and leading academic institutions. The report distinguishes the memory for knowledge and skill related to procedural tasks, cognitive tasks, and perceptual-motor tasks. Memory for task knowledge has been demonstrated to be quite good. Memory for cognitive skills has been demonstrated to be quite good. Memory for psychomotor skills varies, depending on whether the task is continuous, such as riding a bicycle, or discrete, such as executing the separate performance steps involved in disassembling a rifle. Throughout the report, figures depict the relative sustainment or decay of a skill as reported in the research literature. A final section concerns the factors that influence the reacquisition of a skill after extended periods of nonuse, as might occur during a mobilization.

S42
Foundations of the After Action Review Process. Morrison, J. E. and Meliza, L.L. July 1999. (AD A368651)

The U.S. Army has adopted the After Action Review (AAR) as its primary method of providing feedback after unit collective training exercises. The AAR is an interactive discussion in which unit members decide what happened, why it happened, and how to improve or sustain collective performance in future exercises. Other services and organizations outside the military are also beginning to employ the AAR as a feedback tool. This report describes the twenty-five year history of AAR research and development and the major behavioral research areas contributing to AAR development and refinement. In addition, this report defines goals for future AAR research.

S43
ARI Survey Programs: An Outside Look. Tourangeau, R., Miller-Steiger, D., Cohen, M., Hanway, S., and Conner, S. July 1999. (AD A369106)

The aim of this project was to assess the quality of ARI's current survey programs, make recommendations for improving them, and to draft regulations that incorporated these recommendations and brought the regulations up to date. Information was gathered about ARI's current attitudinal, command climate, and occupational analysis studies by examining survey documentation and speaking with the staff who carry out the studies. Information was also collected about a number of comparable surveys done by the other services, academic survey organizations, and private firms, and the users of the ARI surveys were queried to assess their satisfaction with ARI's services. ARI was found to use sound methods, comparable to those used by other survey organizations and it achieved similar response rates, and ARI customers expressed a high level of satisfaction. Recommendations are made for continuing enhancement of ARI survey programs.

SR99-01
Use and Management of Digital Information by Army Aviation Battalion Battle Staff Members. Howse, W.R. and Cross, K.D. April 1999. (AD A364606)

This report is based on empirical research embedded within a training simulation exercise. Brigade and battalion tactical operations centers were replicated with partial implementations of the Army Tactical Command and Control System digitized suite. The brigade installation served as a control center. Observational data were compiled from events and activities in the battalion installation. Over a five-day period a student battalion battle staff conducted mission planning and execution functions within an operational scenario presented through a confederation of computer based simulation systems. Observers recorded events during mission planning, execution and after-action reviews. The student battle staff members completed questionnaires covering background and experience prior to the exercise, activities and experiences during mission planning, and a questionnaire seeking their impressions of potential training effectiveness. Key staff members were interviewed during the week following the exercise. Findings address tactics, techniques, and procedures for utilizing digital command and control systems in the military decision making process and the decision support template and recommend information display configurations.

SR99-02
Cognitive Requirements for Information Operations Training (CRIOT). Brown, B.R., Anderson, L., Begley, I.J. II, and Meliza, L.L. June 1999. (AD A365483)

The advent of battlefield digitization increases the work trainers for live force-on-force exercises must do to control exercises and provide feedback to units, and it will pull trainers at platoon and company level out of the tactical information loop. The goal of this study was to describe instrumentation capabilities with the potential for reducing workloads and pulling trainers back into the information loop for exercises at the Army's maneuver combat training centers (CTCs) and at home stations. This study documents the experiences of approximately seventy of the National Training Center (NTC) observer/controllers (OCs) and analysts that participated in the training of the Army's first digitized brigade during the Force XXI Army Warfighting Experiment (AWE). To gain a better understanding of what is required to support digital training, the study team reviewed emerging tactical doctrine from platoon through battalion task force level to develop a sample of potential digital training points and then designed displays that would help a trainer monitor unit performance with respect to these points. The team then defined the capabilities a workstation would need to create these displays. This report describes, defends and illustrates twenty workstation capabilities that support exercise control and feedback for digitized units.

SR99-03
Findings from the Survey on Officer Careers-1996. HumRRO, and Jones, J.T. August 1999. (AD A370305)

This report summarizes findings from the *1996 Survey on Officer Careers (SOC)*. *SOC* is a continuation of the *Longitudinal Research on Officer Careers (LROC)* survey research program. The *LROC* program called for similar surveys to be mailed to a longitudinal sample of company grade officers each year over a number of years. Surveys were administered in 1988, 1989, 1990, and 1992. The *SOC* was first administered in May of 1996. Samples for *SOC* included all officers who had responded to any of the *LROC* surveys and who were still on active duty, as well as a new randomly-drawn cross-sectional sample of officers at all ranks. This report summarizes findings for the new 1996 cross-sectional sample of officers. The *SOC* continues to provide data on the values, attitudes, family situations, and career experiences of Army officers who are serving in Army Competitive Category branches. *SOC* results will be used to test models of work, career, family, and personal factors that influence officers' career decisions. The *SOC* also provides a rich longitudinal database for examining the Army experience from a long-term perspective.

SR99-04
Modeling the Individual Enlistment Decision: Analysis of the Career Decision Survey. Sticha, P.J., Knerr, C.M., Ramos, R.A., and DiFazio, A.S. September 1999. (AD number: to be determined)

Recently, youth interest in military service has declined, making it difficult for the Army to recruit sufficient soldiers to maintain its strength.

To address this problem, research was conducted to (a) refine enlistment propensity measures to increase their accuracy, (b) develop improved measures to segment the youth population, and (c) increase understanding of the enlistment decision process.

A Career Decision Survey was developed and administered to a representative sample of males from 16 to 21 years of age. The survey measured enlistment propensity, as well as reasons for enlisting, self-assessed aptitude, personality and temperament, military knowledge and attitudes, career preferences, work values, career decision making, high school activities, physical fitness, family structure, and neighborhood safety. Finally, the survey included a telephone-administered word knowledge test.

Analyses identified several individual characteristics that predict enlistment behavior, including attitudes toward conditions of military service, physical fitness, family structure, and academic support and activities. The telephone word knowledge test provided a quick and reasonably accurate measure of aptitude that could be used to segment the youth population by aptitude. The telephone word knowledge test and selected survey items are reasonable additions to the Youth Attitude Tracking Study (YATS). In addition, analysis results have direct implications for recruiting policy.

SR99-05
Advanced Tactical Engagement Simulation Concepts (ATESC). Brown, B.R., Anderson, L., Begley, I.J., and Meliza, L.L. September 1999. (AD A369821)

Trainers for force-on-force training exercises at the Army's maneuver combat training centers and at home station are often distracted from coaching and mentoring responsibilities by the need to perform exercise control and feedback (CAF) functions. The fielding of new weapons and reconnaissance, surveillance, and target acquisition (RSTA) systems as part of force modernization will overwhelm trainers with new requirements unless improved concepts for tactical engagement simulation (TES) and instrumentation systems (IS) are implemented . This study produced an online database that was used to assess the benefits of implementing various new TES and IS concepts, or combinations of concepts, in terms of the number of CAF functions automated, the extent to which each function disrupts trainer coaching and mentoring activities, the number of gaps in training feedback addressed, and the number of systems to which each function or feedback gap applies. The TES and IS concepts we evaluated were designed to address the additional goal of avoiding the stove-pipe nature of past systems. The online database can be used to examine the benefits of additional TES and IS concepts. The study sponsor is using the results to define requirements for future TES systems and IS for live training at CTCs and home stations.

SN99-01
Contract for Manpower and Personnel Research Studies II (COMPRS II) for the U.S. Army Research Institute (ARI): Year 1 – Standard Operating Procedures. HumRRO. October 1998. (AD A355123)

This report documents the Standard Operating Procedures (SOP) for the COMPRS II contract, which is a 5 year (one base year plus four one year option periods) effort administered by means of firm fixed-price delivery orders. This document is intended to provide guidance for both contractor personnel and ARI personnel involved in monitoring the overall contract or individual delivery orders. A such, it provides a good example of successful contract administration in the area of behavioral and social sciences.

SN99-02
CATBOOK- Computer Adaptive Testing: From Inquiry to Operation. Sands, W.A., Waters, B.K. and McBride, J.R. January 1999. (AD A359337)

HumRRO contracted with ARI, sponsored by OASD/P&R (AP), to produce a book for commerical publication by the American Psychological Association (APA) which documents the research and development of computerized adaptive testing (CAT) as a means of administering the Armed Services Vocational Aptitude Battery (ASVAB), the personnel selection test battery used by the Department of Defense (DoD). The CAT-ASVAB program began in 1979, and bore operational fruit in 1992, when CAT-ASVAB went into limited use in an operationl test and evaluation. CAT-ASVAB has since been approved to replace conventional, printed versions of ASVAB, Beginning in 1996 in all Military Entrance Processing Stations (MEPs).

The principal objective of this book is to document the psychometric research and development of the CAT-ASVAB program and the important practical lessons learned in developing its delivery system. The approach does this in a historical context. A secondary objective of the book is to provide a case study of the entire CAT_ASVAB program. The book primarily addresses three aspects of CAT_ASVAB history in DoD (adaptive testing measures and strategies; CAT-ASVAB system design issues; and CAT-ASVAB evaluation). It provides reference information useful to practitioners developing a computerized testing system.

SN99-03
Tacit Driving Knowledge, Emotional Intelligence, Stressful Events, and Accident Risk: Traffic Safety Implications. Legree, P.J., Martin, D.E., Medsker, G.J., and Gregory, E.L. June 1999. (AD A365265)

We developed two tacit driving knowledge scales to investigate whether safer drivers can more accurately assess risks associated with a variety of driving conditions including road hazards and the driver's internal or emotional state. The tests were administered with a battery of conventional cognitive tests, personality instruments and situational variables chosen to predict accident involvement. The correlations between the tacit driving knowledge measures and the accident criteria ranged up to .22 ($p<.001$), and compared favorably to correlations between the accident criteria and the conventional measures. Odds ratios for the tacit driving knowledge tests show that low and average scoring participants had 5 and 2.3 times as many at-fault accidents as high scoring individuals. The data also indicate that stress, fatigue and illness elevate accident risk. The analyses demonstrate the importance of emotional and tacit knowledge and provide specific recommendations to improve driver safety.

SN99-04
Two Studies of Military Vehicle Operator Selection and Safety. Medsker, G.J., Burnfield J. L., Knapp D.J., & Legree, P. J. September 1999. (AD A368619)

The objective was to identify characteristics commanders can use to select safer drivers from among soldiers. This project involved a literature review on accident predictors, statistical analysis of soldier characteristics and accidents, testing of new measures for predicting accidents, and development of practical guidelines leaders can use to select drivers. The majority of this project focused on conducting two empirical studies. Study 1 used Project A selection, personnel, and 1983-98 U.S. Army Safety Center (USASC) accident records for 60,500 soldiers who accessed in 1986-87. Study 2 used personnel data and 1983-98 USASC accident records, combined with responses from

a new 1998 data collection involving 551 soldiers. Predictors included aptitude, temperament, driving behavior, transient, and demographic variables. Predictors' relationships with eight accident criteria were analyzed: costs, injuries, fatalities, work days lost, severity, total accidents, at-fault accidents, self-report accidents, and USASC accidents. The most useful predictors included perceptual aptitude, following regulations/orders, tacit knowledge tests, use of alcohol/drugs, moving violations tickets, a rugged individualism interest profile, attitudes toward Army discipline, stress, fatigue, seatbelt use, speed, time of accident, and being on post or duty.

RN99-01
Linking Leadership Emergence to Leadership Effectiveness and Team Performance in a Military Population. Foti, R.J., Hauenstein, N.M.A., and Sgro, J.A. October 1998. (AD A354192)

Study of individual traits on the emergence of leaders in a team and the impact on subsequent performance.

RN99-02
The American Soldier after the Cold War: Towards a Post-Modern Military? Moskos, C. October 1998. (AD A354194)

Sociological examination of the evolution of military organization in Western developed democracies.

RN99-03
Effective Span of Command and Control by Echelon in Training and Operational Environments. Ford, J.P., Mullen, W.J. III, and Christ, R.E. October 1998. (AD A355164)

In response to reduced resources in the face of more diverse missions, Army leadership is considering new options for the design of its organizations. One option is to create 'flatter' organizations. A consequence of this option is an increase in the span of command and control, and a concern with its impact on the effectiveness of command and control. This report summarizes research conducted to develop a database of information pertaining to seven factors proposed to influence the span of effective command and control, and guidelines for designing and training units that maintain effective spans of command and control. Fifty-five Army officers at various echelons and from different types of units participated in interviews. The resulting database is a set of comments and ratings about the relation between each of the seven factors and the difficulty (or ease) of command and control. The research confirmed the usefulness of the seven factors for discussing issues impacting span of effective command and control. The data were consolidated into observations that pertain to organizing and training military units. This report: (a) presents the results of this research, (b) recommends modifications to the data collection procedures, and (c) proposes further applications of the approach.

RN99-04
The Military Language Tutor (MILT). Kaplan, J.D., Sabol, M.A., and Wisher, R.A. November 1998. (AD A356902)

MILT is a military foreign language tutor and an authoring. MILT joins the strengths of pervious computer-based approaches to language training with emerging technologies from the fields of computational linguistics, computer science, and electrical engineering to form an innovative, interactive tutor in a Pentium-based laptop computer. The first version of MILT with keyboard input was designed for Spanish and Arabic and can recognize tens of thousands of common words and hundreds of military terms in each of these languages. Its major software engine is a natural language processor (NLP). The goal of the MILT design team was an authoring system which would require no formal external training and which could be learned within four hours by anyone familiar with the Windows environment, even someone with no programming experience, using only documentation and internal MILT help functions. In MILT-DSR (discrete speech recognition), students are given an exercise which allows them to use language production to manipulate a graphics microworld. At Fort Campbell using 5th Special Forces Group personnel a field evaluation was conducted in early June, 1997. For each evaluation, two types of data were collected: (a) student attitudes toward the tutor and (b) instructional effects of the tutor.

RN99-05
Continuous Speech Recognition in a Language Tutor – Using Learning Principles to Alleviate Underlying Problems. Kaplan, J.D. and Holland, V.M. December 1998. (AD A356900)

This paper describes the instructional features of the Military Language Tutor (MILT), how they were shaped by principles of learning and memory drawn from work in experimental psychology, and how these approaches are being used to deal with the problems of continuous speech recognition in a tutor.

RN99-06
Human Performance in Simulation Workshop. Johnson, E., Moses, F. and Pstoka, J. November 1998. (AD A357596)

Overview and summaries of presentations at the Human Performance in Simulation Workshop, 30-31 July, 1997.

RN99-07
Human and Organizational Issues in the Army After Next: A Conference Held 13-15 November 1997. Drillings, M., Adelman, L., Manzo, A., and Shaler, M.D. November 1998. (AD A357651)

Notes and briefings from the 1997 Army After Next Conference.

RN99-08
Human and Organizational Issues in the Army After Next- II: A Conference Held 24-26 June 1998. Drillings, M., Adelman, L., Manzo, A., and Shaler, M.D. November 1998. (AD A358346)

Notes and briefings from the 1998 Army After Next Conference.

RN99-09
New Research on Span of Command and Control: Implications for Designing Army Organizations. Ford, J.P., Mullen, W.J. III and Christ, R.E. December 1998. (AD A358571)

From September 1993 to March 1994, a team of two behavioral scientists and a retired general officer interviewed 55 Army officers on factors that affect the span of effective command and control. The interviews were structured around seven factors: Task Characteristics, Organizational Structure, Complexity of Environment, Unit Continuity, Technology, Individual Characteristics, and External Organizations. The first section of this report presents recommendations on forming a joint task force for contingency operations. These recommendations are keyed to comments made during the interviews by 11 general officers who held senior positions in contingency operations. The second section presents conclusions and recommendations for organizing Army units for warfighting operations. These conclusions and recommendations are based on ratings and comments made by officers at echelons from company to corps and from combat, combat support, and combat service support units. Ratings on the impact of each factor as well as comments made during the interviews suggest that the impact of the factors varied as a function of both echelon and type of unit. Recommendations for design are drawn from the study conclusions about each factor as well as directly from those made by some officers.

RN99-10
Documentation and Archival of Selected ARI Data Bases Final Project Summary Report-Phase I. DiFazio, A.S., Young, W.Y., and Drissen, D.P. January 1999. (AD B241154)

Since 1975, the U.S. Army Research Institute (ARI) has collected a wide array of Manpower Personnel Research (MPR) data in support of its research activities. Until this current effort, there have been no formal procedures or guidelines for the documentation and archive of these numerous databases. The ability of new users to access and utilize extant ARI data, whether collected by ARI staff or by outside contractors, is heavily dependent on the knowledge of those ARI staff members who worked most closely with the data. With organizational turnover and downsizing , critical information needed to access and use data by new users will be lost over time. As Phase I of a two-phase effort, the Human Resources Research Organization (HumRRO), and Fu Associates were awarded a contract to develop standards for documentation and archive of extant ARI datasets. The development of these documentation and archive standards is the subject of this report.

RN99-11
Data Base Documentation Standards for Extant Datasets. DeFazio, A.S. and Young, W.Y. January 1999. (AD A359256)

Since 1975, the U.S. Army Research Institute (ARI) has collected a wide array of Manpower Personnel Research (MPR) data in support of its research activities. Until this current effort, there have been no formal procedures or guidelines for the documentation and archive of these numerous databases. The ability of new users to access and utilize extant ARI data, whether collected by ARI staff or by outside contractors, is heavily dependent on the knowledge of those ARI staff members who worked most closely with the data. With organizational turnover and downsizing , critical information needed to access and use data by new users will be lost over time. As Phase I of a two-phase effort, the Human Resources Research Organization (HumRRO), and Fu Associates were awarded a contract to develop standards for documentation and archive of extant ARI datasets. The

development of these documentation and archive standards is the subject of this report.

RN99-12
Analysis of Linkages Between Military Enlistment Plans and Behaviors. Freedman-Doan, P. and Bachman, J.G. February 1999. (AD A359848)

The Office of the Deputy Chief of Staff for Personnel assigned the Army Research Institute (ARI) to identify and to evaluate factors that influence military enlistment propensity, the enlistment decision, and military career progression. As a part of that effort, researchers at the University of Michigan's Institute for Social Research contracted to analyze relevant data collected as part of the Monitoring the Future (MTF) survey from high school seniors and young adults. The MFT data set is unique among social science data collections because of its large national random samples and its cohort sequential design. Each year since 1975, random samples of approximately 17,000 high school seniors per year have provided responses to a 5-minute paper and pencil self-administered questionnaire. Approximately 2,400 young persons from each senior class are selected for follow-up data collections. Each young person in the follow-up is mailed a questionnaire every two years until reaching age 5. This cohort sequential design allowed MTF researchers to examine a variety of issues directly related to the change given to ARI by the Office of the Deputy Chief of Staff for Personnel.

RN99-13
The Relationship of Team Goals and Team Strategies to Team Performance. Locke, E.A. February 1999. (AD A359852)

Six studies were conducted under the contract. Four were laboratory studies and two were field studies. The common theme of the studies was the relationship of team goals and team strategies and tactics to team performance. Each study explored these relationships from a different perspective.

RN99-14
Personality, Motivation and Cognitive Performance. Revelle, W. and Anderson, K.J. February 1999. (AD A359851)

This project examined the determinants of efficient cognitive performance. Specific questions addressed how environmental stressors combine with time of day and individual differences in personality to affect motivational variables that in turn affect components of information processing.

Our research addressed three separate objectives: 1) to do systematic taxonomic work on the relationship between personality traits, situational moderators, and activational states; 2) to develop and test models of stable individual differences and transient affective states as they affect the detection, encoding, storage, and processing of information; and 3) to test and revise our models of motivational effects upon complex cognitive performance.

Results showed that individual differences in temperament combine with a variety of stressors (e.g., time of day, exercise, stimulant drugs, feedback) to affect two components of motivational intensity, energetic arousal and tense arousal, and one of motivational direction. The two components of arousal have systematic effects on performance on a variety of simple and complex cognitive tasks. Cognitive performance measures examined included complex problem solving as well as attention, learning, memory and performance tasks. New techniques were developed that demonstrated the importance of within subject variation in energetic and tense arousal.

RN99-15
Addendum to "Evaluation of ARI Leader Assessment Measures". Mathieu, J.E., Klimoski, R.J., Rouse, C.E., and Marsh, W.M. February 1999. (AD A359876)

Addendum to Research Note 98-06. This document contains the complete inventory of assessment measures evaluated, with capsule summaries of each.

RN99-16
Use of a Joint Battlefield Function Analysis to Produce Training Source Materials. Love, J.F. December 1998. (AD A359971)

Training front-end analysis materials and self-assessment procedures developed in the earlier phases of the Joint and Multi-Service Distributed Training Testbed (JMDT2) program were compiled in the form of a resource document, here called a guidebook. This report discusses

the use of a joint fire support battlefield function (BF) analysis as the resource from which staff responsibilities were extracted and detailed task descriptions developed. Training progress self-assessment procedures were also drawn from the BF analysis. The resulting materials provided bases for conducting mini after action reviews. The focus was on the staff sections responsible for joint fires operations in an Army Corps joint Task Force exercise.

RN99-17
Expert Approaches to Analysis. Collins, A. and Ferguson, W. March 1999. (AD A360743)

Study of how scientists and military analysts make sense of complex situations with the goal of developing an elaborated theory of epistemic forms and games, which can form the basis for building a tool to support expert analyses.

RN99-18
Training-based Requirements for Semi-Automated Forces. Kornell, J. March 1999. (AD A360749)

Effective use of current and planned semi-automated forces (SAF) capabilities is important to maintain Army readiness. To guide commanders in specifying training requirements using SAF, a model of how instruction and training can use SAF is needed. The objective of this research reported here has been to build a foundation for such a model. The long-term goal is to construct a knowledge-based system to aid commanders in translating objectives to training requirements.

RN99-19
Is There a Gap Between Soldiers and Civilians? Comparing the Political Attitudes of Young Recruits with Their Non-Service Peers, 1976-1997. Freedman-Doan, P., Bachman, J.G. and O'Malley, P.M. March 1999. (AD B242250)

To what extent are there differences in political orientation between personnel in the United States military, on the one hand, and civilian political leaders and the general populace, on the other hand? This question has been the subject of much recent theoretical reflection (Avant, 1998; Desch, 1998; Feaver, 1996, 1998; Foster 1998; Kohn, 1994), journalistic investigation (Ricks, 1997a, 1997b; Page 1997). and empirical research (Holsti, 1997). Do military personnel have a distinctive set of political attitudes that separate them from the citizenry they serve? What, if any, is the degree of difference between the ideological composition of the armed forces and the United States populace or its civilian authorities? Many commentators seem to agree with Kohn that the "U.S. Military is now more alienated from its civilian leadership than at any time in American history, and more vocal about it" (For a more nuanced conclusion see Holsti, 1997). If the members of our armed forces do indeed hold a set of political attitudes that differ from the populace they protect, does that constitute a threat to civilian control?
Our purpose here is to extend the empirical research into the ideological composition of the U.S. military. Using national random samples collected over the last twenty years, we examine the political attitudes, values, and behaviors of young male recruits both before and after they begin their military service. We compare young servicemen with age-mates who did not enter the military. We also document historical shifts across the past two decades.

RN99-20
Setting the Standard: When Peacekeepers May Shoot to Kill. Lawlor, B.M. and Lawlor, E.J. March 1999. (AD A361138)

U.S. Army forces are increasingly called upon to engage in peacekeeping missions in settings characterized by crowded, urban environments, where ready identification of friend or foe is difficult. Rather than facing well-defined organized forces, they often confront isolated instances of hostile actions, perpetrated by persons who blend into the general population. The purpose of this report is to document a Soldier Rules of Engagement (SROE) that may be used to govern when U.S. soldiers may employ their individual weapons in self-defense against foreign citizens. Utilizing pervious work with "shoot/don't shoot" standards developed by civilian police agencies, and common standard was developed for application in military settings by soldiers. The standard requires soldiers to ask three basic questions: 1) Does the threat have the ability to inflict harm? 2) Does the threat have the opportunity to inflict harm? And 3) Am I, or a fellow soldier, at risk of injury? If the answer to each of these questions is yes, then the use of deadly force is authorized. This standard is easy for the soldier to understand, remember, and

apply. It is not mission dependent and will not change from one operation to another.

RN99-21
Feedback on 360 Degree Leader AZIMUTH Check Assessment Conducted at Fort Clayton, Panama. Karrasch, A.I. and Halpin, S.M. March 1999. (AD A361832)

This report documents military and civilian leaders' reactions to a multi-rater assessment of their leadership behaviors. The 80 targeted leaders were commissioned and non-commission military officers, and GS-9 to GS14 civilian leaders at Fort Clayton, Panama. After completing the Leader Azimuth Check and receiving feedback, they were asked to complete a survey designed to assess 1) perceptions of trust and the fairness in the multi-rater process, 2) reported understanding of the multi-rater process, 3) beliefs about the accuracy and appropriateness of the sources of feedback and 4) self-efficacy and intentions for change in leadership behaviors. An overview of the responses to the survey are recorded in this report. Subordinates were overwhelmingly viewed as the most valuable source of feedback. Eighty three percent reported that they would use their feedback to monitor and develop their leadership. Motivation to change leadership behavior was best predicted by the extent to which leaders believed the feedback they received was new information. Trust in the confidentiality of the multi-rater process was high, as was the reported understanding in the purpose and methods of the 360. Perceptions of fairness and satisfaction were moderate to high. Perceptions of fairness and accuracy predicted satisfaction with the multi-rater process. Other predictors are mentioned in the report. Implications and recommendations are provided.

RN99-22
What Soldiers Say About Night Operations, Volume II: Appendixes. Dyer, J.L., Pleban, R.J., Camp, J.H., Martin, G.H., Law, D., Osborn, S.M., and Gaillard, K. April 1999. (AD B243378).

A trend analysis of issues surrounding night operations, specifically the deliberate night attack, was conducted. The initial analysis was done in 1992-1993; the follow-on analysis in 1998. During this period, additional night equipment was fielded to units as a result of the Army's "Own-the-Night" effort. In each phase of the research, soldiers and leaders from different infantry units as well as the Joint Readiness Training Center QRTQ observer/controllers (OCs) and opposing force (OPFOR) participated in surveys and follow-on interviews. The tasks and subtasks examined were based on the Mission Training Plan for the deliberate night attack. Areas that remained problems over the six-year period were identified, and soldiers' reasons for these problems delineated. There was high agreement over time regarding problems within each group surveyed and across groups. The JRTC OPFOR had the most unique perspective on problems. Most operational changes reflected the changes in equipment available to units. New equipment solved some operational problems, but often raised new training and employment issues. The difficulty with some areas was not a function of equipment, but related more fundamentally to soldier, leader, and unit expertise and discipline during night operations. Volume I (ARI Research Report 1741) is the main report.

RN99-23
Augmented Selection Criteria for Enlisted Personnel. Ramsberger, P.F., Laurence, J.H., McCloy, R.A., and DeFazio, A.S. April 1999. (AD A363068)

The Armed Forces Qualification Test (AFQT), a composite of math and verbal scores, is used to determine eligibility for entry into the Armed Services. The goal of this project was to identify characteristics of individuals scoring below average on this test which differentiated those who can or cannot perform successfully in various jobs in the Army. The AFQT is part of a test battery known as the Armed Services Vocational Aptitude Battery (ASVAB). When the ASVAB was put into place in 1976, there were undetected flaws in the method used to determine appropriate percentile scores in reference to the normative population. Because of this "misnorming," many recruits were accessed who, if the misnorming had not taken place, would have been identified as belonging in below average AFQT categories. This misnorming continued until it was discovered and corrected in 1980. This project examined data on over 150,000 soldiers who were accessed during the misnorming period. Predictor variables examined included ASVAB subtest scores, interest measure scores, educational

background, and demographic variables. These were linked to the following outcome measures: attrition, reenlistment eligibility, performance on a written job knowledge test, the Skill Qualification Test (SQT), and junior grade (to E-4) promotion rate. Analyses focused on the relationship between predictors and outcome for those identified as below average scorers on the AFQT. Major findings included these: diploma status was best at predicting attrition and also tended to be the best predictor of promotion. A group of cognitive ASVAB subtests were superior predictors of performance on the job knowledge test.

RN99-24
Optimizing the Long-Term Retention of Skills: Structural and Analytic Approaches to Skill Maintenance Annual Report, 1991-1992. Healy, A.F., Ericsson, A., and Bourne, L.E. Jr. April 1999. (AD A362103)

This research program seeks to identify the characteristics of knowledge and skill which are most resistant to decay due to disuse. The general goal is to elucidate principles which will specify those aspects of a complex skill that resist decay over periods of disuse and how they are distinguishable from more fragile components. The research program can be divided into two complementary parts. The first part is concerned with describing the structure of existing skills. The second part is concerned with experimental analysis of factors influencing and improving retention of skill components. Our work encompassed a large number of different studies on a wide range of tasks, including tank gunner skills, Morse code reception, color naming, instrument panel scanning, mental calculation, memory for instances of categories, target detection, data entry, components of memory for lists, components of memory for schedules, and vocabulary retention. Each of these tasks provided a test bed for our major theoretical hypothesis that the durability of memory depends critically on the extent to which learning procedures are reinstated at test.

RN99-25
Modification of the Computerized Adaptive Screening Test (CAST) for Use by Recruiters in All Military Services. McBride, J.R. and Cooper, R.R. April 1999. (AD A362350)

The Computerized Adaptive Screening Test (CAST) was designed to predict performance on the Armed Forces Qualification Test (AFQT). It includes two subtests: Word Knowledge (WK) and Arithmetic Reasoning (AR). CAST has been used by Army recruiters since the early 1980's to prescreen enlistment prospects. The Joint Recruiting Information Support Systems Program Management Office (JRISS PMO) program requested modifications to CAST to make it suitable for use by recruiters in all of the U.S. military services. This report documents the development of CAST, Version 5.

RN99-26
Research Into the Use of Speech Recognition Enhanced Microworlds in an Authorable Language Tutor. Plott, B., Hamilton, A., Princen, E., LaRocco, Col S., Morgan, J., and Kaplan, J.D. April 1999. (AD A362359)

An earlier ARI sponsored MILT project was designed to investigate the possibility of using natural language processing (NLP) software to identify semantic and syntactic errors and provide the basis for state of the art dialogue exercises.

One of the thirteen exercise types developed was the microworld exercise. A microworld is a software environment in which students can issue commands that are executed by animation routines in a game like atmosphere.
Once the first microworld exercise was completed and integrated into MILT, ARI funded the investigation of the use of discreet speech recognition technology in language learning using the microworld exercise as a basis.

The goal of this current effort was to expand the capabilities of MILT and incorporate continuous speech recognition for Arabic, Spanish and English. The overall objective of this project was to develop a general purpose, authorable, microworld that utilizes continuous speech recognition. The central tasks were 1) the design of an enhanced microworld exercise, 2) development of continuous speech recognition components for English, Arabic, and Spanish, 3) incorporation of speech recognition into the microworld exercise, and 4) expansion of the Arabic natural language processing (NLP) system.

RN99-27
Do Individual Differences in Motoric and Rhythmic Skills Intercorrelate? Collier, G. May 1999. (AD A363978)

Explores the role of rhythmic behavior in motor control and tests the hypothesis that individual differences in rhythmic abilities are reflected in motor skills in general.

RN99-28
Platoon Readiness as a Function of Transformational/Transactional Leadership, Squad Mores, and Platoon Cultures. Bass, B. and Avolio, B. May 1999. (AD A364116)

The objective of this research is to determine to what extent military readiness of platoons and their leadership as measured by their performance in JRTC and NTC can be predicted by the transformational and transactional leadership of the Platoon Leaders, Platoon Sergeants, and the overall Platoon in garrison.

RN99-29
Tacit Knowledge for Military Leaders: Lessons Learned Across Organizational Levels. Hedlund, J., Sternberg, R.J., Horvath, J.A., Forsythe, G.B. and Snook, S. June 1999. (AD A364550)

This product is an extension of a project that defined and measured tacit knowledge for leadership among U.S. Army officers. The project researched tacit knowledge for leadership at three different levels of command and developed tacit knowledge assessment inventories for each level. The project is described in detail in ARI Technical Report 1080 (Hedlund et al, 1998) which is referenced in this document. During conduct of the research both common themes and distinct categories of tacit knowledge emerged across the three levels of command (platoon, company and battalion). This report discusses how the categories compare to the general dimensions of leadership identified by other researchers and what these categories reveal about the primary leadership challenges at the three command levels. Good and bad responses to inventory items as rated by experts are compared with the responses of practitioners rated as effective or ineffective leaders by their subordinates, peers or superiors. These data allow the identification of specific response patterns associated with effectiveness ratings from various sources and provide insights into why effective leadership is viewed differently from different perspectives. The findings have implications for the complexity and training of Army leadership.

RN99-30
Documentation and Archival of Selected ARI Data Bases, Phase II: Final Summary Report. DeFazio, A.S., Young, W. Y., Driessen, D.P., and Peck, D. June 1999. (AD A364998)

Since 1975, the U.S. Army Research Institute (ARI) has collected a wide array of Manpower Personnel Research (MPR) and Training data in support of its research activities. Until this current effort, there were no formal procedures or guidelines for documenting and archiving these numerous databases. The ability of new users to access and use extant ARI data was heavily dependent on the knowledge of those ARI staff members who worked most closely with the data. With organization turnover and downsizing, critical information needed to access and use data would have been lost over time. This project had two phases. The first Phase developed documentation and archive standards for extant and future ARI data. Phase II, the focus of this report, applied those standards to specified extant data. The technical approach and procedures used in Phase II of this project is the subject of this report.

RN99-31
Expanding the Concept of Quality Personnel: Final Report. Peterson, N.G., Anderson, L.E., Crafts, J.L., Smith, D.A., Motowidlo, S.J., Rosse, R.L., Wuagh, G.W., McCloy, R., Reynolds, D.H. and Dela Rosa, M.R. June 1999. (AD A365308)

This report describes a project designed to determine if new predicators of performance which could increment currently available operational or experimental aptitude measures could be identified. The focus of prediction was performance of army non-commissioned officers (NCO). New tests of NCO situational judgment, prioritization skills, and self efficacy were examined in terms of what they could add in terms of predictive power to a set of available measures—a cognitive composite, a spatial test, and a temperament measure. These were linked to a composite criterion measure based on a structured interview, supervisor behavioral ratings, and supervisor situational ratings.

New and existing measures were administered to 691 non-commissioned officers across four grade levels. The situational judgement test and a situational self-efficacy measure had moderate correlations with a composite criterion and each added a small increment to the validity generated by a combination of the existing predictors. It appears that situational judgment tests and self-efficacy measures have promise in predicting leader performance although most of the predictive variance they provide may be shared with that of tests of cognitive ability and temperament.

RN99-32
Joint Fires Training Guide for a Corps Joint Task Force. Love, J.F. December 1998. (AD A355818)

A detailed analysis of responsibilities, inputs, processes, outputs, and interactions was conducted for the staff elements and cells involved in joint fires at the Corps Joint Task Force level. This research product documents that analysis. The purpose of the product is to provide a source document for developing training self-assessment checklists for use in future joint training research at the Corps level. The checklists would be used by staff cells or elements to conduct mini after action reviews (sometimes referred to, in the joint community, as facilitated after action reviews). However, the product can also help joint training managers plan scenarios and mission sequence event lists for simulation-based exercises.

RN99-33
Assessment of Two Computer Based Products: The Military Decision-Making Process and the Brigade Battle Captain. Fober, G.W. September 1999. (AD A368209)

This report documents the user evaluation of two prototype-training products originally designed for the Joint Readiness Training Center (JRTC). The products are a computer-based, stand alone, training package designed to assist individuals and staffs of light infantry brigades in learning to participate in the military decision making process (MDMP) and a program geared toward the responsibilities of the Brigade Battle Captain. The courses are based on doctrine and also contain numerous tactics, techniques, and procedures that will assist staff officers in understanding and mastering their individual skills and their roles in the collective process. Based on user feedback, these programs appear to be successful.

RN99-34
Army Leadership in the 21st Century: A Proposed Research Framework. Zaccaro, S.J., Limoski, R.J., and Gade, P.A. September 1999. (AD A368441)

This report presents a framework for future research on Army leadership. Seven key themes, reflecting research on leadership models, tools, and problematics are suggested: (1) Defining and assessing leader effectiveness, (2) Identifying and assessing leader potential, (3) Leadership development as an integrated system, (4) The management of change, (5) Leader performance under adversity, (6) Leadership and the development of subordinate personnel, and (7) Leadership of retention. Specific research questions relating to each of these themes are also suggested. Example research programs addressing the four problematics are also provided. These examples were derived from contributions by several military and academic researchers at a conference convened by the authors to consider this research agenda.

RN99-35
Developing a tool kit for the assessment of Army leadership processes and outcomes: Version 1.0. Zaccaro, S.J., Limoski, R.J., Boyce, L.A., Chandler, C., Banks, D., and Gade, P.A. September 1999. (AD A368448)

This report provides a leadership performance measurement "tool kit", or battery of measures that have been identified as "best practices" for assessing leadership effectiveness, with special attention to effects in the context of organizational change. During an ARI/GMU sponsored workshop, military and civilian leadership researchers identified existing measures, assessment strategies, or measurement templates within a conceptual framework for organization of leadership assessment measures. The framework is organized along three dimensions: leadership processes and outcomes, organizational level, and level of analysis. Several measures were recommended and reviewed for inclusion based on several criteria (e.g., user-friendly, broad in scope, military face validity, documented research record with sound psychometric evidence). The resulting 15 assessment measures or templates with descriptions, summary of psychometric evaluations, application and source information, as

well as references and suggested reading list are included. While measures were identified for each cell of the framework, leadership processes for lower, middle, and upper level leaders, targeting individual, dyad, and team levels of influence were strongly supported. Unit leadership at the upper level processes, however, received less assessment support. Further, the outcome measures lacked "hard" behavioral measures. Recommendations for further research on assessment tools regarding these and organizational levels of analysis were suggested. Template measures, such as the observer/controller ratings, mission accomplishment, and readiness indices also require further research. Researchers using the measures in this tool kit are asked to facilitate continued development of the measures and the tool kit. This tool kit provides a basis for Army leadership research, further work is needed to expand and validate the leadership assessment measures.

RN99-36
High Payoff Tasks for Training Soldiers and Small Unit Leaders in Virtual Environments.
Pleban, R.J. September 1999.
(AD A368698)

This report describes a multi-tiered process for identifying potential high payoff tasks for training small unit dismounted Infantry soldiers in simulated urban operations. Two recently created lists of Infantry tasks and battle drills were evaluated. Four selection criteria were applied: 1) the capability of current and near-term individual combatant simulator systems to support specific task-related behaviors; 2) the potential transfer effectiveness of practicing these tasks in a virtual environment; 3) the frequency with which task components (behaviors) are performed and; 4) the cost effectiveness/feasibility of performing the task in the virtual environment. Five tasks and five subtasks were retained for subsequent development into training scenarios. The tasks included Assault, Move Tactically, Enter Building and Clear a Room, Reconnoiter Area, and React to Contact. The subtasks included Engage Targets with an M16A1 or M16A2 Rifle, Move as a Member of a Fire Team, Control Movement of a Fire Team, Perform Movement Techniques During MOUT, and Report Information of Potential Intelligence Value. The training scenarios will be evaluated in the Land Warrior Test Bed. These evaluations will help confirm the value of virtual environment simulations as a rehearsal tool for soldiers and small unit leaders.

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Abbreviations

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RP	Research Product	SR	Study Report
RR	Research Report	TR	Technical Report
S	Special Report		

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