



MANPRINT Quarterly

February 2001



Director's Corner

Permit me to begin by wishing each of you a very happy New Year and welcome to the new millennium.

As we enter the 21st Century we face an array of opportunities that should keep us all very busy.

First and foremost are the Army's plans for transformation that will call for a full court press in terms of MANPRINT analyses to include modeling and simulation. The Army's MANPRINT domains can expect to be called upon by the PM Interim Armored Vehicles (IAV) and the PM Future Combat Systems (FCS) for advice, assistance and recommendations.

Second is the issuance of the revised set of polices and instructions addressed by the DoD 5002 regulations. For the first time we have a DoD requirement for Program Managers to address the full array of MANPRINT/Human Systems Integration requirements throughout the system acquisition process. I intend to use the language that is included in this revised regulation to help force the issue of DoD Acquisition Schools and Universities (e.g., DSMC, DAU) to incorporate Human Systems Integration education and training into their programs of instruction for Program Manager candidates.

Third is the reality that we are deeply involved in submitting unfinanced requirements (UFR's) covering the design and development of new and updated MANPRINT tools, methods and techniques as well as resources to support the hiring of up to 12 full time civilians who will be dedicated to providing pre milestone I MANPRINT support. Support for these UFR's is coming from the ADCSPER (MG Miller) who has sent letters indicating his endorsement of these requirements to MG Bond, the Assistant Deputy Chief of Staff for Programs (DCSPRO), MG Snider, the Head of RDA at AMC and to MG Grazioplene, the DCSCD at TRADOC.

LTC Zappalla and I met with MG Marcello, the CG Army Test and Evaluation Command (ATEC) this past fall. That meeting resulted in agreements between this office and ATEC to ensure that MANPRINT would be addressed in all Army IOTE and FOTE efforts as well as in user jury assessments of developing systems. MG Marcello is a strong supporter of MANPRINT and has committed his Command to fully examine any issues that our community identifies as problematic.

Lastly, the MANPRINT Board of Advisors (MBA) will hold its second meeting in mid March. This forum, co-chaired by the DCSPER (LTG Maude), the DUSA-OR (Mr. Hollis) and the Principal Deputy to the ASA M&RA (TBD) will address a series of issues carried over from the first such meeting last August. High on the priority list are issues regarding MANPRINT training and education for PM's and resourcing of MANPRINT activities across domains.

Your continued support for MANPRINT policies, procedures and processes is deeply appreciated not simply by this office but most importantly by the American soldiers who are the ultimate recipients of the weapons and information systems each of you review and assess.

We enter the New Year with optimism and high expectations. I look to you for your continued support of MANPRINT across the Army.

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Dr. Bob Holz
Director (Acting)
MANPRINT

Companies Will Test Comanche Helicopter

Reviews will check stealthiness and try out new engine, tail, avionics and communication

PREFACE

This article is reprinted from the Huntsville Times Newspaper, dated January 7, 2001. The article was written by the Times Business Writer, Shelby G. Spires. It is presented here to provide an update on the status of the Comanche and to highlight how MANPRINT has influenced Comanche's design in the following areas: split-torque transmission reduces repair/replace times; dual point folding tail; tail rotor configuration eliminates personnel hazards; accessibility to Line Replaceable Units (LRUs); weapons loading/access; Mission Equipment Package rack orientation and module location; one piece engine cowl allows greater access to engine and auxiliaries; crew protection; cockpit configuration; and easily removable main rotor blades.

After more than a decade of development, the Army's RAH-66 Comanche program will begin a series of design reviews and tests this year that are planned to prove the concept of the lightweight scout and attack helicopter. The aircraft's stealthy capabilities will be measured, and it will be tested with a more powerful engine. A redesigned tail and the cockpit avionics and communications equipment will also be flight tested. "The version we put together this year will be what the Army will fight with," said Col. Bob Birmingham, the Army's Comanche program manager. "There's a lot to do over the next few months."

The Comanche, which is in a \$3.1 billion engineering, manufacturing and development phase, has a significant impact on Huntsville. The \$40 billion program is managed from the Army's Program Executive Office for Aviation at Redstone Arsenal. The Boeing Co. and Sikorsky Aircraft Corp. run a joint program to develop and build the Comanche. In July 2000, the companies opened a joint, 35-member program office in Huntsville.



In the next few weeks, Comanche will undergo flights to test an improved tail design. Boeing has added plates to the rear stabilizer, or tail assembly, to enhance the smoothness of the Comanche's flight and its ability to aim weapons. "These are improvements to design that will deal with buffeting problems we've had in flight," said Darrell Harrison, deputy Comanche program manager. "By improving the tail design we've made the Comanche more stable in flight."

In April, the helicopter will be placed on pylon, and a variety of radar signals will be bounced off. A radar cross section test this effort will physically prove the stealth design of the helicopter. "We've tested all this before in simulations and computer models," said Chuck Allen, vice president and Comanche program director for the Boeing Sikorsky venture. "This is the first time we will have gotten out there and physically tested the radar return on the aircraft... We have no reason to think that it won't work, but this is a test we have to perform," Allen said. The radar cross section test will calculate radar returns for survivability ranges as well as for stealth testing. Air crews need to know the ranges at which their aircraft can be detected on certain types of radar in order to avoid enemy missile sites. "If it works, then we will proceed with the design, and, if it doesn't work, then we will solve that problem and then go on," Birmingham said. "But the radar return has been tested before, and this is just a final test of that."

The Comanche has been through many changes since its inception nearly 10 years ago. The Army identified the need for a helicopter like the RAH-66 in

1983. In 1991, the Comanche was selected to fill the armed scout role. Congress decided in 1995, after the flight of the first Comanche prototype, to fund the program over a longer period of time and purchase fewer of the scouts. For the last 18 months, two prototypes have been flying tests on the Comanche system. In 2001, one will be moved to a training role, and the second will be used to test advanced equipment and avionics.

In May, the second prototype aircraft will be taken out of the testing program and refitted with the advanced avionics and computer equipment that the front-line Comanches would use in combat and flight. Birmingham said that aircraft would return to flight by the end of the year to begin a flight test program on that equipment. "This is when you'll see what the Comanche really can do, and the cockpit will take shape into what I feel the Comanche will look like in production models," Allen said.

Boeing and Sikorsky also plan to add an upgraded engine, which will give the Comanche about a 12-15 percent power boost, Birmingham said. "Every bit of power is needed in a helicopter," the Colonel said. Birmingham said the engine uses improved materials that allow it to run slightly hotter than the current Comanche engine. The decision was made after additional avionic packages and combat missions were added to the Comanche design. This added weight to the aircraft, and an engine with higher performance capability was needed.

The test program will use 13 helicopters to test the Comanche design. By December 2006, the Army expects the first eight Comanches to be sent to the 1st Calvary Division. The Army is aiming for a 62 vehicle-per-year production mark from the Boeing and Sikorsky team. The Army plans to purchase more than 1,200 of the Comanches by 2024 for a price of about \$40 billion.

Meetings of Interest

Human Dimension Research & Analysis Program Review

15 February 2001

POC: LTC Lee Myers, DSN 680-5861, COM (757) 788-5861

MANPRINT Board of Advisors (MBA) Meeting

13 March 2001

POC: LTC Zappalla, DSN 225-9215, COM (703) 695-9215



MANPRINT Team From Centurions To Gladiators

PREFACE

The following article is presented by L. Taylor Jones III, a Practitioner, to encourage Manpower and Personnel Integration (MANPRINT) practitioners and managers to seek new and innovative concepts for infusing and maintaining MANPRINT's focus of always considering the soldier, leader, and unit in Army acquisition programs.

MANPRINT was quite formidable just a decade ago. Backed by an Army Regulation with “teeth,” the six original domains (Manpower, Personnel, Training, Safety, Health Hazards and Human Factors Engineering) were woven through major systems development with limited compromise. Combat Developers wrote Operational Requirements Documents before contracts were awarded. Government and industry program managers generally saw the benefits of maintaining adequate MANPRINT staffing in their budget line. Some world-class systems accurately touted their “human-in-the-loop” design.

We can't say we weren't warned that paradigms would change. The need for battlefield situational awareness and ensuing solutions was a wake-up call to those of us who relished the stable ways of the previous decade. Just as we had developed hasty tactics to deal with commercial-off-the-shelf materiel, such detours as Spiral Development and Rapid Prototyping heralded new challenges. Soldier Survivability (the seventh Domain) created a new and essential element to effectively integrate into multi-system enclaves that, in turn, begat the undeniable necessity for cross-service cooperation.

Three services (Army, Navy and Air Force), seven domains, and hundreds of systems drove the MANPRINT-Logistics team to stronger participation in the proposal and source selection process. Military Standards were applied as a possibility to strengthen weak statements of work. The MANPRINT

Assessment process was modified to meet burgeoning requirements. Just as we seemed to regain control and velocity, the hallowed regulations, directives, and instructions supporting our mission experienced a “softening” process. Additionally, criticism and costs associated with the application of Military Standards pushed those time-honored tools out of the reach of many practitioners. To add to the crisis, our experienced MANPRINT practitioner ranks were thinning rapidly.



Now the Department of Defense's procurement process is truly a more turbulent environment. Rapidly changing reform strategies regularly drive the Acquisition, Technology, and Logistics workforce to new and varying business practices. Published policies often seem to struggle in an effort to codify the latest ways of the streamlining movement. The professional acquisition team is challenged to stay current and efficient, even while becoming even more innovative. The MANPRINT Manager must regain the advantage previously supported by the now defunct common rules of engagement and predictable developmental life cycles.

Now we stand, with the same dedication to human-in-the-loop, surrounded by an unstable group of revised acquisition strategy components. The programs we must participate in are repetitively tailored to mesh with accelerated or delayed milestone decision points. Cost, schedule, and performance trade-offs are not single-point events, but flow with more radical funding/requirements fluctuations. Our MANPRINT mission is but one more consideration in risk and trade-off analysis. We must maneuver effectively through numerous “Teams” and “Committees” to maintain influence amongst competing priorities. We must ensure that the human is represented in the exit criteria.

While there is a critical need for specialists in this evolution, every player must have a strong understanding of the entire team's strategy. We must be as fluent in the acquisition process as we are in the user's requirements. A graphic representation of the Defense acquisition management framework is shown in Figure 1.

For example, "Alpha" contracting might concern members of the old Legion. To some, this approach implies letting the contractors drive the contract. Human Systems Integration avoidance might erroneously be implied. Yet, upon closer examination, the MANPRINT practitioner will find that when properly represented, our requirements-driven priorities are presented to the responding contractor prior to binding negotiation. Government and industry will work together to resolve misunderstandings before the deal is done. Deliverables are priced and negotiated with far greater understanding as to the level of effort, and talent required. Alpha contracting puts MANPRINT upfront and early in the acquisition cycle.

So our professional lives changed. Some of us have chosen to be included in the rapid evolution of the acquisition process, just as our warriors have been required to evolve. Now more than ever, we are faced with the challenge of being properly prepared before we enter each arena, quite often alone. We can be certain that no program strategy will be exactly the same, as we can be just as sure that the program will not pause for those MANPRINT practitioners who hesitate. Proper training and education is more than just a Domain. MANPRINT is truly an approach to systems integration. The most serious barrier to such complete and critical integration is a lack of continuous understanding and participation. We should stay current and stay involved in every facet of our program!

THE 5000 MODEL

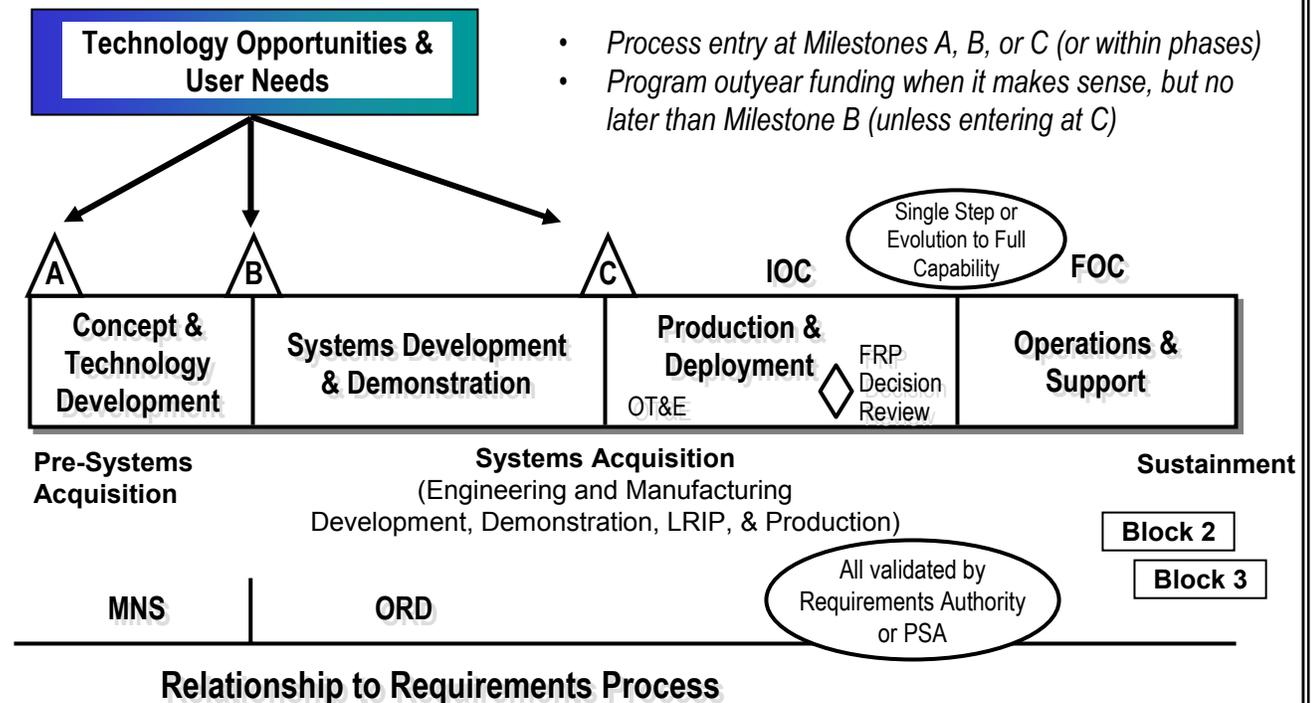


Figure 1

Ref. Defense Acquisition Deskbook, 12 January 2001

MANPRINT Application Analysis

**Joseph S. Chambers,
Director (Acting), Simulation
Directorate, United States Army
Space & Missile Defense
Command**



**And
Carol G. Swinford, Program Manager,
Verification & Validation,
Maximum Technology Corporation**

Huntsville, Alabama

As Chief of the Simulation Development Division (SDD) for The United States Army Space and Missile Defense Command (SMDC), I am constantly seeking innovative approaches to enhance and improve operating requirements of SDD. SDD is responsible for the management and research of modeling and simulation (M&S) resources for SMDC. SMDC was established to reflect the importance of space and missile defense to the Army and the joint warfighter. The command has two basic missions:

- 1. Ensure that the soldier in the field has access to space assets and their products.**
- 2. Seek innovative means to provide effective missile defense for the nation and deployed forces.**

M&S resources managed by SDD primarily consist of software applications, but may involve some hardware support. MANPRINT (Manpower and Personnel Integration) principles were introduced as a possible tool to improve current and future software processes and application and implementation of software to support the warfighter. SDD has on-going efforts to optimize current M&S resources for supporting the warfighter and providing Independent Verification & Validation (IV&V) and Verification Validation & Accreditation (VV&A) resources to Department of Defense (DoD) agencies and contractors.

In the purest sense, we are not M&S software/applications developers. Our development consists of identifying and packaging existing M&S applications to meet specific training and systems requirements. However, new software may be developed by SDD to merge or link M&S applications for producing new functionality. Also, software changes may be made to M&S applications (from a reuse perspective) to correct software errors, solve specific problems or add value to an existing M&S application.

This is a preliminary analysis and we anticipate additional articles or reports as our analysis matures. Currently, SDD is looking at the feasibility of applying MANPRINT principles to two focused areas, M&S development and Verification & Validation (V&V) to include both IV&V of tactical, embedded system software and VV&A of M&S utilized in training, exercises, acquisition processes, etc. MANPRINT is described as *"A systematic and comprehensive program for improving the effectiveness of systems at minimum costs throughout their entire life cycle by designing materiel for optimal performance within and across the MANPRINT Domains."* The Domains include: Personnel Capabilities, Manpower, Training, Human Factors Engineering, System Safety, Health Hazards and Soldier Survivability. The remainder of this report will discuss M&S development and the applicability of MANPRINT Domains that could improve SDD performance for supporting the warfighter. MANPRINT and its potential effect on SDD V&V activities will be discussed in a future MANPRINT Quarterly.

Modeling and Simulation

New equipment, weapon systems, doctrines, and operational concepts require extensive evaluation, potentially at an extremely high cost. Funding is not available to sustain the research, development, and fielding of sophisticated weapons systems, as it has been done in the past. New weapons systems and military support equipment will be developed as modifications and improvements of existing systems, rather than from scratch. This will result in the Army employing more efficient and less costly ways to define requirements, evaluate solutions, and refine

system and equipment designs. One of the most cost-effective means of achieving this goal will be to employ innovative and efficient use of M&S systems that are currently available or under development. Although M&S systems are not the actual hardware, MANPRINT domains, particularly Training, Human Factors Engineering, System Safety, and Soldier Survivability could be applied for these applications which would eventually become an actual weapon system used by the soldier.

The U.S. Army SMDC serves as the Army's proponent for Space and National Missile Defense (NMD) and as the Army's integrator for Theater Missile Defense (TMD). SMDC ensures that Army warfighters have input into the definition, development and deployment of critical space and missile defense assets. This assures access to essential space assets and timely delivery of products which will provide decisive victory on geographically dispersed battlefields, while maintaining a minimal number of casualties. Another role of the SMDC, as the threat of the delivery of weapons of mass destruction increases, is to provide vital resources necessary to ensure that U.S. joint warfighters possess effective missile defense systems to protect our nation. MANPRINT is being implemented with the NMD program and, as such, SDD should, at a minimum, understand MANPRINT's role.

Execution of the Army's M&S mission relies on a variety of tools such as functional prototypes of tactical and technical hardware, surrogates for developmental and fielded systems, and M&S of current and future systems and operating conditions. M&S products must address space, missile defense, and directed energy functionality and ensure that these classes of systems are accurately represented in tools developed by organizations other than the Army. The Army M&S program encompasses three (3) proponenty and mission areas of Space, NMD, and Theater Air and Missile Defense (TAMD) and spans across the following three (3) Army M&S domains:

- 1. Training, Exercises, and Military Operations (TEMO)**
- 2. Advanced Concepts and Requirements (ACR)**
- 3. Research, Development, and Acquisition (RDA)**

Because of the growing role M&S will have in the research, training, and acquisition processes, as the Army invests its valuable resources in M&S, it is imperative that these products emulate real-world conditions. MANPRINT's seven domains are built around real-world events/activities and may play a critical role in this arena. Challenges that must be recognized include embedded training, system readiness certification, lack of M&S maturity for training purposes, and the fundamental ability to convince Congress and the Department of Defense of the effectiveness of a system without the expense of a live fire test program. The following limitations are currently being addressed by the Army:

1. Lack of operational requirements analysis tools to support short-term issue resolution relative to system performance.
2. Lack of M&S capability to evaluate inter-systems operability and performance analysis for the purpose of conducting design parameter trade-off studies.
3. Insufficient operational test-beds for evaluating alternate concepts of operations, tactics and system performance.
4. Insufficient individual, operator-in-the-loop simulations supporting experimentation, training and analysis efforts designed to facilitate modification and improvements of system concept of operations and tactics, techniques and procedures.
5. Lack of sufficient number of integrated, real-time end-to-end simulations with operator-in-the-loop representations for system architectures focused on battle management and associated operational considerations for the staff.

The Army M&S environment must be presented with issues or technology demonstration venues, as they are identified by decision makers and users or developers of technologies. Assessments of currently available tools should be performed and if tools or capabilities do not exist to solve the problem, new tools should be developed.

The SMDC and the SDD have institutionalized the following procedures to address the five limitations listed above:

1. Alignment, definition, refinement, and monitoring of key processes: All M&S processes and practices must follow standards to allow for the dynamic infusion of technical support for short periods or time without incurring lengthy and costly spin-up and training times. The most desirable solution is to have one set of processes and practices for all projects, whether great or small. This will set the stage for a nimble organization that is capable of aggressively supporting DoD decisionmaker requirements.
2. Evolution of a reusable synthetic environment: The need has been recognized for the expansion of the SMDC synthetic environment to allow all SMDC elements, as well as all Army and other DoD organizations, involved in the space, NMD, and TAMD missions to accurately portray their particular systems and conduct system/operational analysis regardless of which M&S domain is utilized. A large concentration of effort will be focused on the development/modification of Army tools to accurately model space and missile defense elements. A standardized environment will be provided so that elements can easily “plug-and-play”. The mechanism for achieving this goal will be the High-Level-Architecture (HLA). HLA provides for an analysis and experiment environment offering a “mix-and-match” set of M&S assets that are linked utilizing a distributed protocol structure.

3. Sharing solutions and the environment with programs and customers: The process of sharing solutions and the standardized environment with other programs and customers will be done according to the following strategies:
 - a. *Injection of functionality into major modeling efforts external to SMDC*: The key element of this strategy is to provide accurate representations of Army space, missile defense, and directed energy capabilities to all warfighters and decision makers within DoD. This will be accomplished by focusing efforts on the injection of space and missile defense functionality into other major modeling efforts occurring external to SMDC. This will ensure that Space and Missile Defense functionality is accurately represented in all major models.
 - b. *Development of M&S capability within SMDC based on addressing areas of new research and documented SMDC requirements*: The Army space support teams require modern models of space and space operations to support training and operations. Models will be developed utilizing this strategy and folded back into the standardized synthetic environment of models for use in experimentation. Processes are being defined to establish and verify requirements to allow responsiveness to all requirements of SMDC and DoD.
 - c. *Provision of M&S expertise and support to experiments, exercises, and training within SMDC, Army, and other DoD organizations*: This strategy allows for the unification of SMDC M&S assets in a synthetic environment, where TAMD and NMD functions will be simultaneously represented. An HLA federation will be formed between all major SMDC M&S applications. These efforts will unify SMDC M&S assets and allows SMDC and SDD to maintain its M&S capabilities as technologies change.

SMDC, and more particularly SDD, has adopted and innovated these strategies in an approach to establish processes; a standardized synthetic environment; and appropriate support required to minimize redundant M&S investments within the SMDC and the Army. The value of knowledge and technology, existent within the SMDC and Army community must be maximized. These strategies could, along with a thorough assessment of MANPRINT and its seven domains, provide consistent support for current and emerging practices and provide cost-effective, measurable processes to satisfy M&S requirements of the Army and the DoD.

For questions, comments, or additional information about this article, please contact Ms. Carol G. Swinford at (256) 864-7630, ext. 111 or email cswinford@maxtc.com.

FY 2001 MANPRINT Training Schedule



MANPRINT ACTION OFFICER COURSE (MAOC)

<u>CLASS</u>	<u>START DATE</u>	<u>END DATE</u>	<u>LOCATION</u>
2001-702	20 Mar 2001	29 Mar 2001	Fort Rucker, AL
2001-703	01 May 2001	10 May 2001	Alexandria, VA
2001-704	11 Sep 2001	20 Sep 2001	Fort Belvoir, VA



MANPRINT TAILORED TRAINING (APPLICATIONS COURSE)



<u>CLASS</u>	<u>START DATE</u>	<u>END DATE</u>	<u>LOCATION</u>
2001-703	13 Mar 2001	15 Mar 2001	Fort Belvoir, VA
2001-708	17 Apr 2001	19 Apr 2001	Dover, NJ
2001-704	22 May 2001	24 May 2001	Fort Knox, KY
2001-001	12 Jun 2001	14 Jun 2001	ALMC, Fort Lee, VA
2001-707	19 Jun 2001	21 Jun 2001	Rock Island, IL
2001-705	21 Aug 2001	23 Aug 2001	Warren, MI

(POC: Mr. Len Girling, COM (804) 765-4361, DSN 539-4361)

MANPRINT INFORMATION

Articles, comments, and suggestions are welcomed. Submit to: MANPRINT Quarterly, HQDA (DAPE-MR), 300 Army Pentagon, Washington, DC 20310-0300; DSN 223-8840, COM (703) 693-8840, FAX (703) 697-1283, E-mail: margaret.simmons@hqda.army.mil

MANPRINT Web Site: <http://www.manprint.army.mil>

POLICY: Department of the Army, ODCSPER, ATTN: DAPE-MR, 300 Army Pentagon, Washington, DC 20310-0300, DSN 225-7035, COM (703) 695-7035.

DIRECTORY OF DESIGN SUPPORT METHODS: Defense Technical Information Center–MATRIS Office, DTIC-AM, NAS NI Bldg, 1482, Box 357011, San Diego, CA 92135-7011, DSN 735-9414, COM (619) 545-9414, E-mail: ddsm@dticam.dtic.mil, and web site: <http://dticam.dtic.mil/hsi/>

MANPRINT DOMAIN POCs:

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SYSTEM SAFETY: Col. Kim Welliver or Mr. Jim Patton, Office of the Chief of Staff, Army Safety Office, ATTN: DACS-SF, Crystal Plaza 5, Rm 980, 2100 S. Clark Street, Arlington, VA 22202, COM (703) 601-2405, Email: kim.welliver@hqda.army.mil, pattojt@hqda.army.mil.

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SOLDIER SURVIVABILITY: Mr. Richard Zigler, U.S. Army Research Laboratory, ATTN: AMSRL-SL-BE, Aberdeen Proving Ground, MD 21005-5068, DSN 298-8625, COM (410) 278-8625, FAX: 278-9337, E-mail: zigler@mail.arl.mil.

Bob Holz
Acting Director for Personnel Technologies

The MANPRINT Quarterly is an official bulletin of the Office of the Deputy Chief of Staff for Personnel (ODCSPER), Department of the Army. The Manpower and Personnel Integration (MANPRINT) program (AR 602-2) is a comprehensive management and technical initiative to enhance human performance and reliability during weapons system and equipment design, development and production. MANPRINT encompasses the seven domains of personnel capabilities, manpower, training, human factors engineering, system safety, health hazards and soldier survivability. The focus of MANPRINT is to integrate technology, people and force structure to meet mission objectives under all environmental conditions at the lowest possible life-cycle cost. Information contained in this bulletin covers policies, procedures, and other items of interest concerning the MANPRINT Program. Statements and opinions expressed are not necessarily those of the Department of the Army. This bulletin is prepared quarterly under contract for the Personnel Technologies Directorate, Office of the Deputy Chief of Staff for Personnel under the provisions of AR 25-30 as a functional bulletin.

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