MANPRINT BULLETIN

Vol. I No. 11 "Remember the Soldier" May 1987

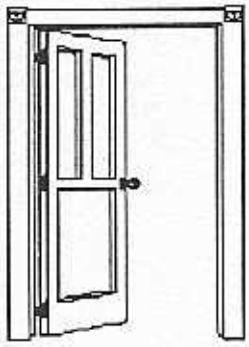
MANPRINT and Soldier Performance in Operational Test and Evaluation

by LTC Joe Bishop

It is not very useful for the operational evaluator to think of manpower and personnel integration (MANPRINT) in terms of the six domains identified in AR 602-2 [i.e., human factors engineering (HFE), manpower, personnel, training, system safety, and health hazards]. It *does* make sense to think of MANPRINT in terms of human performance and human resources.

The MANPRINT domains, especially the first four, represent types of solutions to performance problems rather than indicators of possible problems. The operational evaluator cannot classify problems in terms of the first four domains because it is not his role to anticipate the best solution or combination of solutions to a performance problem that he finds through operational test and evaluation (OT&E). His role is to diagnose the probable causes of the observed performance problems and to identify feasible solutions.

This alternate way of looking at MANPRINT is especially pertinent to formal OT&E and the development of testable issues and criteria. Essentially, human performance issues are testable but human resource issues are not, except in a microscopic, inconclusive way. In fact, formal OT&E does not actually test the six domains. Rather, it tests soldier performance to identify task performance problems, which include unanticipated safety and health hazards.



Inside . . .

Human performance is the integrating factor across all domains of MANPRINT. The unique contribution of OT&E to the MANPRINT Program is the collection, analysis, and evaluation of empirical data at the soldier task performance level, recorded under realistic operational conditions. OT also captures data on

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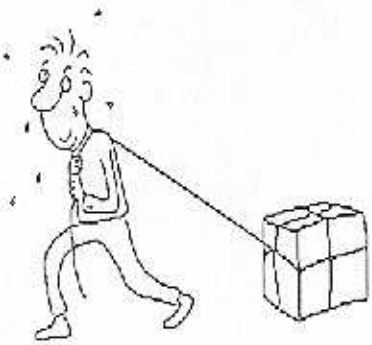
personal characteristics of soldiers that are potentially correlated with task performance. These personal data are useful in diagnosing possible causes of task performance problems.

Soldier performance is a component of system performance and unit effectiveness and should be analyzed during OT&E as a component of system performance. It encompasses the performance of operators, maintainers, repairers, and other personnel who support the system. If a soldier performance problem is discovered, the solution to that problem can be found in one (or a combination) of the first four domains of MANPRINT; the hardware or software can be redesigned (HFE); or changes can be made in the manpower, personnel, or training subsystems. Safety and health hazards are eliminated in the same way soldier performance problems are solved, i.e., by redesigning the hardware or software and making changes in the manpower, personnel, or training subsystems.

Thus, operational evaluators find it more useful to consider soldier performance as the integrating concept of MANPRINT in OT&E, rather than the six traditional MANPRINT domains. For more information on this topic, contact LTC Joe Bishop, U.S. Operational Test and Evaluation Agency, Falls Church, VA 22041-5115; AV: 289-2487 or COM: (202) 756-2487. ●

Brook's Law

Adding manpower to a late software package makes it later.



BOOK REVIEW

Humans are Absent in Battle Models

by Kent Myers, Ph.D.

Sally Van Nostrand. *Model Effectiveness as a Function of Personnel.* Concepts Analysis Agency, SR-86-34. DTIC accession no.: ADB 109139L (Restricted access).

(An unrestricted summary of the report is in *Phalanx*, March 1987, pp. 22-24. Quotations are taken from this source.)

Most current battle models simulate the interaction of machinery under established doctrine and do not account for human variables. Examples of human variables might be fatigue or deliberate deviation from doctrine. Both are known to occur and to affect the outcome of battle, yet are not used in battle models. To eliminate the confusion that this terminology fosters, the author recommends the use of the term "firepower model" to describe current simulation models. Firepower models are important tools when their limitations are recognized, but interpreters want to press beyond those limits. The author's answer to making a more realistic and comprehensive model is not to add further complication to materiel variables, but to add human variables.

A general approach for making this modification would involve work on five types of variables. These types of variables differ in the availability of data and the extent of representation in the model. The first type of variable has data available for it and is currently represented in a limited form. An example would be probability of target detection. Analysts frequently use the rated value for the equipment because data are not readily available on the operator's contribution to actual performance. The author recommends building a data base from which accurate operator performance measurements could be drawn: "It

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would seem that one of the most important aspects of combat effectiveness would be the soldiers' ability to use that equipment, rather than the pure firepower aggregation."

Combat fatigue and presence of toxic substance represent another type of variable that is well documented but not represented in the model. There is a third type of variable that taken alone is not considered to have significant battle effects. Humidity and isolation are example of such variables. The author warns, however, that research may be able to demonstrate that a combination of several stressors may produce effects that warrant modeling.

In the fourth type of variable, no data exist, even though the variables are clearly important and are included in current models. For example, most models use a casualty percentage to indicate when a unit loses effectiveness and is defeated, but there is "... no data that validate that the percentage of casualties is a relevant variable."

A final type of variable has no data and is unrepresented in models. There are many research questions worth pursuing here, such as the following topics:

- Psychology and physiology (fear, food and water deprivation, etc.)
- Psychosocial climate (morale, cohesion, leadership, etc.)
- Command, control, communications, and intelligence (C^3I) and decision-making.

Aggregation techniques also need to be questioned. A unit operates differently from the sum of its weapon systems (this is implied in the notion that C^3I is a force multiplier), yet the models are based on the opposite assumption.

To demonstrate, the author modified the FORCEM models to reflect the detrimental effects of environment and stress on soldiers. Specific variables are listed that could either be added or are candidates for additional research. The author describes existing or in-process human performance data bases that modelers could use.

This study is important to the MANPRINT community in several respects. Modeling can be a focusing device to help specify the ways and extents to which humans contribute to battle outcomes. In particular, the rigorous and systemic context of a model can be used to justify the collection of MANPRINT data and to gain greater visibility and use for this data. Integration problems between soldier and machine can be conveniently and quickly investigated through models, and new experimental hypotheses about soldier contributions can be generated. ●

How to Get MANPRINT Documents to Industry

by CPT Don Hinton

As the Manpower and Personnel Integration (MANPRINT) Program has matured, greater emphasis has been placed on finding methods for communicating MANPRINT concerns to industry early in the materiel development process. The major emphasis has been on designing equipment to prevent the development and fielding of equipment too complex for our soldiers to operate and maintain. If we are to ensure that our equipment is designed with the soldier in mind, industry must be given the relevant data on the soldiers who will be operating and maintaining the proposed system. The System MANPRINT Management Plan (SMMP) is the management document used to ensure that MANPRINT issues are identified and addressed as early as possible. A tremendous amount of work has gone into completing the SMMPs required for proposed materiel systems. Now that these documents are completed, it is important that the information found in them [e.g., the target audience description (TAD), lessons learned, and MANPRINT objectives] be available to industry. A number of mechanisms are in place to pass information from the

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Army to industry. This article describes the alternatives and the information needed to implement them.

One way industry can obtain Army documents is through the Defense Technical Information Center (DTIC). The documents that industry needs should be submitted to DTIC by sending form DD 1473 and *two* legible copies of the document to the Defense Technical Center, Cameron Station Building 5, Alexandria, VA 22304-6145. If you have any questions about submitting a document to DTIC, call (202) 274-7148 or AV: 284-7148. After receiving the document, DTIC assigns it an accession number. These documents are then made available to anyone who has a DTIC account.

Once the document is available at DTIC, industry must be informed of its availability. This can be done through the *Commerce Business Daily*. The local contracting officer must be notified in order to place a notice in the *Commerce Business Daily*. The announcement should state that the document is available through DTIC and should state its accession number.

If a more direct means for making a document available to industry is desired, an announcement can be placed in the *Commerce Business Daily* stating that the document is available by contacting the system proponent or whoever will be acting as the document distributor. In this case, the school must publish a sufficient number of documents to meet the potential demand. If this option is used, a mailing label should be requested when a document is ordered.

Documents may also be provided to industry through the National Technical Information Service (NTIS). All unclassified documents that are placed in DTIC are automatically sent to NTIS. Therefore, if you use DTIC, it is not necessary to send NTIS a copy of your document unless you want to expedite the process. The major difference between DTIC and NTIS is that an account is not needed to obtain a document from NTIS. To submit a document to NTIS, contact Evette LaGarde or Dottie Adams at (703) 487-4650. The address for NTIS is National Technical Information Service, 5285 Port Royal, Springfield, VA 22161.

TRADOC public affairs offices (PAO) can also serve as a means of providing documents to industry. Each TRADOC post has a public affairs office. The PAO can announce the availability of system documents in a number of trade journals. This option can be used either in lieu of or in addition to using DTIC.

Another means for making your documents available to industry is the Technical Information Center. The Technical Information Center passes documents to the technical information liaison officer (TILO), who in turn passes the documents to industry. TILOs are located in each subordinate research and development command. The Technical Information Center operates as a reading room for industry. Documents may be submitted to the main office or to the subordinate office. The point of contact at the main office is Dolores Mahon, telephone: (202) 274-8948 or AV: 284-8948. The address for the Technical Information Center is HQ, U.S. Army Materiel Command, ATTN: AMCLD-TILO, 5001 Eisenhower Avenue, Alexandria, VA 22333-0001.

These are the recommended means for passing documents such as the TAD or the SMMP to industry. TRADOC's most important role in this process is to ensure that the documents are available as early as possible in the development process and to notify industry that the documents are available. ●

Ellen Goodman

What is this Human Factor?

Boston--In technical terms, I am what is known as the "human factor." So are you.

Once upon a time we were just plain people. But that was before we began having relationships with mechanical systems. Get involved with a machine, and sooner or later you are reduced to a factor.

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Today, for example, I am interacting (this is what it's called) with a word processor and an entire computerized system. No matter how perfect this setup is, I have the power to botch up the results. From the point of view of the machine, I am the loose cannon, the dubious and somewhat unpredictable human factor in its life.

If the processor that I write on had a separate existence, it would probably send messages to its colleagues saying, "You won't believe what my human factor did today. Coffee! Right down the old keyboard!" But on the whole, I am not very dangerous to the wider world. Indeed, the most common evil I spew forth from this machine into the environment is a grammatical error.

But what about the other human factors out there? Last week, the National Research Council reported with alarm that there is practically no safety research being done by the Nuclear Regulatory Commission on the "human factors." The focus has been on the physical plants, they said, and not on the "people who design, operate, maintain and manage" nuclear plants. I suspect it's like that almost everywhere.

The disaster at Chernobyl, the near-disaster at Three Mile Island, each had its human factor, and yet most of the original attention focused on the buildings, the systems. The Challenger explosion one year ago initially was billed as a technological disaster. It was a while before the inquiry shifted from the state of the O-rings to the state of the decisionmakers.

At Bhopal, India, where some 1,700 people died, and at Basel, Switzerland, where the Rhine River was poisoned, we heard first of chemical leaks and spills and impersonal safety "procedures." We heard only secondarily of workers who might not have sounded alarms or known enough not to hose chemicals. Even in the recent low-tech Amtrak disaster, the attention was first on the state of signals and only then on the signal-readers.

I suppose there's a reason for our reluctance to focus on the human factors. During recent decades, we have all become more conscious of the centralization of danger. We know that more lives hinge on fewer "things": on nuclear missiles and plants, on chemicals and computers. It may be easier to think on "systems" that can be perfected than on people who aren't perfectible.

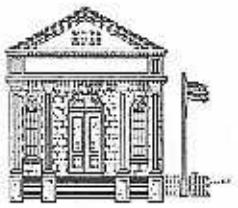
But it is human factors who read nuclear-plant blueprints backward. Human factors who cut corners to meet deadlines and use lower-grade concrete to save money. Human factors who try to cover up errors. Human factors who make those errors. Human factors who get cranky, careless, tired. Sometimes even fall asleep on the job. And when we try to design plants and procedures that guard against human error, it is humans who design them.

In my 3-o'clock-in-the-morning fantasies of nuclear war, I have one that features a series of improbable mistakes in some silo deep under the North Dakota earth. I have another that shows a light going on in the White House and a single man who must, without a shower, without a cup of coffee, without time for consultation or double checking, decide whether or not to send the missiles up. Such fantasies are not reassuring.

But during daylight hours, most of us choose to think of the human role in our sophisticated technological society as a minor part of the equation. We accept a walk-on part in the modern world and give the machines, the systems, the lead.

Again and again, in the wake of a catastrophe, we look for solutions that will correct "it" rather than "us." The risks we live with, particularly those of chemicals and atoms, are so enormous that it is comforting to believe people can people-proof their lives. But it is illusory.

Consult my computer if you must, but no machine is more trustworthy than the humans who made it and operate it. So we are stuck. Stuck here in the high-tech, high-risk world with our own low-tech species. Like it or not, no mechanical system can ever be more perfect than the sum of its very human factors. ●



Schedule of MANPRINT Courses for FY 87

MANPRINT Staff Officer Courses

Date	Location
15 Jun 87 - 2 Jul 87	Ft. Belvoir, VA
27 Jul 87 - 14 Aug 87	Ft. Belvoir, VA
14 Sep 87 - 2 Oct 87	Ft. Belvoir, VA

One Week MANPRINT Courses

Date	Location
1 - 5 Jun 87	Ft. Harrison, IN
13 - 17 Jul 87	Ft. Belvoir, VA
20 - 24 Jul 87*	Ft. Leavenworth, KS*
31 Aug - 4 Sept 87	Ft. Belvoir, VA

* Please note changes.

GO/SES MANPRINT Seminars

All located in Washington, DC

Dates

21 May 87
23 Jun 87
22 Jul 87
20 Aug 87

Information on course allocations can be obtained from HQDA (DAPE-ZAM), Washington, DC 20310-0300. Telephone: AV 225-9213 or COM (202) 695-9213.

Meetings of Interest In 1987

14 - 16 September
Air Land Battle Fire Support Conference. Ft. Sill, OK. Contact: National Security Industrial Association, 1015 15th Street, N.W., Suite 901, Washington, D.C. 20005. Telephone: (202) 393-3620.

22 - 24 September
Automatic Test Equipment International Conference. Wiesbaden, Germany. Sponsored by the National Security Industrial Association. Contact: National Security Industrial Association, 1015 15th Street, N.W., Suite 901, Washington, D.C. 20005. Telephone: (202) 393-3620.

12 - 14 October
Association United States Army Meeting. Washington, DC.

18 - 23 October
Human Factors Society Annual Meeting. New York City, NY. Contact: Human Factors Society, P.O. Box 1369, Santa Monica, CA 90406. Telephone: (213) 394-1811.

30 November - 2 December
9th Interservice/Industry Training Systems Conference (I/ITSC). Washington, DC. Sponsored by the American Defense Preparedness Association. Contact: American Defense Preparedness Association, Rosslyn Center, Suite 900, 1700 N. Moore Street, Arlington, VA 22209-1942, Attn: TMAS. Telephone: (703) 522-1820.

HOTLINES

MANPRINT -- (800) 262-1626; In VA: (800) 327-1626; 9:00 a.m. - 4:00 p.m.
HEL -- COM: (205) 876-2048; AV: 746-2048; 7:00 a.m. - 4:00 p.m

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LTC William Blackwood, ODCSPER Coordinator

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The MANPRINT Bulletin 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 (AR602-2) 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 six domains of manpower, personnel, training, human factors engineering, system safety, and health hazard assessment. 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 published monthly under contract by Automation Research Systems, Ltd., 4401 Ford Avenue, Suite 400, Alexandria, Virginia 22302, for the Office of the Special Assistant to the Deputy Chief of Staff for Personnel (MANPRINT) under the provisions of AR 310-2 as a functional bulletin. Proposed articles, comments, or suggestions should be mailed to MANPRINT Bulletin, Attn: HQDA (DAPE-ZAM), Washington, DC 20310-0300. Telephone: Commercial (202) 695-9213 or Autovon: 225-9213.