DTIC Current Awareness: July 2002

Bos, J. E. (2002). *Somato-Vestibular Interactions Regarding Spatial (Dis)orientation (Report No. TNO-TM-02-C010)*. Human Factors Research Inst, TNO: Soesterberg, Netherlands. (DTIC No. ADA402896)

http://handle.dtic.mil/100.2/ADA402896

Abstract: This report results from a contract tasking TNO Human Factors as follows: The contractor will investigate, and model somatosensory-vestibular interactions such that quantitative predictions on aerospace vehicle attitude perception can be made. Emphasis will be made on modeling situations relevant to high-performance aircraft. The final product will be a TNO Technical Report or draft paper for publication.

Brett, B. E., Doyal, J. A., Malek, D. A., Martin, E. A., and Hoagland, D. G. (2002). *The Combat Automation Requirements Testbed (CART) Task 5 Interim Report: Modeling a Strike Fighter Pilot Conducting a Time Critical Target Mission (Report No. AFRL-HE-WP-TR-2002-0018).* Science Applications International Corporation: Dayton, OH. (DTIC No. ADA403495)

http://handle.dtic.mil/100.2/ADA403495

Abstract: The Combat Automation Requirements Testbed (CART) program is developing and demonstrating human performance modeling technology that can be used to design more effective crew systems. CART applies the task network modeling approach of the Army's Improved Performance Research Integration Tool (IMPRINT) and adds new functions called goals that enable more adaptive model performance and a High Level Architecture (HLA) interface for coupling with other simulations. This report documents the first application of CART modeling technology. A model of a strike fighter pilot conducting a time critical target (TCT) mission was developed and integrated with a strike fighter flight simulation that interacted with a Joint Integrated Mission Model (JIMM) TCT scenario. The pilot model was exercised in six TCT scenarios and eight pilots flew the same scenarios in a virtual version of the simulation. Overall, pilots found and destroyed the TCT 98% of the time. The model was successful 100% of the time. Comparison of pilots and the model on summary measures of key mission functions showed generally high correlation between pilot and model performance (Congruency Ratio = .78). The results suggest that human performance models can predict operator performance and provide important insight into operator issues in new systems.

Ching, W. S. (2002). *An Exploratory Analysis on the Effects of Human Factors on Combat Outcomes.* Naval Postgraduate School: Monterey, CA. (DTIC No. ADA403526)

http://handle.dtic.mil/100.2/ADA403526

Abstract: The ongoing revolution in military affairs is transforming the nature of warfare. Modern combat systems are increasingly more effective yet more complex to operate. Nonetheless, their complexities cannot be compared to human behaviors which remain the most important factor in combat. Within Project Albert, an agent-based model called SOCRATES has been developed to enable users to explore the emergent behaviors of the agents. A deep operation scenario is developed to explore the effects of human

factors on combat outcomes. Two experimental designs are used in this investigation: A Latin Hypercube and a Full-Factorial Design. Using the computing facilities at NPS, MITRE and MHPCC (Maui High Performance Computing Center), a total of 174,960 runs are made. The data suggest the existence of emergent patterns, and provide some insights into the question of how much more capable a smaller force must be in order to effectively battle a larger force. In addition, the analysis shows that the Latin Hypercube Design is able to identify the same significant factors in the scenario as are obtained by the Factorial Design, but with much fewer runs.

Geling, G., Williams, C., & Guirguis, M. (2001). *D-SAFIRE: A Distributed Simulation*. Defence Research Establishment: Ottawa, Ontario. (DTIC No. ADA402972)

http://handle.dtic.mil/100.2/ADA402972

Abstract: Defence Research and Development Canada (DRDC) has been developing a low cost means to evaluate the integration of new display equipment for the Air Force. The result has been the Aircraft Crewstation Demonstrator (ACD), which is capable of simulating the cockpit of an aircraft for human factors evaluation (HFE). In order to support future display upgrades within the cockpit of the CF-18, DRDC contracted an HFE study of the CF-18 displays, especially the radar displays associated with radar and data link. Earlier work at the Defence Research Establishment Ottawa (DREO) had resulted in a high fidelity simulation of the air to air modes of a fighter radar. In order to develop as representative display as possible, a task to integrate the ACD with the DREO radar simulation as a distributed simulation was included with the HFE study. This report describes the use of the high level architecture (HLA) to combine these two disparate simulations into one distributed simulation. The results indicate that HLA is an effective means of combining different models to provide an improved simulation to the user. Advantages and limitations are discussed, as is a proposed future architecture.

Guthrie, J. D. (2002). *Technical Support DLA Apparel Research Network*. IIT Research Institute: Rome, NY. (DTIC No. ADA402833)

http://handle.dtic.mil/100.2/ADA402833

Abstract: The Defense Logistics Agency's Research and Development Enterprise Division established a network of universities, equipment suppliers, apparel manufacturers, industry consultants and software developers. The focus of this network, known as the Apparel Research Network, is to optimize the military clothing supply chain. Coordinating research activities of these diverse organizations is a daunting task. The Defense Logistics Agency's Research and Development Enterprise Division employs the DoD's Advanced Materials and Processes Technology Information Analysis Center (AMPTIAC) to directly assist the ARN program management with meeting coordination, technical oversight support, and assistance in technology transfer. This report describes the contents of that support from April 2001 to May 2002.

Knott, B., Gannon, A., & Rench, M. (2000). *Runway Incursion: Human Factors In Runway Incursions (Report No. HSIAC-RA-2000-001A)*. Crew System Ergonomics Information Analysis Center: Wright-Patterson AFB, OH. (DTIC No. ADA402929)

http://handle.dtic.mil/100.2/ADA402929

Abstract: The runway incursion issue is a major concern for the Federal Aviation Administration (FAA) and is one of the top five aviation safety issues for FY 2000 for the FAA Administrator. It is such a significant problem that the Administrator has established a new Runway Incursion Safety Program Office that reports directly to her. The Program Office has responsibility for coordinating multiple taskings in this area across several internal FAA offices. As a part of this overall FAA effort, the Office of the Chief Scientific and Technical Advisor for Human Factors/AAR-100 has asked HSIAC to conduct (1) a search of domestic and international literature/databases on human factors issues of runway incursions and (2) a written review of the key documents from international sources. This document contains a summary of these key documents followed by the citations and abstracts gathered from the literature search.

Knouse, S. B. (2001). *Diversity and Shared Team Mental Models in the Military (Report No. DEOMI-RSP-01-03).* Defense Equal Opportunity management Institute, Patrick AFB, FL. (DTIC No. ADA403424)

http://handle.dtic.mil/100.2/ADA403424

Abstract: Diversity provides a number of advantages to military teams including an increased information and experience pool for task completion as well as broader perspectives for problem solving. There can be a number of problems with diversity, however, including how team member background differences affect shared team mental models of team tasks (common knowledge, expectations, and sensemaking). This report examines a number of factors in such shared models, such as team development stages, training, task experience, and task cohesion, and presents a model of how diversity affects these factors' influence upon shared team mental models, team processes, and team performance. Recommendations follow for how the military might enhance shared team mental models in order to improve the performance of diverse teams.

Kocian, D. F. (2000). *Helmet-Mounted Tracker and Display (HMT/D) Interfaces Developing a "Standardized" Helmet-Vehicle Interface (HVI)* (Report No. AFRL-HE-WP-TR-2002-0105). Air Force Research Lab, Human Effectiveness Directorate: Wright-Patterson AFB, OH. (DTIC No. ADA402770)

http://handle.dtic.mil/100.2/ADA402770

Abstract: The successful integration of technology and human factors meets its ultimate challenge in the area of military performance. Nowhere are the stakes so high and the competition so rigorous as in the arena of combat. This paper documents the attempt to define, develop, and test a 'standardized' interface for helmet-mounted tracker and displays aircraft. The design that has been evolved is based upon active use and refinement in an environment that is as close to combat conditions as resources permit. Many of the design ideas and lessons-learned covered in this paper came either directly or indirectly from pilots and support personnel of the USAF 422 Test and Evaluations Squadron located at Nellis AFB NV.

Minor, D., & Farrell, P. S. (2002). *Software Documentation for CF-18 ACD (Report No. TM-2002-026)*. Defence Research and Development: Ottawa, Ontario. (DTIC No. ADA402959)

http://handle.dtic.mil/100.2/ADA402959

Abstract: Since 1998, The Aircraft Crewstation Demonstrator (ACD) has provided the opportunity for scientists and practitioners to review interface designs in a dynamic setting with the human-in-the-loop. This document serves as a reference for the software developed to support the CF-18 ACD that resides at DCTEM. The ACD has a very modular architecture, which allows for components to be added and removed over time. As such, the ACD is best described in terms of its individual components. The modular nature of the ACD, combined with the physical separation of the software components across several computers, makes interprocess communication of central importance to the software architecture. As such this document gives a comprehensive view of the interprocess communication that occurs during the running of the ACD, before treating each component in depth. This document is current as of January 17, 2002. It is anticipated that as other components are added to the CF-18 ACD, this reference document will also need to be updated.

Morrison, D. J. (2002). *360-Degree Feedback Implementation Plan: Dean Position, Graduate School of Business and Public Policy, Naval Postgraduate School*. Naval Postgraduate School: Monterey, CA. (DTIC No. ADA402760)

http://handle.dtic.mil/100.2/ADA402760

Abstract: 360-Degree Feedback is a personal development and appraisal tool designed to quantify the competencies and skills of fellow employees by tapping the collective experience of their superiors, subordinates, and peers. Substantially better than the hierarchical, single-source assessments employees are familiar with, this multi-source system provides participants with a comprehensive interpretation of their performance from numerous perspectives within the organization. The objective of this thesis is to develop a 360 degree feedback system tailored specifically for the Dean position, Graduate School of Business and Public Policy, Naval Postgraduate School. This thesis presents a literature review, a case description involving the Dean position, and discusses a series of interviews conducted with key groups of organizational stakeholders. With the results of this research confirming the need for and potential content of a feedback system, this thesis culminates by presenting 360-degree feedback procedures and documents created specifically for the Dean position.

NATO Research and Technology Organization. (2002). *Human Factors in the 21st Century (Les facteurs humains au 21th siecle) (Report No. RT0-MP-077).* Neuilly-Sur-Seine, France. (DTIC No. ADA403342)

http://handle.dtic.mil/100.2/ADA403424

Abstract: Representatives of NATO member nations, Partnership for Peace counties and non-NATO member nations met in Pails (Val de Grace Hospital) from II to 13 June 2001, for a Specialists Meeting on 'Human Factors problems in the 21st century'. This meeting was particularly concerned with Human Factors problems which have appeared since what is known as the Revolution in Military Affairs (RMA) dating from the end of the Cold War. The meeting was held in parallel with a workshop on decision making in the 21st century from 13 to 15 June 2001, organized jointly by the DGA (The General Armaments Delegation of the French Ministry of Defence), the ONRIFO (Office of Naval Research Field Office) and the company THALES.

Rench, M. E., Johnson, S., & Sanders, T. (2001). *Cost Benefit Analysis (CBA) for Human Effectiveness Research Biacoustic Protection (Report No. HSIAC-TR-2001-014)*. Human Systems Information Analysis Center: Wright-Patterson AFB, OH. (DTIC No. ADA402813)

http://handle.dtic.mil/100.2/ADA402813

Abstract: Human Systems IAC was asked to assess the costs and benefits associated with providing improved hearing protection for Air Force flightline personnel. To ensure individuals with a direct stake in this area of study were included, input was obtained from subject matter experts as well as stakeholders such as Air Force fighter pilots and maintenance crew chiefs. A standard eight-step process was used to identify and evaluate the costs and benefits associated with the current bioacoustic protection system in use and two alternative systems. This study evaluates the costs and benefits associated with three hearing protection alternatives. Each alternative was estimated for cost and evaluated for relative benefits. By assigning a numerical value to the benefits, Human Systems IAC was able to develop a cost/benefit ratio (CBR) for each of the three alternatives. The lower the CBR, the more desirable the alternative. Human Systems IAC found that the most effective alternative with respect to the stated goals is alternative #3, ACCES with ANR (CBR = 9.0). The second most desirable alternative was ACCES (CBR = 10.9). Based on the evaluated cost and benefits the least cost effective solution in providing hearing protection was alternative #1, the fielded system (CBR = 11.6).

Smyth, C. C. (2002). *Modeling Indirect Vision Driving With Fixed Flat Panel Displays: Task Performance and Mental Workload (Report No. ARL-TR-2701)*. Army Research Laboratory: Aberdeen Proving Ground, MD. (DTIC No. ADA403232)

http://handle.dtic.mil/100.2/ADA403232

Abstract: The relation between mental workload and situational awareness and the effects on vehicle performance are of interest to designers of future combat ground vehicles. In this report, a micro-state task time line analysis of attention workload is used to describe a model of driving performance and mental workload for indirect vision driving. The model is based on the results of a field study in which a military vehicle was driven with flat panel, liquid crystal displays fixed in the cab and a forward viewing monocular camera array mounted on the front roof. The task load times for the model are calculated with a mathematical equation for vehicle speed as a function of the camera field of view. The vehicle speed equation is derived with consideration given to the effects of scene compression on the informational needs of the driver in a self-paced task. An analysis shows that the task performance and mental workload are separable for the short course runs used in the field study. The effect of indirect vision driving on mental workload is determined from the subjective ratings of perceived task loading that were reported in the field study. Along with the perceived workload, the study participants rated the mental measures of task allocated attention, situational awareness, motion sickness, and subjective stress. Because of collinearity, the perceived workload is regressed on the factorial components of a cognitive loading space derived from a factorial analysis of the mental measures. Following rotation to a 'skills-rules-knowledge' cognitive processing space derived from the clustering of the measures, the perceived workload is shown to be a function of the skills and rule-based components. On this basis, a micro-state time line model is proposed for the task information processing.

Stothard, C., & Nicholson, R. (2001). *Skill Acquisition and Retention in Training: DSTO Support to the Army Ammunition Study (Report No. DSTO-CR-0218)*. DSTO Electronics and Surveillance Research Laboratory: Edinburgh, South Australia. (DTIC No. ADA402986)

http://handle.dtic.mil/100.2/ADA402986

Abstract: This work was undertaken within the Land Preparedness Studies Task (ARM 01/059) within the Land Operations Division. It is in response to the request for DSTO support contained within the Terms of Reference for the Army Ammunition Study (AAS). This request was for DSTO to assist in developing a better understanding of skill degradation (retention) and acquisition, with the view that this would enable accurate prediction of training requirements and in the longer term the development of tools to predict levels of proficiency provided by different training regimes. In summary we: (1) Took a systems approach to the training problem and assessed the impact of the treatment of skill acquisition and degradation of predictions of training frequency requirements. (2) Undertook a literature survey, concentrating on the Cognitive Psychological literature, to ascertain the current thinking on how people learn and forget. (3) Assessed the gaps in the literature and scoped the work needed to address these gaps. Assessed how DSTO could address the issues raised by the AAS in both the short and long terms, through the development of appropriate R&D programmes.

Trabun, M. A. (2002). *The Relationship Between Emotional Intelligence and Leader Performance.* Naval Postgraduate School: Monterey, CA. (DTIC No. ADA403540)

http://handle.dtic.mil/100.2/ADA403540

Abstract: This study reflects a comparison of the measured emotional intelligence ability to the evaluated leadership performance of 104 select male and female U.S. Naval Academy midshipmen. Binary logistical regressions were used to analyze the impact of selected explanatory variables on the probability of an individual performing effectively as a squad leader. Separate leader performance models were estimated on the numbers of the sample, and some significant relationships between the EIQ scores and leadership performance were found. The results of this research assessed the utility of the Mayer, Salovey, Caruso Emotional Intelligence Test, Version 2 (MSCEIT v.2) to discriminate between effective leaders as inconclusive, while some scores from the MSCEIT v.2 were found to add to the predictive validity of each of the models. Conclusions and recommendations for further research are provided.