

DTIC Current Awareness: May 2003

Barnes, M. J. (2003). *The Human Dimension of Battlespace Visualization: Research and Design Issues (Report No. ARL-TR-2885)*. Aberdeen Proving Ground, MD: Army Research Lab. (DTIC No. ADA412248)

<http://handle.dtic.mil/100.2/ADA412248>

Abstract: The purpose of the report was to explore the human dimension of battlefield visualization in order to generate design principles and suggest future research topics. The author reviewed cognitive engineering research sponsored by the U.S. Army Research Laboratory, other military related research, and pertinent open literature publications. A descriptive model of visualization is discussed in terms of the ability of the commander to understand the current combat situation, generate courses of action (COAs) and predict COA results. Specific topics covered as part of situation understanding included terrain visualization, situation displays that use symbology, techniques for abstract visualizations, and multi-media knowledge walls. Military decision-making research was reviewed in order to explore specific topics related to the commander's ability to use visualization tools to predict combat results. Based on the reviewed research, the author discusses design principles for the following issues: Dimensionality, slant range, degree of terrain immersion, and virtual environments. Methods of combining terrain views. Limitations of and ways to enhance military symbology Configural, narrative, and pattern recognition advantages of abstract displays. Operator-derived principles for knowledge walls. Uncertainty representation, trend perceptions, and visualization biases. Story telling as a visualization aid for naturalistic decision-making. Information presentation, feedback, and the automation paradox effects on visualized automated systems. Visualization aids for complex and nonconventional military environments. Based on these principles, generalized design guidelines were proposed for a commander-centered architecture as a basis for future battlefield visualization and knowledge management systems.

Bederson, B. B. and Boltman, A. (1999). *Does Animation Help Users Build Mental Maps of Spatial Information?* College Park, MD: University of Maryland, Department of Computer Science (DTIC No. ADA412683)

<http://handle.dtic.mil/100.2/ADA412683>

Abstract: This study examines how animating a viewpoint change in a spatial information system affects a user's ability to build a mental map of the information in the space. The 20 subjects were asked to navigate family trees created in the Pad++ program by clicking on hyperlinks that were represented by yellow arrows. For

each family member, subjects saw a single photograph. Above the photograph was the family member's first name and yellow hyperlink arrows with the words "parent", "child", "sibling", and "spouse", where appropriate. Two different but comparable family trees were used in the test. Subjects were presented with one family tree with animation and the other family tree without animation. They were given three tasks to perform in each family tree. First, subjects were presented with a series of nine statements about family relationships and asked to navigate the family tree until he/she could say a statement was true or false. The second set of tasks evaluated recall memory, and the third set of tasks evaluated reconstruction ability. Lastly, the subjects were asked to complete two user satisfaction surveys--one about their experience with animation and the other about their experience without animation. Speed and accuracy were measured for each task. The results show that animation improves users' ability to reconstruct the information space, with no penalty on task performance time. The study provides strong evidence for adding animated transitions in many applications with fixed spatial data where the user navigates around the data space.

Blais, A., Thompson, M. M. and Baranski, J. V. (2003). *The Effects of Individual Differences in Cognitive Styles on decision-Making Accuracy and Latency (Report No. DRDC-TR-2003-023)*. Ottawa, Ontario: Defence Research and Development Canada. (DTIC No. ADA412182)

<http://handle.dtic.mil/100.2/ADA412182>

Abstract: How might individuals' typical decision-making styles affect the quality and latency of their decisions? In a first study, 48 adults completed three measures of cognitive styles, including the Personal Need for Structure and Personal Fear of Invalidity scales (PNS and PFI; Thompson, Naccarato, Parker, & Moskowitz, 2001), and the Need for Cognition scale (NFC; Cacioppo & Petty, 1982). Participants then completed three trials of a medium-fidelity simulation of a naval surveillance and threat assessment task called TITAN (i.e., "Team and Individual Threat Assessment Network") that required participants to evaluate seven pieces of information for potential targets displayed in a radar space (e.g., direction, speed, bearing, etc.). After reviewing the information for each target, participants submitted their threat assessment and were provided feedback about the degree of actual threat for the target. For each session, participants were instructed to clear the radar space of as many targets as possible within a 25-minute period and to perform this operation as accurately as possible. Results showed a significant decrease in processing time across trials. Higher NFC scores predicted a significantly smaller mean decision error across trials, and higher PNS scores predicted a greater mean decision error, although the latter effect failed to reach statistical significance. None of the cognitive styles scores had a significant main effect on the mean time spent processing TITAN targets.

In Study 2, 80 Canadian Forces personnel completed the three cognitive styles measures and worked in four-person teams on TANDEM 11, a simulation similar to TITAN. Each team consisted of three subordinates who separately reviewed and integrated five pieces of complex information per target before forwarding their individual threat assessments to a team leader.

Chronaki, C. E., Lelis, P., Demou, C., Tsiknakis, M. and Orphanoudakis, S. C. (2001). *An HL7/CDA Framework for the Design and Deployment of Telemedicine Services*. Crete, Greece: Crete University Department of Computer Science. (DTIC No. ADA411363)

<http://handle.dtic.mil/100.2/ADA411363>

Abstract: The advance of regional healthcare networks has created increasing demand for telemedicine services tailored to particular medical specialties and healthcare settings. At the same time, emerging telemedicine protocols and guidelines combined with various medical standards provide specifications not only for the exchanged clinical content but also for the physical setting and technology in use. This paper presents a framework for the design and deployment of telemedicine services based on open standards: HL7/CDA for clinical documents, DICOM 3 for imaging, and SCP-ECG for ECGs. The originality of the approach lies on: (a) the creation, maintenance, and reuse of clinical document templates adhering to the HL7 Clinical Document Architecture (CDA) - a recent ISO standard and (b) interoperability with middleware services of the health information infrastructure (HII). This work adds value to the WebOnCOLL collaboration infrastructure, which has been deployed successfully for provision of remote consultation services in cardiology.

Hornbaek, K., Bederson, B. B. and Plaisant, C. (2002). *Navigation Patterns and Usability of Zoomable User Interfaces With and Without an Overview*. College Park, MD: University of Maryland, Department of Computer Science. (DTIC No. ADA412685)

<http://handle.dtic.mil/100.2/ADA412685>

Abstract: The literature on information visualization establishes the usability of interfaces with an overview of the information space, but for zoomable user interfaces, results are mixed. The authors compared zoomable user interfaces with and without an overview to understand the navigation patterns and usability of these interfaces. Thirty-two subjects solved navigation and browsing tasks on two maps, one of Washington State (no-overview interface) and the other of Montana (overview interface). There were no differences between interfaces in subjects' ability to solve tasks correctly, but 80 percent of the subjects preferred the interface with an overview, stating that it supported navigation and helped

keep track of their position on the map. However, subjects were faster in completing tasks when using the map without an overview, which may have been due to the organization of that map. The Washington map was organized in multiple levels, which rendered the overview unnecessary by providing richer navigation cues through semantic zooming. The combination of the Washington map and the interface without an overview also improved subjects' recall of objects on the map. Subjects who switched between the overview and the detail windows used more time, suggesting that integration of overview and detail windows adds complexity and requires additional mental and motor effort.

NATO Research and Technology Organization. (2003). *Virtual Reality: State of Military Research and Applications in Member Countries (Report No. RTO-TR-018, AC/323(HFM-021)TP/18)*. Neuilly-Sur-Seine, France: NATO Research and Technology Organization. (DTIC No. ADA411978)

<http://handle.dtic.mil/100.2/ADA411978>

Abstract: NATO Research Study Group 28 (RSG 28), flow Human Factors and Medicine, HFM-21, was established to: 1) identify human factors issues involved in the use of VR technology for military purposes; 2) determine the state of knowledge with regard to those issues; and 3) recommend a research agenda that will address critical questions and enable effective products to be produced to meet the military's needs. HFM-21 has adopted the following definition for its use of the term Virtual Reality: Virtual Reality is the experience of being in a synthetic environment and the perceiving and interacting through sensors and effectors, actively and passively, with it and the objects in it, as if they were real. Virtual Reality technology allows the user to perceive and experience sensory contact and interact dynamically with such contact in any or all modalities. This is the final report of the Research Study Group (RSG) on Virtual Reality Applications. A summary is presented of three conferences: Workshop on Human Performance Metrics, at Chertsey, Surrey, UK, 15 October 1996; Conference on The Capability Of Virtual Reality To Meet Military Requirements, at Orlando, Florida, USA on 4, 5 & 8 December 1997; and Conference on Industry Capability at The Hague, The Netherlands on 13 - 15 April 2000. Conclusions are drawn and recommendations presented in this report. In addition, member nations present a summary of where they were in VR when RSG-28 was established, and where they are as HFM-21 draws to a close.

Trenchard, M. E., Edwards, S. S., Clarke, W. K., Lohrenz, M. C. and Collins, C. (2003). *Human Factors Study: Vector Map Evaluation for TAMMAC (Report No. NRL/MR/7440--03-8292)*. Washington, DC: Naval Research Lab. (DTIC No. ADA412191)

<http://handle.dtic.mil/100.2/ADA412191>

Abstract: The Tactical Aircraft Moving Map Capability (TAMMAC) Program (NAVAIR PMA-209) has identified the use of vector map products as a high priority growth item. The TAMMAC Program will conduct an EME effort during FY03-FY05 to incorporate the use of vector map data, specifically, the National Imagery and Mapping Agency's (NIMA) Vector Product Format (VPF) standard. In support of this effort, the Naval Research Laboratory was tasked to evaluate the potential functional benefits of vector map data and specific NIMA vector map products. This study focused on the functional aspect of using vector maps in the cockpit. The results from this effort are to help develop and refine the implementation requirements of vector maps as a growth item in TAMMAC and influence requirements for future map displays. In addition, the results are to help segregate the mission planning aspects of vector map mission planning from cockpit functional needs.

Waard, D., Brookhuis, K. A., Moraal, J. and Toffetti, A. (2002). *Europe Chapter of the Human Factors and Ergonomics Society Meeting*. Netherlands: Groningen Rijksuniversiteit, Department of Psychology. (DTIC No. ADA412433)

<http://handle.dtic.mil/100.2/ADA412433>

Abstract: The Final Proceedings for Europe Chapter of the Human Factors and Ergonomics Society Meeting, 7 November 2001 - 9 November 2001 This is an interdisciplinary conference in human factors and ergonomics, with an overall theme of Human Factors in Transportation, Communication, Health, and the Workplace. A total of 50 papers are divided into sections comprising Transportation, Augmented Cognition, Health and the Workplace, and Communication.

Zhang, D. and Celler, B. (2001). *Monitoring Physiological Signals During Running Exercise*. New South Wales, Australia: New South Wales University, School of Electrical Engineering and Telecommunications. (DTIC No. ADA412362)

<http://handle.dtic.mil/100.2/ADA412362>

Abstract: An ambulatory monitoring device for the measurement of heart rate, step rate and respiration signals of human subjects during running exercise is described. The monitor, which is fixed on an elastic belt, can be worn around the subject's chest. A new Microchip P1C16F876-20 8bit Flash Programmable Micro-controller with built-in A/D converters is used to sample analogue signals and transmit them wirelessly to a computer via RF transceivers. With 2.4GHz frequency

hopping spread spectrum technology, the RF transceivers provide immunity to jamming as well as multi-path fading. The transmission power is 100mW that covers a range of approximately 1km line-of-sight. The monitor can also receive data from the computer for adjusting analogue circuit parameters and provide an audio click sound to the subject as a step reference signal through an earphone. It is hoped that, in the future, this ambulatory device will contribute to research studies on human performance during running exercise.