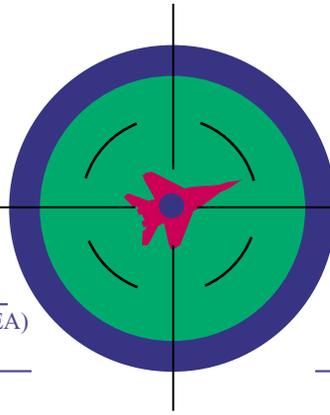


FIGHT'S ON!



Quarterly Newsletter from the Warfighter Training Research Division (AFRL/HEA)
of the Air Force Research Laboratory Human Effectiveness Directorate

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New World Vistas Funds the PALM Lab for Three Years

Air Force Office of Scientific Research funds cutting edge research

AFRL/HEA's Mesa Research Site has established a Performance and Learning Models (PALM) Lab with the mission of conducting empirical research and creating computational process models to achieve a better understanding of human performance and learning. The lab equipment includes computer workstations for data collection and model testing, and an eye tracker to reveal details regarding visual information search techniques.

Dr Kevin Gluck, PALM Lab government lead, and Dr Don Lyon, a Sr Research Scientist with L3 Communications (L3COMM), recently received 3 years of funding from the Air Force Office of Scientific Research (AFOSR) for a basic research program focusing on visuospatial working memory (VSWM) and the Uninhabited Air Vehicle (UAV) Operator. This effort, is fundamental to developing warfighter training research and development (R&D) technologies and methods.

This team's pursuit of an improved scientific understanding of VSWM and

its influence on warfighter behavior confirms the significance of forging a symbiotic bond of science and technology to foster the Division's warfighter training R&D programs. This synergy is integral to the Division's Warfighter Skill Development and Training Research

ighter training R&D to encompass all mission domains.

To springboard the Division's basic scientific research toward enhanced training technologies and methods, the VSWM effort is studying the set of

cognitive processes that allow people to visualize the relative positions of things. Virtually all spatial problem-solving involves VSWM, and it is hypothesized to be crucial for UAV operators. PALM Lab research relies on a promising new technique called Path Visualization for obtaining quantitative information about the fundamental nature of VSWM, and developing and testing computational models. A preliminary model, developed by Dr Lyon, is based on a spreading-activation mechanism in

an isomorphic projection (IP) space. When fully developed, this IP model should be a key component of larger models of experts and novices performing realistic tasks that tap VSWM. A computational process model of specific piloting tasks performed by UAV Air

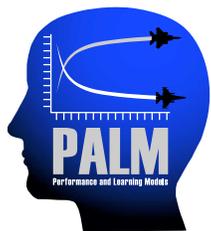


Government lead, Dr Kevin Gluck (standing, second from left), with PALM lab team members gathered around the UAV STE displays (counterclockwise) Dr Jerry Ball, Mr Ben Sperry, Lt Mathew Purtee, Dr Don Lyon, Mr Mike Krusmark, and Lt Col Stu Rodgers, Deputy Chief, Warfighter Training Research Division and the program's subject-matter expert consultant.

sub-thrust, acclaimed for world-class R&D by the recent Air Force Scientific Advisory Board quality review. Noting the Division's exceptional impact and lauding the strong relationship with the warfighter, the Board endorsed Mesa's vision for the future to expand warf-

Vehicle Operators (AVO) will eventually be tested.

With New World Vistas funding from AFOSR, AFRL/HEA researchers have already designed and implemented a synthetic UAV reconnaissance task that taxes AVO's spatial working memory. This task is part of a UAV Synthetic Task Environment (STE) that includes a high-fidelity AVO station simulation of the system currently being used to train Predator RQ-1A pilots at Indian Springs AFAF, NV. A computational process model of UAV piloting, built within the Adaptive Control of Thought-Rational (ACT-R) architecture developed by John Anderson and Christian Lebiere at Carnegie Mellon University, will be used to understand and predict performance on reconnaissance tasks. Plans



to translate the IP model into ACT-R for integration into the UAV piloting model should result in a computational process model for VSWM that realistically

accounts for complex cognitive processes underlying AVO performance.

Research currently underway in the PALM Lab will improve scientific understanding of VSWM, and will improve the ability to create computer-based computational representations of perception, cognition, and action in human-in-the-loop behavior. Ultimately, this will lead to critical downstream transition opportunities that will improve USAF distributed warfighter readiness training. These applications include: more realistic and interactive Blue and Red computer-generated forces for effective, flexible, and scalable distributed training environments, a further understanding of human learning to aid training syllabus design, and more accurate predictions of warfighter behavior for force modernization analysis.



TARGETS of OPPORTUNITY

As part of the Air Force **Distributed Mission Training (DMT) Operations and Integration (O&I)** contract, Capt Jeremy Hendrix is working with TRW and other Air Force organizations investigating technical limitations of DMT systems. With horizontal inclusion of intelligence,

assets at key operational C2ISR bases.

Complementing the DMT Testbed of four F-16C simulators, are a Predator station, constructive threat simulations, and DMT networked C2ISR simulation assets including AWACS, JSTARS, and Rivet Joint mission platforms. Following research testing, the Division will be well positioned to participate in future DMT exercises and tests, as Mesa personnel have



View of AFRL/HEA's dynamic Aerospace Operations Center demonstration incorporating C2ISR simulation assets in time-critical targeting "sensor-to-shooter" scenarios. Demonstration incorporated space assets (top middle), AWACS (lower left), UAV (upper left), and synthetic JSTARS (lower right) simulators manned by warfighters.

surveillance, and reconnaissance (ISR), as well as command and control (C2) assets, the initial series of tests involves Mesa's DMT Testbed and C2ISR nodes, such as the Theater Air Command and Control Simulation Facility at Kirtland AFB NM and training

up to date technical experience with TRW representatives developing security accreditation and daily operating procedures for national and international DMT operations.

Dr Robert Walker, Director General of R&D Programs for Defence R&D Canada, led a contingent



Dr Walker (standing in front, second from right), with the Canadian attaché and government representatives from the military research fields, join AFRL/HEA Project Officers reviewing the CF-18 simulator prototype under development at Mesa Research Site



Dr Byron Pierce, US Project Officer, briefs the status of US/Canadian effort during the 2-day review at Mesa Research Site.

of government scientists, engineers, and military pilots to appraise the status of the **US/Canada Project Arrangement** concerning DMT technologies. As a key component of planned future international DMT experiments, US and Canadian Project Officers are managing joint development of a prototype CF-18 simulator based on the Multi-Task Trainer (MTT) simulation architecture designed at the Mesa Research Site. The open architecture MTT design, currently installed in Mesa's F-16C and A-10 simulators, has proven to be an unequaled "cheaper, better, faster" engineering approach for reliable real-time (60hz) simulation. With the CF-18 prototype MTT on track, US and Canadian officials reviewed program details, flew F-16C missions in the DMT Testbed, and discussed training effectiveness considerations with scientists and visiting USAF F-16C pilots participating in a training week at Mesa.

The Training Systems Technology Team, led by Dr Wink Bennett, held a 3-day strategic planning workshop to review current program precedence, anticipate future ground-breaking R&D opportunities, and forecast resources required to provide laboratory support commensurate with critical warfighter training needs. Dr Bennett spearheaded the team's initial plan development more than 18 months ago, and orchestrated this workshop to build on the team's dazzling success and produce visionary strategies for future R&D. Led by gOE's professional facilitators, Mesa scientists, engineers, and program managers collaborated with MAJCOM customers, industry representatives, and academia experts to delineate and define strategies to "lead turn" readiness training shortfalls with R&D solutions.



BRIEFS and DEBRIEFS



Capt Kurt Saffer, Director of Intelligence at Mesa Research Site, won recognition as Air Force Materiel Command's (AFMC) nominee for the 2001 Air Force Intelligence Awards Program. Capt Saffer represents AFMC at the Air Force-level competition for the Maj Gen John S. Patton Intelligence Officer of the Year. He is currently deployed to Southwest Asia in support of Operations Southern Watch and Enduring Freedom.



Mr Glenn Cicero won AFRL's Outstanding Intelligence Contributor of the Year for developing an unprecedented physics-based integrated threat environment sensor model, while leading the \$3M revolutionary Electronic Warfare (EW) training system program. He drove the EW program to successfully replicate emitters from air and surface threat systems, earning accolades from COMACC and designation of the effort as a Category I Advanced Technology Demonstration (ATD). By identifying technology transition opportunities to solve real-world training challenges,

Maj Andre emphasizes research program opportunities brainstormed and developed during the 3-day strategic planning workshop to Dr Scott Tannenbaum, a member of the Group for Organizational Effectiveness (gOE), who with Dr George Alliger, co-facilitated meeting events.



Mr Cicero enabled imbedded training at a savings of \$500K annually per aircraft, while reducing OPSTEMPO and increasing mission readiness.

AFRL/HE Annual Awards (presented by Col Jerry Straw, Chief, Warfighter Training Research Division, at Mesa Research Site on 11 Mar 2002)



Dr “Wink” Bennett garnered Mentor of the Year honors for peerless leadership of the Training Systems Technology Team, the Division’s largest. He proactively met with each member of his team to best match individual skills with technical projects, and ceaselessly advocated leadership opportunities for his cohesive team. He selflessly harmonized his team’s interest areas, fostered leadership in new growth areas, and brilliantly leveraged his team’s R&D efforts to benefit warfighters, yielding resounding endorsement from senior USAF leadership. Validating his mentoring approach, his team garnered \$3M of external funding from ACC and AFRL for collaborative R&D, and secured \$2M of Small Business Innovative Research (SBIR) funding for the SWC and an additional \$2M of SBIR funding for two Office of the Secretary of Defense R&D efforts.

Dr Herb Bell won the Senior Leadership Award for excellence in DMT Program Management, notably by coor-

inating translation of ACC capability goals into specific technical program objectives leading to an integrated series of ATDs and Critical Experiments. Dr Bell’s persuasive briefings to ACC, the Applied Technology Council, and higher headquarters yielded funding baselines for all Category 1 ATDs. He reorganized the Division’s annual \$5M 6.2 and 6.3 DMT R&D programs, kick-starting technology transition opportunities, overcoming funding limitations, defining R&D thrust focus, and validating customer needs.



Maj (PhD) Terence Andre’s visionary plans as Chief, Warfighter Skill Development and Training Branch, earned the Leadership Award by identifying more effective reporting structures and establishing areas of responsibility to facilitate new program growth and future work efforts. He astutely refocused a \$4M training research program, maximizing return on warfighter investments and spearheaded the expansion of DMT research to space, information operations, and command and control.

Captain Steve Polliard earned the Scientific/Technical Management Award as Program Manager for the revolutionary Multilevel Security (MLS) guard for High Level Architecture (HLA) DMT systems. By championing MLS, he catalyzed support from several agencies for additional funding and clinched the program’s Category I ATD status by engineering convincing demonstrations of near real time two-way data transfer between simulations executing missions at different classification levels.



A1C Kristina Brown, assigned to the Division’s Information Systems Training Branch, at Brooks AFB TX, merited the Administrative Excellence Award for critical success of the unit’s Automated Business Service System Program, superbly processing more than 25 short notice TDY orders, ensuring 100% on time and error free performance. Generating a savings of more than \$35K in contractor costs, she was an integral team member relocating more than \$100K worth of non-reportable items to the Division’s three geographically separated duty locations.



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