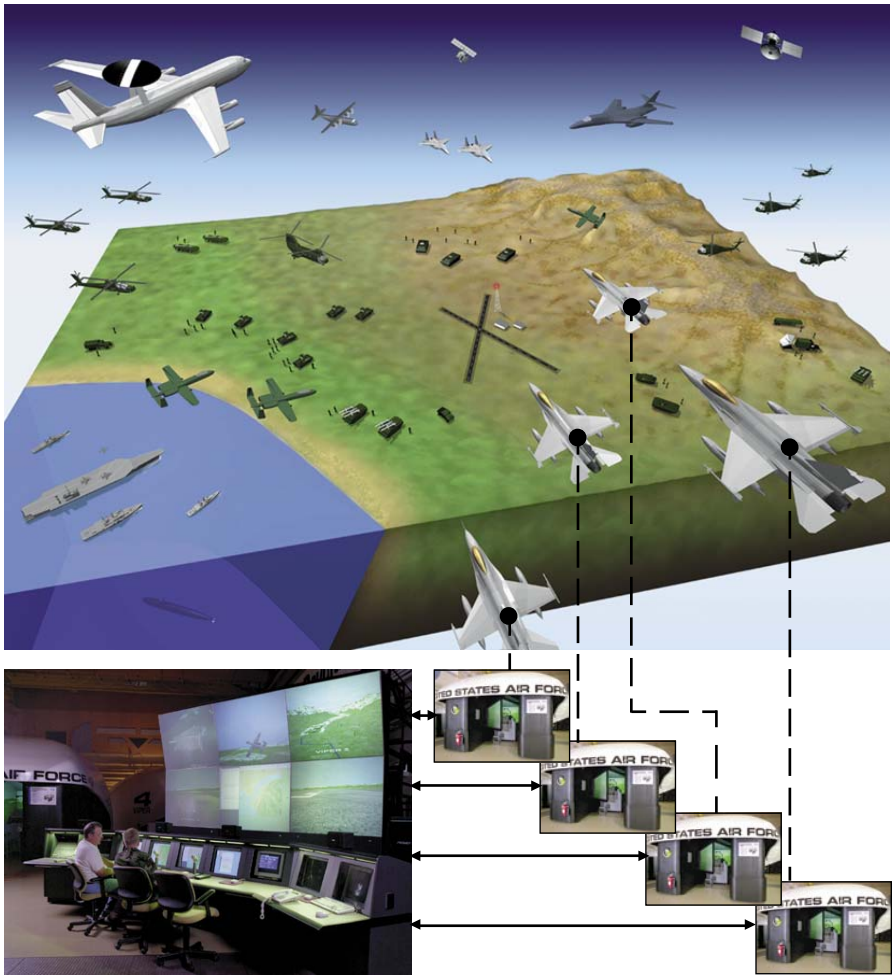
# Air Force Research Laboratory

## Mesa Research Site

# Distributed Mission Training Technology and Methods

In the past, warfighter training depended heavily on the weapon systems as the only realistic media for providing mission training. Aircraft training devices were predominantly used to prepare aircrews to more effectively use limited flying hours. Their main purpose was to provide procedural training (e.g., emergency procedures, instrument approaches, and intercepts) aimed at improving aircrews' skills. Increased complexity of the weapons systems, increased training requirements, and expanding peacetime military operations other than war have significantly reduced the quality and quantity of realistic, available training opportunities in the aircraft for warfighters. Now, with dramatic improvements in the capability and affordability of advanced distributed simulation technologies, warfighter training can be significantly improved at the mission and team level using the Distributed Mission Training (DMT) concept.

DMT is, simply stated, a shared training environment comprised of live, virtual, and constructive simulations allowing warfighters to train individually or collectively at all levels of war. DMT allows multiple players at multiple sites to engage in training scenarios ranging from individual and team participation to full theater-level battles. It allows participation, using almost any type of networkable training device, from each weapon system and mission area. Additionally, computer-generated, or constructive, forces can be used to substantially enhance the scenario. This combination of live, virtual, and constructive environments allows nearly unlimited training opportunities for joint and combined forces from their own location or a deployed training site. This expanded capability provides on-demand, realistic training opportunities for all warfighters unconstrained by the fiscal, geopolitical, legal, and scheduling problems associated with current real-world ranges and training exercises that limit training effectiveness and arbitrarily cap readiness levels today. DMT dramatically improves the quality and quantity of warfighter training.



*AFRL/HEA's Distributed Mission Training Testbed for the Synthetic Battlespace*

Low-cost, high fidelity, unit-level simulators with full visual systems immerse the warfighter in the "synthetic battlespace" training arena, enabling training throughout the full spectrum of operations. Available at the unit level networked locally and long-haul to other mission level nodes, units will be able to team with other air, ground, sea, and space forces to execute the Air Tasking Order (ATO) in various training scenarios. At other times, units will conduct local training or prepare for major exercises using the DMT system. DMT will also enhance brief, debrief, data collection, and mission replay and analysis to enable effective mission planning and targeting. Furthermore, it will provide combat assessment and improve future combat mission execu-

tion thereby dramatically increasing the probability of first mission success.

However, to make DMT a reality, many of the present enabling technologies must be significantly improved, made affordable, and some new concepts developed into useable technologies. While low-cost, high-fidelity cockpits are currently available, these devices must now become surrogate weapon systems rather than superficial emulations that merely complement the aircraft. Practical interfaces from the virtual systems to the live or "real" systems must be developed. Visual and cueing systems must adequately represent the environment to allow the players to execute their missions. Networking requirements include local area (LAN) and long-haul or wide area (WAN). The networking environment faces multilevel security challenges to reliably connect disparate sites around the world. Network interface units (NIUs) and simulation communications protocols (e.g., DIS and HLA) must be expanded to accommodate massive amounts of information and traffic generated by thousands of entities. Mission control stations, threat systems, and mission support stations must be improved and standardized to provide mission planning, coordination, and execution capabilities to the warfighters. Brief and debrief capabilities must be part of the system to maximize training and to address safety issues.

Technologies are being advanced to create affordable solutions for these training nodes, effectively reducing the cost of a four-ship system, for example, from hundreds of millions of dollars to $10 to $15 million. The goal of next generation cockpit designs is to have them function and process information similar to the aircraft but without using aircraft equipment. The result will be low-cost surrogate weapon systems indistinguishable from the real weapon system. The training environment will be created by multispectral image generators, helmet-mounted or mini-dome displays augmented by microlaser high-resolution target insets, and real-world databases using photo-realistic images. The simulators will be connected to each other and to mission planning systems through semiautomated mission control stations that will facilitate networking, mission preview, briefing, debriefing and archiving mission data.

In conjunction with the Training Systems Product Group (TSPG), the Warfighter Training Research Division (AFRL/HEA) is collaborating with the U.S. Navy, Marine Corps, USAF MAJCOMS, Air National Guard, and industry to develop and directly transition technologies and improved training methods to the user. Training enhancements will be developed and validated in the DMT testbed or on fielded systems to assist the Commands in making training procurement, implementation, and utilization decisions. AFRL/HEA will also support training effectiveness and behavioral studies to create more efficient and effective training programs.

Implementing the DMT concept will require changing how we think about training. "Training the way we intend to fight" requires recognizing that training is the peacetime manifestation of war. Future training systems must represent the total integrated mission, not just provide a reasonable emulation of the aircraft in a stand-alone configuration. This expanded training environment must support significantly enhanced training opportunities for all warfighters. AFRL/HEA is supporting the development, demonstration, evaluation, and transition of the enabling technologies and methods needed for effective, affordable Distributed Mission Training for the warfighter.

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