Establishing Metrics and Creating Standards: Quantifying Efficacy of Battlefield Simulations

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Abstract: *This paper asserts that quantification and verification of Battlefield simulations is necessary to assess, verify, and guide the researchers, military commanders, and users in both their development and their implementation. The authors present their observations on previous development activities that were hampered by lack of effective metrics and present their arguments that much of this was driven by a lack of standards. Tracing back using commonly accepted System Engineering practices, they show how lack of such standards makes even to the development of effective metrics problematic. The paper documents the experiences and enumerates the potential pitfalls of these shortcomings. Both the authors' experiences in military service and the technical literature supporting their theses are adduced to support their analysis of the current technical research and development environment. Then the paper evaluates several System Engineering tools to further investigate and establish the ultimate goals of these formalized processes. Using their current project in establishing virtual on-line mentors as an exemplar of the way such tools would be effective, the authors make a case for the needs for metrics standards that both are accepted by consensus and are ultimately directed at providing the warfighter with all of the training possible before putting that warfighters in harm's way and imperiling the missions for which they are putting themselves at risk. Examples of the nature and reaction to simulator training, virtual human interaction, computer agent interfaces and implementation issues are given to further illuminate for the reader the possible extensions of these approaches into the reader's own research as well as calling for a more community-wide recognition of the needs for standards both for implementation and for metrics to assess Battlefield Simulation utility to the warfighter. Future investigations, analysis and action are considered and evaluated.*

Authors' Biographies

Dan M. Davis is now a consultant for the University of Southern California, focusing on large-scale distributed DoD training, education and avatar mentors. Pre-retirement, he was the Director of USC's JESPP project for JFCOM for a decade. As the Assistant Director of the Center for Advanced Computing Research at Caltech, he managed Synthetic Forces Express, bringing HPC to DoD simulations. Prior experience includes serving as a Director at the Maui High Performance Computing Center and as a Software Engineer at the Jet Propulsion Laboratory and Martin Marietta. He has served as the Chairman of the Coalition of Academic Supercomputing Centers and has taught at the undergraduate and graduate levels. As early as 1971, Dan was writing programs in FORTRAN on one of Seymour Cray's CDC 6500's. He saw duty in Vietnam as a USMC Cryptologist and retired as a Commander, Cryptologic Specialty, U.S.N.R. He received B.A. and J.D. degrees from the University of Colorado in Boulder.

Skandar Guizani is working at the University of Southern California in the Institute for Creative Technologies as a visiting researcher. He is studying Electrical Engineering and currently focuses his research efforts on hardware, infrastructure, and operations of long range secure communications systems. Skander is from Tunisia and is a foreign exchange student at the United States Military Academy at West Point, New York. Back in Tunisia, his father is a Colonel and commands a unit in that country. While at the Institute for Creative Technologies, Skander will be working with the MentorPal team to enhance the virtual human conversations for advising high school seniors. He anticipates receiving a degree in Electrical Engineering in the spring of 2022 from USMA, West Point.

Evan Jaksha is a Visiting Researcher at the Institute for Creative Technologies (ICT) at the University of Southern California. ICT is a University Affiliated Research Center for the Army Research Laboratory. He is highly interested in the effectiveness of interacting with virtual human interfaces. Evan has grown up in a military family in San Diego, with his father serving in the Navy and his three siblings serving the Army. While in San Diego, Evan had two articles related to Cyber Security published in the Coronado Times. He is scheduled to graduate in 2022 with a degree in Computer Science and a minor in Cyber Security from the United States Military Academy in West Point, New York.

Howard Spaulding is a retired Cryptologic Technician (Interpretive) Senior Chief Petty Officer and recently retired from Schneider National where his duties focused on training. His military service spanned three decades including 28 months in Viet Nam as a Marine Cryptologic Linguist. His Naval service included tours in the Philippines, Thailand and Japan. He also served as the Assistant Officer in Charge during the development of a highly technical project under the supervision of CNSG and SPAWAR and was instrumental in the interior design of the ES-3A Aircraft. He made two deployments aboard an Allied Naval vessel as the lone area/target expert. He has been at the forefront of career path decisions of other personnel in both the military and civilian sectors. He received a BA from California State University, Long Beach in 1983 while still on active duty.