

# COMBATXXI

COMBATXXI is a stochastic<sup>1</sup>, high-resolution simulation representing land and amphibious warfare from Soldier to brigade combat team. The simulation is a synergy of the physical model, context of the scenarios, and requisite performance and characteristic data to represent the systems. The basic unit of resolution is an individual Soldier or weapons system. Most vehicles may be portrayed as a monolithic entity<sup>2</sup> or further resolved into explicit portrayal of vehicle, crewmembers, and mounted passengers. COMBATXXI represents these individual entities and platforms along with appropriate representative systems from echelons above brigade (EAB) and Joint assets. COMBATXXI is a closed-form simulation – there is no human interaction with the simulation once it starts running. Since it is closed form (or constructive), sophisticated decision-making and behavior mechanisms must be in place before model execution.

COMBATXXI has the essential capabilities necessary to represent a combined arms military operation with the appropriate representation of Joint/EAB assets. Key functionality in COMBATXXI includes Joint/Army sensors, intelligence, HUMINT/ambiguity, ground maneuver, direct/indirect fire, mines and improvised explosive devices, air defense, ambush, dismounted operations, urban operations, amphibious operations, fixed/rotary wing, manned and unmanned assets, sustainment, maintenance, engineers, communications, and terrain effects. COMBATXXI uses validated, data-driven algorithms for fundamental models, such as sensing and attrition. TRAC uses certified performance data from the Army Material System Analysis Activity (AMSAA) as input to these models. Operational data (for example, tactics, techniques, and procedures (TTP)) that drive the combat actions/activities come from subject matter experts, such as the TRADOC Centers of Excellence and the TRADOC G2 Intelligence Support Activity (TRISA).

TRAC uses COMBATXXI as one of its analytic tools to enable informing decisions about concept development, acquisition, force design, force mix, and/or TTP development. COMBATXXI is not a predictive simulation; rather, it is a comparative analysis tool. It is executed through multiple replications to statistically bound the solution set. This simulation enables an analyst to understand how a specific capability or concept might contribute to a military operation relative to a baseline. TRAC conducts effectiveness analysis of military operations and as such TRAC's combat simulations focus on representing the effect of a capability rather than real-world representation (that is, modeling the physics of a missile in flight is not required to understand the effect a missile has in a combat operation). The effect, as the performance characteristics and the operational employment determine, provides the means for analysts to conduct comparative analysis.

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<sup>1</sup> Pertaining to a process, model, or variable whose outcome, result, or value depends on chance. Department of Defense (DOD) Modeling and Simulation (M&S) Glossary, 2011.

<sup>2</sup> Any component in a system that requires explicit representation in a model. Entities possess attributes denoting specific properties. DOD M&S Glossary, 2011.

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