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Optimizing UAS Mission Training Needs through Tradespace Analysis

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Author Note: Cadets Bearden, Scribbick, West, and Zapcic are seniors at the United States Military Academy. They will commission as Second Lieutenants in the United States Army in May 2017. MAJ Motupalli is an assistant professor in the Department of Systems Engineering and the advisor for this capstone project. The client for this project is the Unmanned Aircraft Systems Project Management Office (PM UAS) located in Huntsville, Alabama.

Abstract: The Gray Eagle unmanned aircraft systems (UAS) training program requires the reallocation of multiple fully operational UAS from the operational environment to facilitate training. The UAS Project Management Office (PM UAS) is concerned that this practice lacks efficiency. This study sought to: (1) conduct a comprehensive analysis for resource optimization with respect to achieving essential training tasks across multiple UAS, (2) conduct comprehensive cost-benefit analysis to assess the value of allocating a full-time and Gray Eagle platforms to accomplish training versus part-task trainers, and (3) define and quantify measures of performance and effectiveness. To achieve these objectives, this study implemented a tradespace analysis methodology to produce a discrete-event simulation model and a resource optimization tool. The impacts of this project will result in substantial cost savings per fiscal year, allow the client to forecast the resource needs of the organization effectively, and allow for the proper allocation of these resources.

Keywords: Unmanned Aircraft Systems, Training Resource Allocation, Optimization, Discrete-Event Simulation, Tradespace Analysis, Design of Experiments, Predictive Analytics