A tool for considering human behaviour within design trade-study constructive simulations: lessons learned from two case study applications

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Abstract

Constructive (i.e., all-digital) modelling and simulation tools used in design trade studies today rarely contain an explicit representation of crew behaviours. Consequently, simulation results tend to be insensitive to the operators' roles and can lead to erroneous conclusions regarding system effectiveness and survivability. To address this problem, the Air Force Research Laboratory's Combat Automation Requirements Testbed (CART) program is developing and demonstrating human performance modelling methods and tools that can be used to develop models of human behaviour that can be readily integrated with constructive simulation environments. Case Studies using complex mission simulations have been used to demonstrate the viability of the technology. These Case Studies verified the feasibility of the technology's capability to represent warfighter behaviour. Currently CART models are being applied in joint military simulation exercises to help improve the fidelity of operator representations within these complex multi-service, geographically-dispersed exercises. An overview of the CART program, the case studies, the way ahead, and some lessons learned are provided.

Introduction

Early in the process of acquiring new military systems, analysts construct digital representations of the envisioned mission environment in which the new system is intended to operate. Digital models are constructed of alternative, contemplated system concepts, and integrated with the constructive mission environment. Then these digital representations are employed in simulations conducted to evaluate the mission effectiveness of the alternate concepts considered. As design decisions are made and the concepts are evolved, these digital models are refined and used in constructive simulations supporting design trade studies in an iterative fashion – further defining system requirements and constraining design options. A major problem with this process is that -- while human performance is often a high-risk element of system operational effectiveness -- there is generally little emphasis on

In D. de Waard, K.A. Brookhuis, and C.M. Weikert (Eds.) (2004), *Human Factors in Design* (pp. 279 - 288). Maastricht, the Netherlands: Shaker Publishing.