A Systems Analysis to Improve Missile Stockpile Reliability with Internet of Things Technology

J.M. Comstock Jr., N. Ball, J. Cassalia, P. Kearney, and Z. Mancini

Department of Systems Engineering
United States Military Academy
West Point, NY, USA

Corresponding author's Email: james.comstock@usma.edu

Author Note: Major James Comstock is an Assistant Professor in the Department of Systems Engineering at the United States Military Academy who served as the faculty lead investigator. Second Lieutenant Nicholis Ball, Second Lieutenant Jordan Cassalia, Second Lieutenant Patrick Kearney, and Mr. Zachary Mancini conducted this research during the completion of their degrees at USMA. The authors give special thanks to Matthew Johnson at Lockheed Martin for his invaluable input.

Abstract: In an increasingly volatile world, amidst an era in which United States defense dollars must be used with ever greater efficiency, the maintenance of existing systems is paramount in order to sustain readiness and extend utility. This is especially true for surface-to-air missiles, which in many cases were designed initially at the end of the Cold War era. Incorporating Internet of Things (IoT) technology into missile stockpiles offers the potential to improve inventory reliability and system health monitoring. This research utilized the Systems Decision Process (Parnell/Driscoll) to investigate how Lockheed Martin and the Department of Defense could integrate IoT into existing missile stockpiles. Research focused first on problem definition, which resulted in a value model that identified the critical needs of a solution set and a means for scoring. The generation of robust alternative solutions followed. Feasibility screening yielded four feasible candidate solutions for examination. A decision analysis of the feasible solutions evaluated each for total value and a cost versus value comparison. The recommended solution includes built-in-test capability; sensors for pressure, leaks, vibration, shock, and electromagnetic interference; and costs approximately $2500 per unit.

Keywords: Internet of things, reliability, value modeling