Alternative Energy in Military Contexts: Defense Force-Simulations Evaluation Roles

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ABSTRACT

A major function of the simulation community is technology evaluation. The future holds many unknowns, not the least of which is the impacts from the adoption of sustainable energy and the abandonment of reliance on traditional fuels. These influences may flow in both directions: the impact of defense imperatives on energy policy and the impact of energy policies on defense capabilities. Some of these issues generate emotional and doctrinaire discussions that obfuscate rational approaches to optimal resolutions of competing interests. The I/ITSEC community has a unique set of skills, by virtue of its long-term provision of objective representations of defense matters, driven by the constant pressure of knowing that missions and lives are literally always at stake. To accomplish this, good experimental design and responsive simulation implementation is vital. This paper lays out the issues based on both the study and the experience of the authors, as well as an extensive literature review of the range of opinions and options. This is followed by a survey of the plethora of simulation implementations and the wide range of constraints and opportunities represented therein, especially those that are energy-dependent or energy-threatened. These matters are then considered in view of the needs of both of the "end users": warfighters and the government decision-makers. A number of experimental explicatory designs are then proffered, described, and analyzed with an eye toward their impact on the stake-holders in these issues. There is an extensive discussion on how these designs will optimally approach the issues in a way that would assure their unassailable validity in a quest that seeks unbiased insights. The goal set forth is to provide decision-makers an overview of the variety of approaches and the array of outcomes that may be in the offing. The paper concludes with a review of sustainable and defensible simulation alternative designs.

ABOUT THE AUTHORS

Mark C. Davis, Ph.D. is the Chief Technical Officer at Wood Duck Research, Inc, and is semi retired after careers in the US Navy and as a computer design engineer for both IBM and Lenovo. Rising to the level of Distinguished Engineer at Lenovo, he was responsible for the design of laptop computer cross-disciplinary technology, including PC architecture, embedded systems, open source and virtualization. Previous work was with IBM in the areas of software development and architecture involving security, storage and virtualization. Dr. Davis has been granted well over fifty patents that were filed during his service at both companies. He is a graduate of the Duke University NROTC program and was commissioned as an Ensign, attended nuclear power school, and served as a Submarine Officer for twelve years, including one duty tour as a classroom instructor. He left the active duty as a Lieutenant Commander to pursue a PhD. Mark holds a BSEE degree from Duke University and a PhD in Computer Science from the University of North Carolina, Chapel Hill, where his advisor was Professor Fredrick P. Books.

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