System of Systems Complexity Addressed by Practical Adiabatic Quantum Computing

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Systems of systems require more computing power than is currently available. Simulation of environments, weapons systems and individual platforms are required. Thus the Test and Evaluation community has a great need for improved computing capabilities.. Despite approaching the limits of transistor-based CPUs, there remains a general expectation of improved computational performance. Quantum Computing is advanced by many as the next major breakthrough that will satisfy those expectations. The authors report early results of more than three year's experience on an Adiabatic Quantum Annealer at the University of Southern California – Lockheed Martin Quantum Computing Center, located at USC's Information Sciences Institute (ISI). The paper first describes quantum annealing and the theoretical orders of magnitude improvements it may deliver. It then outlines the D-Wave installation at ISI. Using these data as foundations, the potential in the realm of DoD Test and Evaluation is discussed. They discuss a range of the test and evaluation problems that should be amenable to this new technology and forthrightly list a few areas that they believe will not benefit from Quantum Computing.

Key Words: System of Systems; Quantum Computing, Simulated Annealing; and Optimization.

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