THE UNDER SECRETARY OF DEFENSE
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WASHINGTON, DC 20301-3010

ACQUISITION,
TECHNOLOGY
AND LOGISTICS

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MEMORANDUM FOR CHAIRMAN, DEFENSE SCIENCE BOARD

SUBJECT: Terms of Reference – Defense Science Board 2015 Summer Study on Autonomy

The technology of autonomy is rapidly advancing and finding widespread private sector and public sector application. Relevant capabilities span the spectrum from autonomy, i.e. the brains, to autonomous systems (e.g. robots, drones, etc.) which integrate autonomy into physical systems. Applications include IBM's Watson, the use of robotics and automation in ports and mines, autonomous vehicles (from UAVs to Google's self-driving car), automated logistics and supply chain management, and many more.

The purpose of this study is to identify the science, engineering, and policy problems that must be solved to permit greater operational use of autonomy across all warfighting domains. The study will assess opportunities for DoD to enhance mission efficiency, shrink life-cycle costs, and reduce loss of life through the use of autonomy. Emphasis will be given to exploration of the bounds—both technological and social—that limit the use of autonomy across a wide range of military operations. The study will ask questions such as: What activities cannot today be performed autonomously? When is human intervention required? What limits the use of autonomy? How might we overcome those limits and expand the use of autonomy in the near term as well as over the next 2 decades?

Applications to be considered include decision aids, planning systems, logistics, surveillance, and war-fighting capabilities. The study will also identify cost-imposing opportunities such as the use of autonomy to spoof adversaries, creating confusion and consuming their resources; and will also consider potential threats stemming from the use of autonomy by adversaries.

The study will examine the international landscape, identifying key players (both commercial and government), relevant applications, and investment trends. Considerations will include "baked-in" security, scalability, and variable cooperation between autonomous algorithms/systems and humans.

The study will consider opportunities such as: the use of large numbers of simple, low-cost (i.e. "disposable") objects vs. small numbers of complex (multi-functional) objects; use of "downloadable" functionality (e.g. apps) to repurpose basic platforms; and an ability to vary the degree of autonomy vs. human supervision/control for specific missions rather than developing mission-specific platforms.

The study will deliver a plan that identifies the barriers to increased operational use of autonomy and ways to reduce or eliminate those barriers. The study report should include: recommendations to reduce or eliminate the barrier, an assessment of risks to successful

implementation of the recommendation, and an estimate of resources required to implement the recommendation.

I will sponsor the study. Dr. Ruth A. David and Dr. Paul D. Nielsen will serve as Co-chairmen of the study. Dr. Jonathan Bornstein, US Army Research Laboratory, will serve as Executive Secretary. Lt Col Michael Harvey, USAF, will serve as the DSB Secretariat Representative.

The study will operate in accordance with the provisions of P.L. 92-463, the "Federal Advisory Committee Act" and DoD Directive 5105.04, the DoD Federal Advisory Committee Management Program." It is not anticipated that this study will need to go into any "particular matters" within the meaning of title 18, United States Code, section 208, nor will it cause any member to be placed in the position of action as a procurement official.

Frank Kendall