

Naval Submarine Maintenance: An Examination of Areas of Potential Availability Execution Risk

by

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Abstract

In the growing ‘Great Power Competition’ of the 21st century, the US Navy has faced near-peer competition that it has not experienced in several decades. This competition has ultimately resulted in increased operational strains on the submarine fleet which have in turn trickled down to affect the nuclear submarine maintenance enterprise. Despite the recognition of that strain, problems continue to persist that are yielding significant ramifications on overall submarine fleet readiness. The urgency to consistently complete maintenance availabilities on time in order to provide combatant commanders with the submarine assets they need, when they need them, has become a primary concern of the fleet.

The goal of this thesis is to explore potential areas of execution risk within the submarine maintenance enterprise. It is clear that the US Navy possesses a strong incentive to better understand ways in which submarine availability durations can be minimized and execution risk can be better managed throughout the lifecycle of an asset. In support of that incentive, this thesis first looks to examine the current state of the submarine maintenance enterprise, including an understanding of the initiatives currently being undertaken to improve performance. Second, the thesis looks to analyze additional ways in which more efficient submarine maintenance processes can be realized, through the lens of a flexible hose case study involving a comprehensive lifecycle analysis and service life evaluation. In doing so, the thesis investigates supply chain composition, as well as the history flexible hose employment and service life policy by way of extensive literature review and stakeholder analysis. Additionally, flexible hose replacement data is quantitatively analyzed to ascertain expected service life and understand the cost savings and benefits that may be achieved by extending

flexible hose service life to achieve parity with non-nuclear surface ships.

The results of this thesis highlight the existence of a number of potential risk areas that can be extrapolated to the enterprise as a whole. Inadequate and incomplete maintenance data structures, sub-optimal maintenance scheduling policies, and lack of employment of innovative technology all threaten to exacerbate the ongoing issues exhibited by the enterprise. However, they also present an opportunity for the Navy to adopt new processes and improve the efficiency of submarine maintenance in the decades to come.

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