2016

Applying Systems Engineering and Architecting to the Application of Distributed Lethality to the Operational Navy Surface Forces

Paulo, Eugene; Beery, Paul

Monterey, California. Naval Postgraduate School

Applying Systems Engineering and Architecting to the Application of Distributed Lethality to the Operational Navy Surface Forces

Naval Postgraduate School

Project Summary

Distributed Lethality (DL) is a new concept that involves small groups of surface combatants to go on the offensive. This research defines the core requirements of DL and the capabilities that are necessary to meet these requirements. It builds an example mission flow for a DL scenario, and then defines the functions necessary to implement this flow. Finally, the model includes the components that perform the identified functions. The process for developing this systems architecture for operational DL is based on the Department of Defense Architecture Framework (DODAF). The process is dependent upon each element in the architecture being easily traceable to every other part of the model. The first step is to develop Requirements that are linked to Capabilities, which form the basis of Operational Activities that are implemented by Functions. Finally, Functions are allocated to the Components that perform them (see Figure 1).

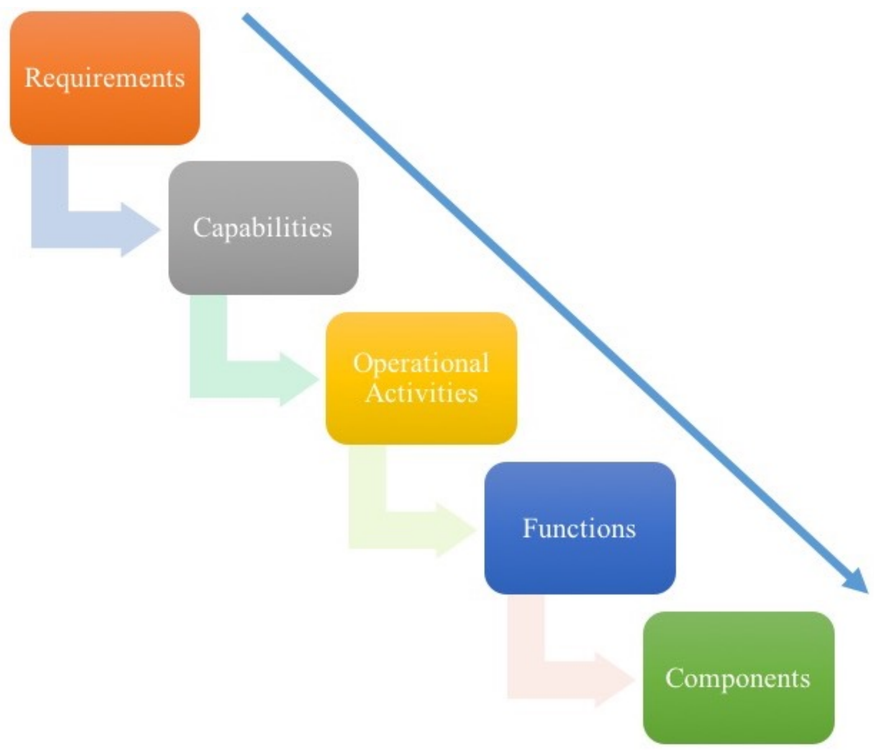

FIGURE 1. SYSTEMS ARCHITECTING APPROACH FOR DISTRIBUTED LETHALITY. ADAPTED FROM GIACHETTI (2015).

Study Focus

11 Requirements for operational DL were identified, including Localized Sea Control, Offensive in nature, and Rapid Adaptive Force Package Turnaround (see figure 2). These Requirements then implement the various DL Capabilities, including Amphibious Operations Support, Anti-Surface Warfare, and Strike Operations. From there, the entire model is built for one of the eight sub-Capabilities, Anti-Surface Warfare. This model includes the mission flow of the Capability, the Functions required to execute the mission flow, and the Components that execute the Functions. The end result is a clear path between the physical systems through the model all the way to the Requirements for which the physical systems are necessary.

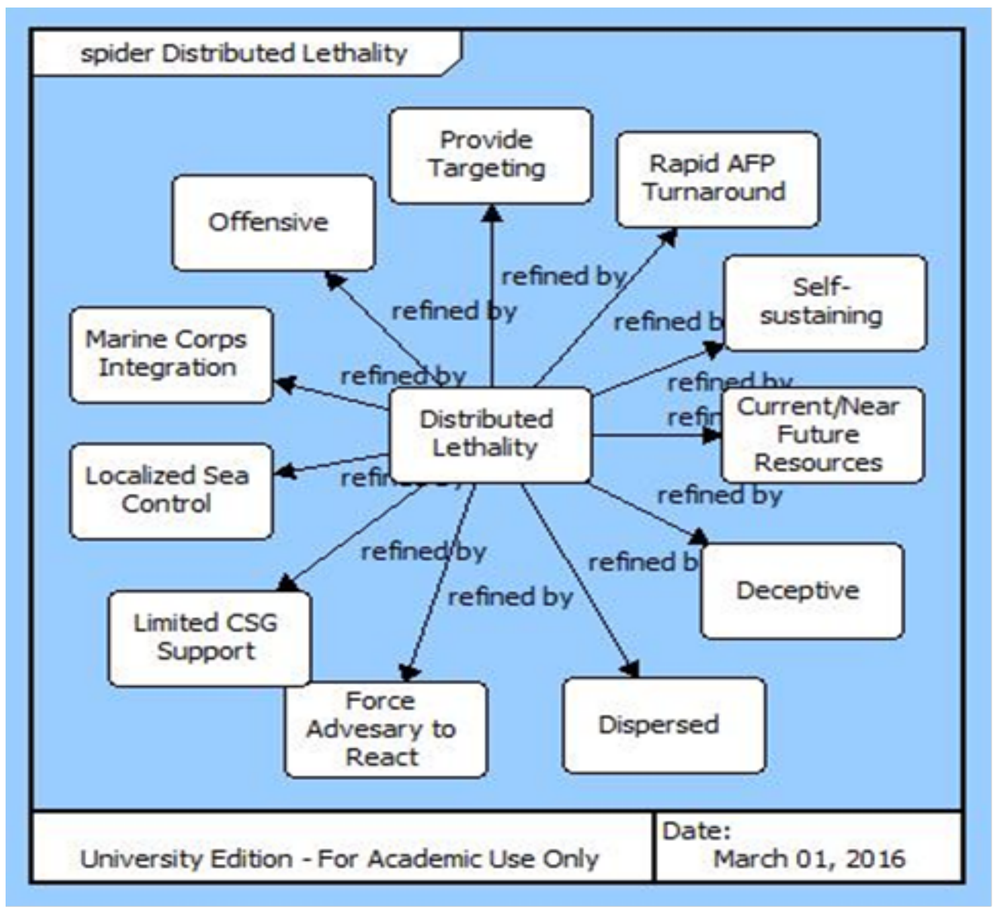

Figure 2. Distributed Lethality's Requirements

Future Work

Model Expansion: The architecture built for this research only fully develops a model for one of the eight sub-Capabilities. Each of the eight sub-Capabilities is essentially a mission area, and the architecture for each should include a detailed flow of Operational Activities, the Functions that implement the Operational Activities, and the Components that perform the Functions. If each of these models were fully built, then all of the Components could be compared for redundancies. Additionally, if each of the sub-Capabilities were fully built through the Components then the Components could be organized into the units that contain them.

Support to Simulations: The systems architecture of Distributed Lethality is useful on its own as a detailed description of the system and its internal interactions, but it could also be used to power simulations. A more detailed system is necessary to accurately model the complexities of a Distributed Lethality scenario. A systems such as Beery's methodology for employing architecture in system analysis (MEASA) could be useful in converting the CORE model of DL into a more usable simulation that could be used for more in depth analysis.

Researchers Names: Eugene Paulo, Paul Beery
NPS School: GSEAS
Topic Sponsor Organization:
OPNAV N952C

IREF ID Number: NPS-N16-N233-B
TITLE: Applying Systems Engineering and Architecting to the Application of Distributed Lethality to the Operational Navy Surface Forces