

April 14, 2021

How Does the DoD Acquisition Community Achieve a More Resilient and Competitive Supply Chain?

Enabling Mission and Systems Engineering Modeling Methods

The National Defense Strategy (NDS) acknowledges “an increasingly complex global security environment, characterized by overt challenges to the free and open international order and the re-emergence of long-term, strategic competition between nations.” The DoD’s enduring mission is to provide combat-credible military forces that deter war and protect the security of our nation and its interests. To address the scope and pace of our adversaries’ ambitions, the NDS recognizes the need for sustained, predictable budgets that enable adequate investment in the modernization of “key” capabilities.

- 1) How does the defense industry, or those wanting to do business with the DoD, implement best practices and strategies that demonstrate “key” capabilities and product availability, and rapidly meet acquisition demands?
- 2) How does the defense acquisition community communicate needed future capabilities early enough to enable more resilient and competitive suppliers when seeking alternate sources or developing proposed concepts and equipment?

The Office of the Deputy Assistant Secretary of Defense for Systems Engineering defines “Mission Engineering” (ME) as the “deliberate planning, analyzing, organizing, and integrating of current and emerging operational and system capabilities to achieve desired warfighting mission effects”.¹ This definition designates the “mission,” as Wasson describes, as the System of Interest (SoI), consisting of components or subsystems represented by systems with different capabilities.⁴ The acquisition process typically starts with an assessment of the equipment and resources needed to address an operational issue or the capabilities needed to address an emerging threat. This acquisition process is then informed through Mission Analysis from the Military Decision-Making Process (MDMP), where stakeholder needs, analysis, problem definition, and capability gap assessments are performed to identify specific and emerging capability requirements. Systems Engineering methodologies and Model-Based Systems Engineering (MBSE) methods can then be deployed to effectively develop and populate actionable data across the entire acquisition process.³

How can ME tools be used to enable a more robust and resilient supply chain for the DoD? Through the assessment of the “kill chain”, the needed capabilities associated with planned missions can be defined, modeled, and sanitized for engagement with industry.² If these needed and sanitized capabilities are shared with potential suppliers (in the current Defense Industrial Base (DIB) and in

adjacent industries), it will enable innovative tier 1, 2, or 3 companies to better align with these capabilities, and in some cases make internal investments in response to what would be perceived as future defense needs. If MBSE tools are effectively adopted in the ME process, efficient extraction of capability definitions that are understood by different supply tiers (e.g., 1-3) and disciplines can be performed. These disciplines include design and development, logistics, supply management, and manufacturing.

A digital thread that ties design, manufacturing, and logistics data to the mission model and aligns these processes to achieve the desired capabilities could more effectively realize the platform's specific acquisition objectives. The MBSE tools environment becomes the “glue” that bridges capability needs to optimal industrial investments through the model. This concept of early capability mapping through mission modeling, from an industrial perspective, is akin to what successful companies do to understand future “market demand” of their products or services. From the DoD perspective, an early defense market analysis using these tools will rapidly address industrial capability gaps identified by the kill chain analysis. As a result, current and potential multi-tier DoD suppliers are enabled to invest in future defense capability needs, which will build a more robust and resilient industrial base.

References

- ¹**Gold, R. A.** “Mission Engineering.” 19th Annual NDIA Systems Engineering Conference. 2016, Springfield.
- ²**Moreland, James D.** “Mission Engineering Integration and Interoperability (I&I).” *Naval Sea Systems Command*, www.navsea.navy.mil/Home/Warfare-Centers/NSWC-Dahlgren/Dahlgren-Resources/Leading-Edge/I-I-Leading-Edge/Moreland/.
- ³**Ng, Ean H, et al.** “Mission Engineering: Innovations in the Military Decision-Making Process.” American Society for Engineering Management International Annual Conference. 2017, Huntsville.
- ⁴**Wasson, Charles S.** *Systems Engineering Analysis, Design, and Development*. 2nd ed., John Wiley & Sons, Inc, 2016.