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BRIDGING THE GAP: OPERATIONAL UTILITY IN S&T TO IMPROVE TECHNOLOGY TRANSISTION

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ABSTRACT

Defense acquisition presents unique challenges to the Science and Technology (S&T) process. Due to the nature of the S&T environment, often the requirement for a particular capability is not explicitly driven by an identified operational need, but by a technology developed in the commercial market. Often these projects present a challenge in the operational domain for S&T programs. Their use would represent a significant change to the Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities and Policy (DOTMLPF-P). Work must be done to define the future operational environment and DOTMLPF-P considerations that would be in place at some point in the future when the technology could probably be fielded. This paper presents a methodology for developing a Concept of Operations (CONOPS) for emerging technologies at the System and Sub-system level.

INTRODUCTION

Defense acquisition presents unique challenges to the Science and Technology (S&T) when compared to a traditional acquisition program covered under the Defense Acquisition System (DAS). Due to the nature of the S&T environment, often the requirements for a particular capability is not explicitly driven by an identified operational need, but by a technology developed in the commercial market. While some S&T projects are driven by a bona-fide operational need, others are encouraged to exceed the traditional boundaries of risk to explore military suitability emerging from the commercial market. Still, other S&T projects desire to show utility of a low Technology Readiness Level (TRL) technology early in the development cycle in order to determine suitability to continue research or transition the technology to a program-of-record.

Often these projects present a challenge in the operational domain for S&T. In some cases, technologies represent paradigms shifts from current and future military operations`. Their use, if fielded, would represent a significant change to the Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities and Policy (DOTMLPF-P) framework currently in place. As such, applying the current operational environment and DOTMLPF-P framework to determine the end utility of a new technology project is not appropriate. Analysis must be done to define and describe impact to the future operational environment and DOTMLPF-P

considerations. This is particularly challenging in S&T where technology may be so new that a capability developer, normally responsible for assessing suitability, may not be available to integrate onto the project.

This paper presents a methodology for developing a Concept of Operations (CONOPS) for emerging technologies, particularly in S&T environments where the current environment may not appropriate or where the capability developer is not directly involved in the program at the system level. The methodology described within, demonstrates TARDEC's approach to the issue, and how the CONOPS are developed in conjunction with, and integrated into, the larger Systems Engineering effort. As the CONOPS definition improves, specific requirements and architecture components are constrained or derived from the intended application of the technology in the future operational environment.

Scope of the Problem

Science and Technology programs present a unique challenge because there might not be a readily distinguishable need within the operational force identified that the proposed technology would fill. Low Technology Readiness Level (TRL) technologies might not have a ready identifiable use due to the immaturity of the technology. Simply put, a new idea might not have a use for it, yet.

Technological innovation inherently creates new methods for solving both old and new problems, not just filling gaps in current operational doctrine. In itself, new technologies can change how the Army fights at the tactical, operational and strategic levels. These changes may not accounted for in current Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities and Policy (DOTMLPF-P) and therefore could drive changes in how the Army operates in order to fully utilize the new technology.

At the Science and Technology level in the Defense Acquisition System, full examination of the new technology does not typically warrant the expenditure of time and resources for a full examination of the impact and utilization of proposed technology. Instead, a system level Concept of the Operations (CONOP) will need to be developed. In order to maximize utilization of time, conserve resources, and standardize and constantly apply rigorous methodology to each proposal, the following methodology is proposed.

CONOP Methodology

The methodology for determining the operational concept is divided into three major components. The first component is analyzing the new technology. Specifically, determining what is the current and potential performance characteristics of the new technology. The second component is assessing how the Army currently fights and how it plans to fight in the future coupled with how the new technology will affects current and future DOTMLPF-P. The first part of is determining if the Army had tried previous integrating this or similar technology and why it was not successful before. The second part is identifying if the new technology will change how the Army fundamentally fights and if that is a desirable change. Finally, the last component will be to determine a proposed operational use for the new technology codified in a system and sub-system level operational concept through the creation of CONOPs, use cases, proposed DOTMLPF-P and virtual simulation.

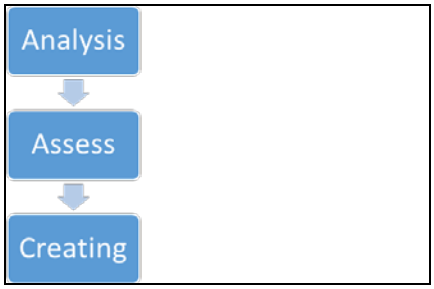

Figure 1 CONOP Methodology

CONOP Process

The process to produce a CONOP for a new technological concept is a five steps process. The first step is to understand the new concept so that a full accounting of the capabilities and limitations can be understood. Second, determining the capabilities and functions of the new technology so an operational construct can be developed. Next, a review of the current DOTMLPF-P review is conducted to determine current Army operational methods that relate or are impacted by the new technology. Fourth, determine how the new technology will or could potentially operate within current Army doctrine. If determined that the new technology would change DOTMLPF-P, then further analysis of the scoop of the change is conducted before final recommended changes are determined. Finally, a CONOP for the new technology is developed.

2 CONOP Process

Understanding the new technology is key to developing a complete operational picture of the new technology. This assists the combat developers to determine how the new technology will be used within the intended battlespace. Determination of what the new technology does and how the S&T Developer envisions how it should work are also assessed. Limitation of the new technology are explored in order to determine its functional constraints.

The second step is to determine operationally, what the new piece of technology offers the warfighter. This includes specific functions and tasks the new technology will perform. The operational construct begins to form at the system level. Operational boundaries and limitations are also defined, especially if designed to operate in a specific environment. Once a technical understanding is achieved, a thorough review of the operational use of the new technology can begin.

The third step is to conduct a review of the current DOTMPL-P to baseline current Army processes in the area the new technology will be inserted. The focus will on fully understanding current processes and begin to study how the new technologies fit within those processes. Also, determine how the new technology will fit on the current system and/or replace them. Finally begin to identify what parts of DOTMPL-P might need to change in order to maximize the use of the new technology. Once the new technology is understood and review of current Army practice to has been completed, melding the two into a coherent picture to create the Concept of the Operations is the fourth step.

Creation of the concept that will fuel the Concept of the Operations (CONOP) is the most critical step in the creation of the CONOP. The base idea revolves around creating the Operational View Point 1 (OV-1), High-Level Operational Concept Graphic, to drive more detailed operational and tactical concepts for utilization of the new technology. Upon development of the higher level operational concept, further development of subsystem operations can be performed. Subjects that must be addressed is operational purpose, integration, how it changes current operations, and logistical support. Step 5 is a straight forward documentation in report form of the new operational concept.

Conclusion

New and immature technologies open up the possible. Understanding and applying new technologies to current military operations will continue to challenge the Army in how best to apply them. A rigorous operational analysis and creation of a solid Concept of the Operations will help ensure that new technologies are identified and utilized appropriately.

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