MOVING ALONG

A Family of Medium Tactical Vehicles with shelters are loaded and chained to railcars at Fort McCoy, Wisconsin. The DPE teams ensure large systems can be secured to transportation assets and can deploy efficiently and safely. (Photo by Scott T. Sturkol, Fort McCoy Public Affairs Office)

BALANCING ACQUISITION RISK WITH DEPLOYABILITY REWARD

Challenges of maintaining deployability of systems with Middle Tier Acquisition.

by Wendy Long and Michael Bartosiak

Imagine you are assigned to be a program manager to field a new bulldozer for the Army. There are several commercial vendors that produce existing bulldozers that will meet the required performance criteria; therefore, a Middle Tier Acquisition (MTA) strategy is employed to develop and test the bulldozers in five years or less. After the performance testing is complete, the bulldozer that best meets the performance criteria is selected and low-rate initial production begins. Transportability testing was not assessed in the performance testing and is conducted as part of the production verification testing. The bulldozer is equipped with tiedown provisions—hard points used to chain the bulldozer down for transport when loaded on trailers, railcars, vessels and aircraft. During the pull testing of the tiedown provisions on the bulldozer, not only do the tiedown provisions deform, but the main chassis that the provisions are attached to also show evidence of deformation. This could render the bulldozer as not mission capable when deployed, assuming it doesn't break loose during transport to the theater of operation. Working with the vendor to fix the issue, it is estimated that the cost to fix the future production bulldozers—along with retrofitting the bulldozers that have already been manufactured—will result in receiving only 60% of the required bulldozers with a two-year fielding delay based on the current contract. Any program manager would want to avoid this hypothetical scenario.

The engineers and transportation specialists with the Deployability Engineering (DPE) branch of the Military Surface Deployment Distribution Command Transportation

Engineering Agency (SDDCTEA) have been working to avoid this scenario, and other ones like it, from becoming reality. The DPE branch is a small team that provides transportability engineering expertise to program offices and materiel developers throughout the development and testing of large and heavy systems. Transportability engineering is the process of identifying and measuring limiting constraints, characteristics and environments of transportation systems. The DPE team ensures any system that can be directly secured to various transportation assets can deploy efficiently and safely through the Defense Transportation System.

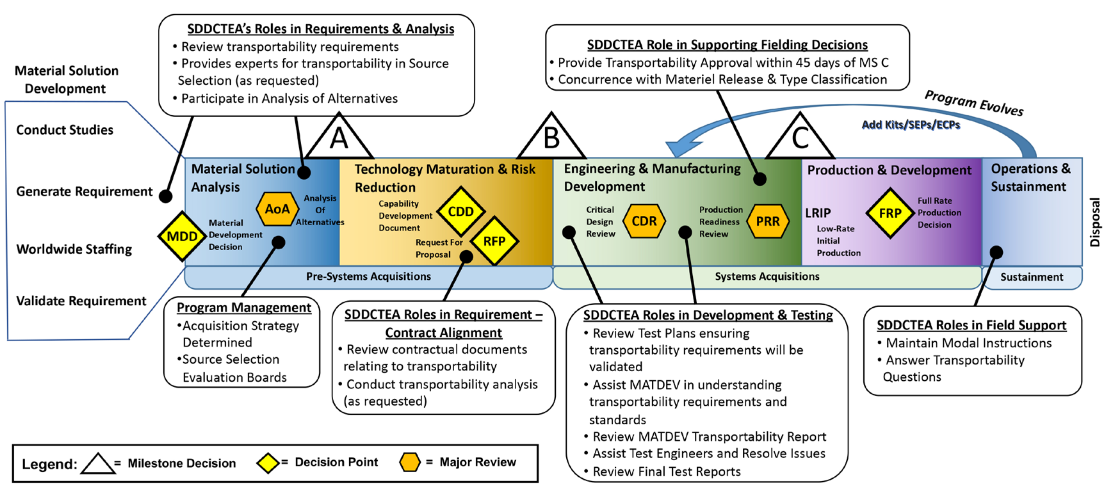
Wheeled or tracked systems, heavy systems or large systems that cannot be cargo inside 20-foot ISO containers are defined as transportability problem items (TPIs) in Military Standard (MIL-STD)-1366 E, "Interface Standard for Transportability Criteria." This standard defines the capabilities and limitations to move TPIs through the Defense Transportation System. Material developers rely on this standard to design systems that can be deployed in their required transport modes. Transportability engineering and the work of SDDCTEA enables a key component of the National Defense Strategy that requires the United States to deploy forces at the time and place of our choosing.

Army Regulation (AR) 70-47, "Engineering for Transportability Program," defines the role of transportability engineering in the acquisition and development of TPIs within the traditional acquisition strategy that is referred to as the Major Capability Acquisition (MCA) pathway. This regulation outlines how SDDCTEA, program managers and materiel developers work together to produce transportable designs. Figure 1 shows the various collaboration that occurs throughout every phase of the MCA acquisition life cycle. The most consequential of these interactions is the transportability approval that SDDCTEA generates after the completion of successful transportability testing, which is required by the program to enter a fielding decision (Milestone C). Because of this collaboration throughout the acquisition life cycle, programs using AR 70-47 and the MCA pathway have been able to avoid the unfortunate consequences illustrated by the previously referenced bulldozer example.

TRANSPORTABILITY AND DEPLOYABILITY CHALLENGE

With the need to increase competition and field mature systems quickly to keep up with fast-paced technological advances and the progress of our adversaries, the MTA strategy was developed and is defined in the Department of Defense Instruction 5000.80, "Operation of the Middle Tier of Acquisition." Figure 2 outlines how these programs interact with the MCA pathway. While the MTA pathway allows faster system development and fielding over the MCA pathway, the increased flexibility left the sequencing of transportability testing and

FIGURE 1

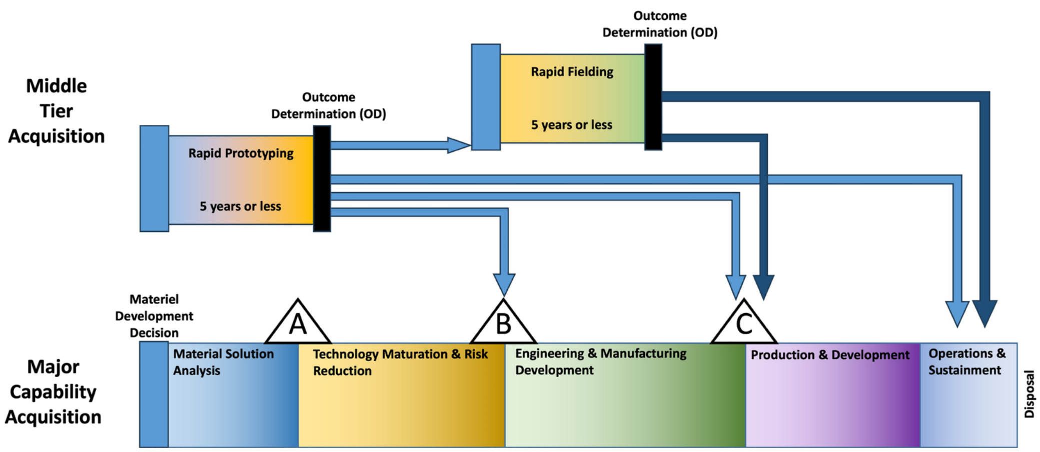


ENSURING TRANSPORTABLE DESIGN

Through the MCA pathway, SDDCTEA has input into the development of TPI requirements, review and support of development and testing and provides transportability guidance supporting deployments once in operation. (Graphic by Michael Bartosiak, SDDCTEA) analysis undefined. As a result, the DPE team revised AR 70-47 in March 2024 to clarify the role of transportability engineering, testing and transportability approval for transportability problem items using MTA. These revisions underscore the importance of incorporating transportability analysis and testing early in the acquisition process and not just at or after outcome determination. This early collaboration minimizes the risk that transportability related complications will occur during production and initial fielding, when system modifications can be particularly expensive and time consuming.

Now included in AR 70-47 for MTA programs, the materiel developer (vendor) transportability report and the planned testing are reviewed early in the acquisition execution phase. Using the bulldozer example, the transportability reports from each bulldozer vendor would be reviewed and commented on by the DPE team. A key part of transportability is the design and location of the tiedown provisions on the bulldozer which are defined in MIL-STD-209, "Interface Standard for Lifting and Tiedown Provisions." The DPE team at SDDCTEA can ensure the materiel developers understand the transportability

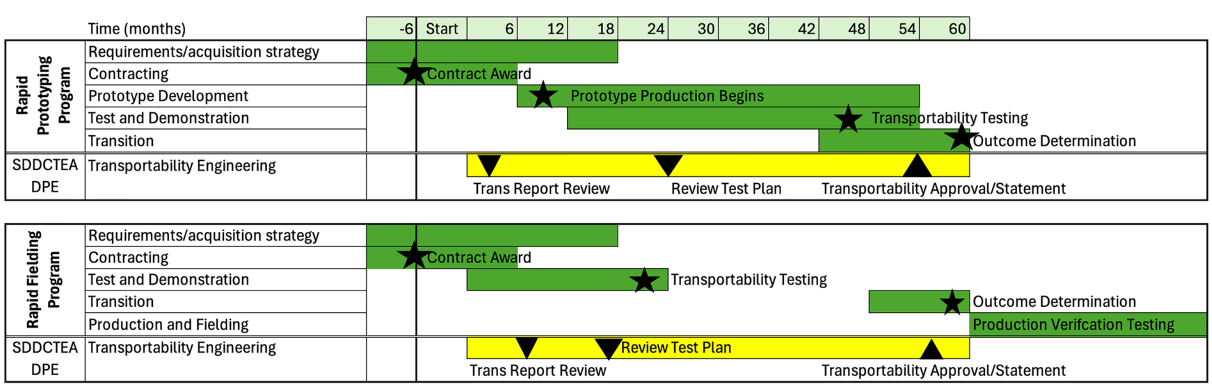
FIGURE 2



KEEPING THINGS MOVING

TPIs that are developed using the MTA strategy can enter back into the MCA pathway either at Milestone B, Milestone C or directly into Operations and Sustainment. (Graphic by Michael Bartosiak, SDDCTEA)

FIGURE 3



MITIGATING RISK

Updates to AR 70-47 can help mitigate transportability design risk. SDDCTEA reviews the materiel developer transportability reports and testing to provide decision-makers a transportability approval or statement to consider the transportability of the designs in the outcome determination decision. (Graphic by Wendy Long, SDDCTEA)

IN TRANSIT

A bulldozer is loaded inside of a C-17 Globemaster III in Afghanistan in support of Operation Resolute Support, Jan. 13, 2016. (Photo by Staff Sgt. Corey Hook, U.S. Air Forces Central)

requirements and military standards and ensure their securement tiedown plans are realistic. If not, changes to the design can be made prior to production or testing. Design changes this early in the development phase are less costly and there is little schedule risk to production.

It is common for commercial systems adapted for a military application to not have lift and tiedown provisions that are properly located and sufficiently strong to support multimodal military deployments. This means a bulldozer could be secured on a railcar, lashed down to a ship or secured inside an aircraft over many deployments over its lifetime. Multimodal deployments require the tiedown provisions on the bulldozer to be placed and sized so that different strength and number of chains can be applied at different angles depending on the transport mode. Commercial items are not usually designed with multimodal movements in mind. A commercial bulldozer typically will be equipped with tiedown provisions accommodating only highway movement on a lowboy trailer. The movement of a bulldozer on a railcar or secured inside an aircraft requires more chains to secure it for those transport modes. This is just one example of how designing for transportability for multiple transport modes is not always intuitive.

BALANCING AGILE ACQUISITION WITH TRANSPORTABILITY REQUIREMENTS

Another key addition into AR 70-47 is that SDDCTEA provides formal transportability engineering input into the MTA outcome determination. SDDCTEA accomplishes this by evaluating the system versus its transportability requirements based upon the materiel developer transportability report and the results of any transportability testing that occurred prior to the outcome determination. When multiple vendors develop systems or prototypes, SDDCTEA will issue a transportability statement or approval specific to each vendor's proposed solution to support the outcome determination. Before the recent changes in AR 70-47, the transportability of the designs was not formally considered at outcome determination. Informing the program office of the ability to

TPI RESOURCES

The DPE team provides transportability engineering expertise to program offices and materiel developers to aid in developing systems that meet their transportability and deployability requirements. SDDCTEA maintains a series of modal instructions for lift and tiedown of TPIs. These modal instructions are a field reference used at home stations, railheads and ports to help make deployments successful. They are available on our website at **https://www.sddc.army.mil/sites/TEA/Functions/Deployability/TransportabilityEngineering/Pages/default.aspx.**

meet the transportability requirements for each design is now conducted whether an MTA rapid prototyping or rapid fielding is used, as depicted in Figure 3.

If the testing conducted before the outcome determination is successful, covers all the validation required and is done on a system that is production representative, a full transportability approval could be achieved and issued by SDDCTEA. If all the transportability testing is not successful, does not cover all the requirements or the system design is still not final, SDDCTEA will issue a transportability statement for the outcome determination that will clearly communicate any transportability issues that need to be resolved in the final design before entering production.

CONCLUSION

The goal of the revised guidance in AR 70-47 is to decrease the chances of requiring design changes later in production. In the case of the Army bulldozer, if the failed pull test results were observed before outcome determination, SDDCTEA would generate a transportability statement that identified that as a serious issue. The program office would have this information and consider it before selecting a vendor design to continue into production after outcome determination. If that design was selected because it performed best overall, the program manager and the vendor would know before going into production that the design needs to change and might slow down or halt production until that issue is resolved. Alternatively, outcome determination could result in selecting a bulldozer that did not have problems with the tiedown provisions and avoid any redesign for transportability issues.

While it is necessary to invoke adaptive acquisition strategies like MTA to stay ahead of our adversaries, it does little good to develop a new military vehicle or weapon system quickly that cannot be transported and deployed as required. Incorporating design for transportability earlier into the process is critical for MTA programs to be successful for systems classified as TPIs. Changes to AR 70-47 help mitigate risks and ensure that systems are capable of rapid deployment and strategic mobility.

For more information about SDDCTEA services, email ***usarmy.scott.sddc.mbx.tea-dpe@mail.mil****.*

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