Solving Deployment Challenges Using a Systems Approach to Understand the Defense Transportation System

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As many biologists and organizational behavior experts have shown, events or problems rarely occur in isolation. Rather, successes or challenging setbacks transpire as interactive behaviors or patterns within systems and networks.[1] An understanding of how the components of systems interact is especially critical when considering how the Defense Transportation System (DTS) processes units for deployment. Because of the system's vast number of interdependent parts, solving common deployment readiness challenges depends on observing its components "from the balcony" as interrelated functions, versus attempting to evaluate individual issues as isolated phenomena while standing "on the dance floor." This type of investigation is sometimes called systems thinking. Researchers Melanie Minarik, Bill Thornton, and George Perreault, citing Peter M. Senge, suggest that systems thinking is suitable "when many complex issues surround a particular challenge, when there is a high dependence on the actions of many people, and when there is the potential for ineffective coordination among the people involved."[2] All these conditions apply to the DTS.

Therefore, this article examines the DTS from a systems perspective. The study identifies five common problems that hinder the readiness of Army units to deploy as well as five practical solutions that could improve the system's overall functioning: (1) ensure deployability of a unit's equipment by allowing the unit at least six weeks to prepare it; (2) ensure accurate property records by evaluating unit deployment data quarterly and by publishing orders to update organizational equipment lists (OELs) as soon as units receive notification of deployment; (3) ensure efficient and accurate use of information systems by making them user-friendly and fully integrated; (4) ensure a unit's movement priorities are accomplished by applying command emphasis and operations staff planning; and (5) ensure effective coordination among Military Surface Deployment and Distribution Command (SDDC) terminal brigades and battalions (i.e., ports of embarkation [POEs]), installation transportation offices (ITOs), and units by conducting meetings early and often.

Soldiers with 68th Combat Sustainment Support Battalion (CSSB), 4th Sustainment Brigade, 4th Infantry Division, provide fuel to vehicles from 3rd Armored Brigade Combat Team (ABCT), 4th Infantry Division on 2 December 2016 during rail load operations at Fort Carson, Colorado. The 68th CSSB provided logistical support to 3rd ABCT, loading its entire set of equipment onto trains to begin the movement of the brigade to Europe in support of Operation Atlantic Resolve. (Photo by Capt. Scott Walters, U.S. Army)

Structure of the Defense Transportation System

The DTS is the global transportation infrastructure, managed by U.S. Transportation Command. The structure consists of military and commercial resources such as aerial ports, automated information systems, highways, railways, and seaports. This infrastructure also includes essential customs, in-transit visibility, and traffic management services that enhance the Department of Defense's ability to project power around the world.

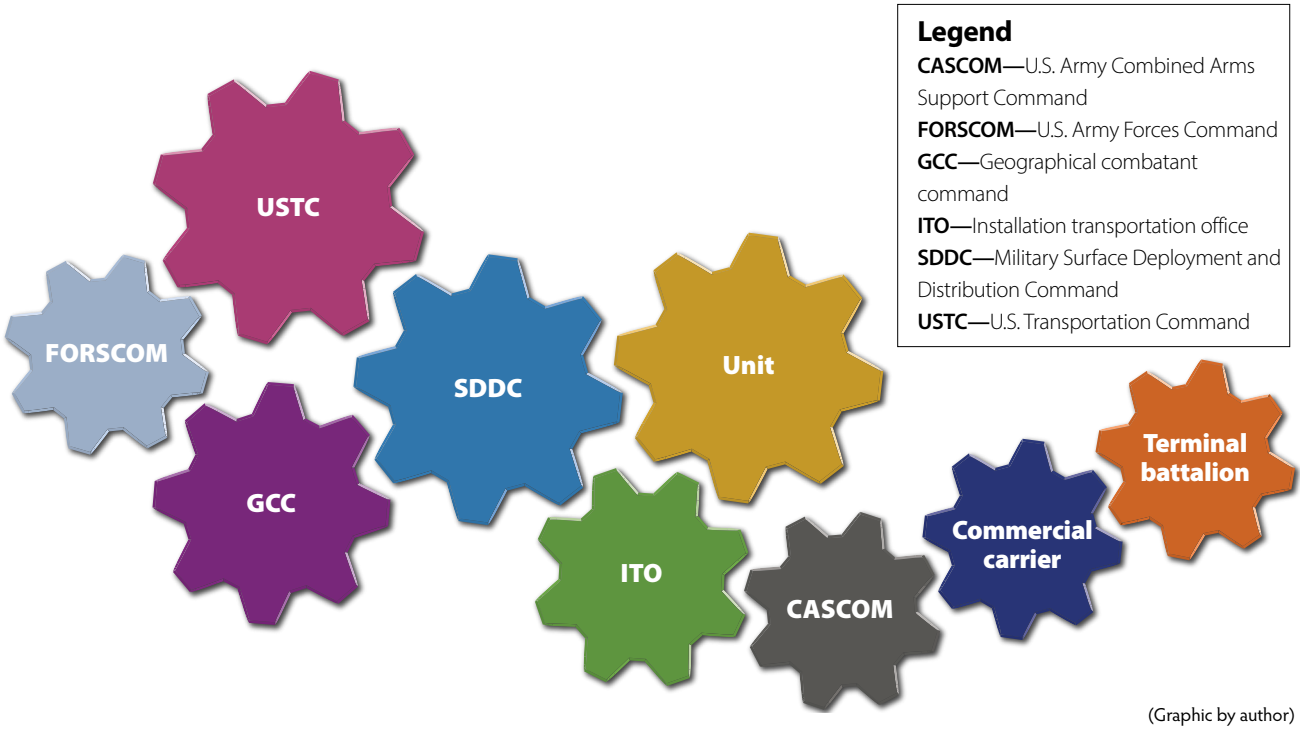
As illustrated by figure 1 (page 88), each organization interacting within the DTS is working as a gear in a synchronized effort to move maneuver forces from home station to their designated point of assembly. With that said, everything begins with a supported geographical combatant commander (GCC) generating requirements for forces. Once the capabilities are approved by the joint staff, U.S. Army Forces Command (FORSCOM), as the force provider, matches Army forces to the appropriate organizations. From this point, transportation requirements are analyzed and determined by U.S. Transportation Command based on the supported GCC's timelines and mission objectives. This article considers surface and maritime assets for its transportation feasibility analysis of the interconnected components of the DTS.

Once a GCC and the U.S. Transportation Command agree that a surface deployment meets operational requirements, the SDDC begins to identify organic (military) or commercial assets to support the operation. Afterward, FORSCOM pushes the transportation information (e.g., mode or timeline)

to the designated unit, simultaneously pushing the data to the servicing ITO.

The ITO is a critical component of this system. It is responsible for assisting units throughout the movement process while also serving as the linchpin between each unit and the servicing SDDC terminal transportation battalion. The Combined Arms Support Command is responsible for training unit movement officers (UMOs) throughout the Department of the Army.

unit is properly prepared for deployment. As illustrated in Army Techniques Publication (ATP) 3-35, *Army Deployment and Redeployment*, one essential aspect of deployment planning is possessing a working knowledge of the "total deployment process."[3] Not only is it important for members of DTS components to understand the overall deployment process, but also FORSCOM organizations must grasp the importance of defining units' mobility requirements and identifying critical milestones.



(Graphic by author)

Figure 1. Agency/Organization Interconnectedness Forming the Defense Transportation System

This overview of how the different agencies and organizations must function cooperatively with one another to deploy a unit shows the importance of taking a systems view for overcoming deployment challenges. The next section discusses five common challenges and offers recommendations for overcoming them.

Challenge Number 1: Needing Time for Equipment Readiness

The GCCs initiate the deployment process by defining requirements and determining when resources are required in theater, also known as a required delivery date. Once a required delivery date is established, FORSCOM is responsible for "backward planning" to ensure the

Unlike during Operations Enduring Freedom and Iraqi Freedom, when units deployed within the Army force generation cycle, now Army units must posture themselves to deploy in an expeditionary fashion with assigned equipment.[4] Therefore, FORSCOM planners must ensure units are given the appropriate time to achieve success. In the six to eight weeks before the assigned available-to-load date (ALD), units should be focusing on preparing their equipment to move from the fort to the port.

However, there is a growing trend of units who are about to deploy conducting major training events (e.g., Joint Readiness Training Center or National Training Center exercises, convoy live-fire exercises, and field

training exercises) with the same vehicles identified for deployment—in some instances, only one week before their ALD. The absence of ample time and space for units to prepare could lead to non-mission-capable equipment being towed onto transportation assets or shown on unit deployment lists (UDLs) without being validated promptly, which could in turn affect the Joint Operation Planning and Execution System validation process as well as the availability of adequate transportation assets.[5] As one can imagine, equipment being towed off a vessel does not enhance the GCC's strategic message of projecting combat power around the world.

To strengthen the GCC's messaging of showcasing force projection, units should cease using designated equipment approximately forty-five days or more before their ALD. To meet training requirements, senior commanders should task other organizations on the installation to loan deploying units the necessary equipment, if available.

Challenge Number 2: Needing Accurate Property Books and Organizational Equipment Lists in Advance

UDLs are necessary documents to validate transportation requirements. However, before the UDLs can be developed, units must ensure OELs are created in the Transportation Coordinator's Automated Information for Movements System II (TC-AIMS II). The Center for Army Lessons Learned Handbook 15-01, *Command Deployment Discipline Program* (*CDDP*), recommends that company-level commanders update their OEL semiannually or upon significant property book changes.[6] However, during one major deployment exercise, less than 50 percent of the subordinate organizations had created OELs in TC-AIMS II. This is a significant issue.

If units fail to reconcile their property book with their OEL on a quarterly or semiannual basis, inaccurate data probably will be transmitted to the Global Air Transportation Execution System (GATES), thus potentially impacting vessel allocation along with the overall buildup of combat power. For example, if a unit is issued mine-resistant ambush-protected vehicles in lieu of up-armored high-mobility multipurpose wheeled vehicles, and it fails to reconcile its property book and OEL, planning dimensions will not be updated in the system. This will cause the UDL to be built with inaccurate information since the two vehicles are drastically different in size. The SDDC may not acquire the appropriate amount of space to support the deployment, thereby possibly compelling equipment to be left on the pier awaiting a follow-on move. As a result of such errors, the unit's combat effectiveness will likely be hampered.

To mitigate such a planning failure, commanders above battalion level should evaluate their subordinate organizations' deployment data on a quarterly or semiannual basis, as recommended by the *CDDP*. Also, upon deployment notification, commanders should publish a warning order and an operation order requiring their formations to update OELs, which will lead to accurate UDLs.

Challenge Number 3: Needing Efficient Information Systems

As the battalion sergeant major and the authors of this article were conducting battlefield circulation within the 10th Mountain Division and Fort Drum area, a logical question arose as to why the TC-AIMS II rejected nonstandard or modified dimensions when creating or updating OELs. From the battalion sergeant major's perspective, this problem definitely presented second- and third-order effects, and we agreed. On the one hand, the Army directs unit commanders to build and maintain

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Sixty-eight soldiers from the New Jersey Army National Guard's 50th Infantry Brigade Combat Team load more than 170 tactical vehicles onto rail cars 2 May 2017 at Morrisville Yard in Morrisville, Pennsylvania. A total of 700 vehicles and trailers were headed to Fort Pickett, Virginia, for the Army National Guard's eXportable Combat Training Capability Exercise 17-01. (Photo by Master Sgt. Matt Hecht, U.S. Air National Guard)

OELs to sustain an expeditionary posture. However, the system does not retain accurate information, forcing UMOs to reinsert actual data at the time of deployment—in essence, when populating the UDL. This network interface issue causes delays and inefficiencies at the strategic level. This is a significant matter, especially given that maintaining accurate OEL is the initial step of deployment readiness.

After conducting some analysis, the 841st team identified that the real issue resided within the Computerized Movement Planning and Status System (COMPASS). In accordance with the *CDDP*, UMOs are directed to submit updated OELs through their chain of command to the ITO on a semiannual basis or when significant changes to the property book occur. Here lies the issue. When a unit modifies a piece of equipment and uploads the accurate dimensional data into TC-AIMS II, if the information is two percent greater than the standard characteristics found in Technical Bulletin 55-46-1, *Standard Characteristics for Transportability of Military Vehicles & Other Outsize/Overweight Equipment*, COMPASS will return an error message, although the data were accurate.[7]

However—it must be noted—this default function may be in place as a precautionary factor to prevent the input of incorrect information.

Some transporters may see this as an insignificant obstacle, but this can be a frustrating experience for UMOs, who are assigned this task as an additional duty and, in most cases, are not transporters by trade. Also, OELs may then contain inaccurate information as the UMOs cannot bypass the software programming. Therefore, during a real-world movement sequence or timeline, one must ask, "In a time of haste, what is the likelihood that a UMO will input accurate data when creating their UDL when the system has already rejected the information?" In the authors' opinion, the odds are moderate, at best.

In view of this, if data inconsistent with Technical Bulletin 55-46-1 are entered during the OEL development phase, the system should generate a message to verify the provided dimensions. It should allow an UMO to verify the data and then bypass the standard when appropriate. This would lead to more accurate records.

Demonstrating the importance of data accuracy, if a deploying unit (with the assistance of their servicing ITO) loaded 965 pieces of equipment into TC-AIMS II, it is likely that no more than 350 items would be viewable in GATES. The remaining 615 would be dropped from the system. Of the 350 pieces in this scenario, only 12 items would be valid in GATES and prepared to manifest, which is less than a 1.3 percent accuracy rate. Any time this issue arises, it is classified as a "sequencing problem" between the Integrated Booking System and GATES. Resolving this issue entails days of crosstalk at the battalion, brigade, and headquarter levels at SDDC.

Ultimately, this shortcoming is creating inefficiencies throughout the DTS. (The complex relationships and inconnectivity between DTS information systems are depicted in figure 2 on page 92.) With this in mind, U.S. Transportation Command and the SDDC should lead an effort, with participation of all essential stakeholders at the strategic, operational, and tactical levels, to create an end-to-end information system that ensures systems interface, booking capabilities, and in-transit visibility accessibility—all to enhance efficiencies throughout the deployment process.

Challenge Number 4: Needing Effective Operational Planning

Per Field Manual 6-0, *Commander and Staff Organization and Operations*, the staff element responsible for the movement-and-maneuver warfighting-function tasking, along with publishing orders and plans, is the operations staff officer (G-3 or S-3).[8] The deployment process is also considered as a major operation that requires the G-3 or S-3 to publish an operation plan or operation order. Instead, however, over several strategic deployments, we have noticed that operations sections at the division level and below are rarely involved in the deployment process. This means that when an operation order is published consisting of critical responsibilities, timelines, and milestones—which, in most cases, are not distributed—commanders and operations staffs are pushing all the movement responsibilities onto the brigade mobility officer (BMO).

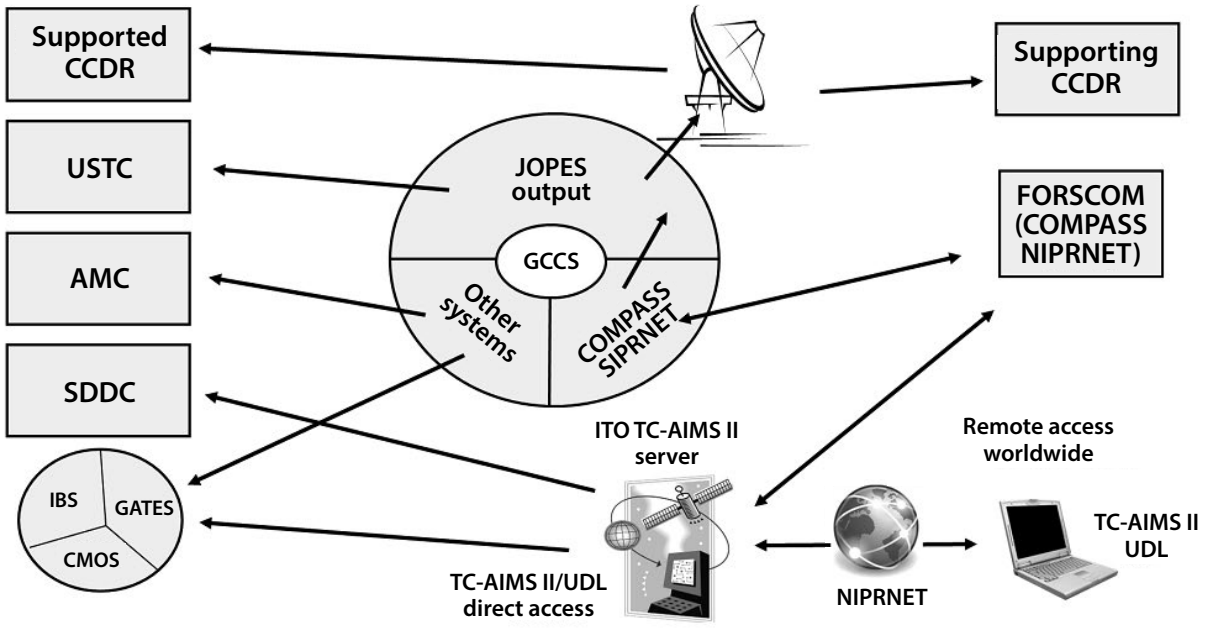
The first issue with pushing the majority of the functions onto the BMO is he or she has zero tasking authority, which means some unit commanders may place emphasis on other priorities, and they may order their UMOs to perform other tasks outside of preparing the unit for deployment. ATP 3-35 clearly highlights the need for command emphasis throughout the planning and preparation phases of the deployment process: "Without unit command involvement and emphasis … the [BMO and] UMO will not have the resources required to accomplish [their] tasks."[9]

Second, the BMO may not possess a firm appreciation for the link between the deployment and employment of forces. Because of this potential lack of expertise, the BMO may not properly prioritize equipment for shipment based on capability, especially if the equipment is required to remain on pier due to unforeseen circumstances. Moreover, the BMO may not monitor critical assets to facilitate the buildup of combat power. Having said this, one must ask, "Are we effectively mentoring these young BMOs as they are assigned to these key positions?" Schoolhouse training is not enough.

For an organization to operationalize the commander's intent, staff personnel must have a firm understanding of the linkage between deployment and employment. The process of transitioning ideas to reality mandates that operations staffs develop feasible plans and orders with the assistance and coordination of the BMO to ensure that the right capabilities are in the right location, at the right time, and in the right quantities. This operationalizing process also requires the assistance of external partners.

Challenge Number 5: Needing Effective Coordination among Terminal Brigades and Battalions, Installation Transportation Officers, and Units

The terminal brigades and battalions possess a unique skill set that has atrophied across the Army. Over a twelve-year span, operational units have deployed within an Army force generation rotational cycle, transitioning from the *train/ready* force pool through the *available* and *reset* force pools to repeat the procedures all over again. In this model, units deployed to a known location, with



Legend

AMC—Air Mobility Command
CCDR—Unified combatant commander
CMOS—Cargo Movement Operations System
COMPASS—Computerized Movement Planning and Status System
FORSCOM—U.S. Army Forces Command
GATES—Global Air Transportation Execution System
GCCS—Global Command and Control System
IBS—Integrated Booking System
ITO—Installation transportation officer
JOPES—Joint Operation Planning and Execution System
NIPRNET—Nonsecure Internet Protocol Router Network
SDDC—Military Surface Deployment and Distribution Command
SIPRNET—SECRET Internet Protocol Router Network
TC-AIMS II—Transportation Coordinator's Automated Information for Movement System II
UDL—Unit deployment lists
USTC—U.S. Transportation Command

(Graphic modified from Army Techniques Publication 3-35, *Army Deployment and Redeployment* [Washington, DC: U.S. Government Publishing Office, 23 March 2015], A-4)

Figure 2. The Interconnection between the Transportation Information Systems that Comprise the Automated Data Flow within the Defense Transportation System

theater provided equipment in place, replacing a similar unit; with theater provided equipment, there is little requirement for units to coordinate with terminal brigades and battalions except for containerized equipment. In contrast, as we return to expeditionary deployments, terminal brigades and battalions must assist deploying units with the efficient movement of organic assets from their home station to their designated assembly area.

UMOs are now capable of accessing TC-AIMS II from their unit area home station, which should improve the property book and OEL reconciliation process. If not appropriately managed, ITOs and units may experience a breakdown in communication and coordination because units are not forced to interact with their servicing ITO, as frequently happens. This could become a significant issue since the ITO is the linchpin between the unit and SDDC resources. This makes movement-and-support coordination ever more essential, especially early in the deployment process. However, there is a way to bridge any potential interaction gaps.

It is critical that SDDC terminal brigades and battalions (i.e., POEs) and ITOs engage with the deploying units early and often. This is particularly the case for the terminal battalions. If these organizations assist with identifying critical shortfalls at the fort versus the port, it is beneficial for all parties and throughout the DTS. Joint Publication 3-35,

Deployment and Redeployment Operations, calls such engagements "movement and support meetings."[10] The manual suggests, "at the tactical/unit level, identifying and resolving transportation shortfalls and/or limitations must ... occur early. ... Another key interface required during these support meetings is between the deploying units and the C2 [command and control] elements of the air and sea POEs."[11] These engagements are critical for successful deployments.

Although this is an unfunded requirement, the SDDC is postured to support the effort with the assistance of the Deployment Support Command. The Deployment Support Command is an Army Reserve organization aligned with SDDC. Therefore, in support of the SDDC Total Force Integration Strategy, Army Reserve deployment and distribution support teams are aligned to continental United States-based active-component terminal brigades and battalions to advise and assist units during the deployment process. These teams are ever more critical as ITO staffs are experiencing staffing deficiencies. In essence, these deployment and distribution support teams are augmenting ITOs at coordinated times during deployment preparation.

Summary

Having an appreciation for the interrelated parts of the deployment process reveals why deployment readiness challenges should not be evaluated as isolated phenomena. As with any system, if one component behaves differently or fails, this failure could have a cascading effect on the entire network. Components could also include current policies. To address deployment readiness issues, we must solve problems by taking a comprehensive look at how the parts of the DTS comprise the whole. Improvements in five critical areas could significantly improve the functioning of the whole: allowing units at least six weeks to prepare their equipment, updating unit deployment data quarterly and as soon as units receive notice to deploy, making information systems user-friendly and fully integrated, dedicating command emphasis and operations staff planning to movement priorities, and conducting early and frequent meetings among SDDC components, ITOs, and units. ■

Notes

1. Lee J. Sweetlove and Alisdair R. Fernie, "Regulation of Metabolic Networks: Understanding Metabolic Complexity in the Systems Biology Era," *New Phytologist* 168, no. 1 (October 2005): 9–24. The authors provide a discussion of metabolism as a whole system rather than divided into its mechanistic parts.

2. Melanie M. Minarik, Bill Thornton, and George Perreault, "Systems Thinking Can Improve Teacher Retention," *The Clearing House* 76, no. 5 (May-June 2003): 231. Minarik, Thornton, and Perreault cite Peter M. Senge, *The Fifth Discipline* (New York: Currency and Doubleday, 1990).

3. Army Techniques Publication (ATP) 3-35, *Army Deployment and Redeployment* (Washington, DC: U.S. Government Publishing Office [GPO], March 2015), 1-3.

4. During Operations Enduring Freedom and Iraqi Freedom, units were supplied with theater-provided equipment. However, to maintain an expeditionary posture today, units must prepare to deploy with organic equipment.

5. *User's Guide for JOPES (Joint Operation Planning and Execution System)* (Washington, DC: U.S. GPO, 1 May 1995), iii, 16–17. "JOPES is a combination of joint policies and procedures (guidance), and automated data processing (ADP) support used to plan and execute joint military operations."

6. Center for Army Lessons Learned (CALL) Handbook 15-01, *Command Deployment Discipline Program* (Fort Leavenworth, KS: CALL, December 2014), 12.

7. Army Technical Bulletin 55-46-1, *Standard Characteristics (Dimensions, Weight, and Cube) for Transportability of Military Vehicles and Other Outsize/Overweight Equipment (In TOE Line Item Number Sequence)* (Washington, DC: U.S. GPO, 1 February 2015).

8. Field Manual 6-0, *Commander and Staff Organization and Operations* (Washington, DC: U.S. GPO, 5 May 2014).

9. ATP 3-35, *Army Deployment and Redeployment*, 2-5.

10. Joint Publication 3-35, *Deployment and Redeployment Operations* (Washington, DC: U.S. GPO, 31 January 2013), B-B-5.

11. Ibid., IV-3.