RESEARCH SUMMARY

Assessment of Joint All Domain Command and Control Requirements and the Use of Live, Virtual, and Constructive Capabilities for Training

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ISSUE

As the anticipated character of warfare changes, new operational concepts emerge in response to new needs, and training must also adapt to support these concepts and ensure readiness. Given the speed at which concepts develop and the length of time it may take to adapt training after the fact, it is prudent to assess training capabilities and practices as concepts mature rather than after concepts have been fully operationalized. Joint All Domain Command and Control (JADC2) is emerging as the preeminent operational concept. It is intended to improve situational awareness, improve abilities to direct forces across domains and services, and facilitate rapid decisionmaking. Distributed sensors, shooters, and data from all domains are connected to joint forces, enabling the coordinated exercise of authority to integrate planning and synchronize convergence in time, space, and purpose. However, JADC2 is under development by all the services as well as the Joint Staff, and therefore, plans for its execution are not yet mature. It is a complex and networked concept, and training to support this concept will require preemptive consideration of supporting capabilities, especially when considering continuation training for air operation centers. Live, virtual, and constructive (LVC) simulations can help support the complex training JADC2 will require, but proper development and deployment will require aligning training processes, LVC capabilities, and JADC2 training needs.

APPROACH

Project AIR FORCE leveraged extensive interviews with subject-matter experts, a systematic series of discussions with air operations center (AOC) representatives, and a review of policy, research, and development literature. JADC2-relevant training needs, processes, and capabilities were assessed for the U.S. Air Force in general and for each AOC across the air, space, and cyber domains. Capabilities and training processes were mapped back to training requirements identified early in the study. Opportunities for leveraging LVC most effectively were identified and presented as a summary of how LVC can support JADC2.

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CONCLUSIONS

- JADC2 intent, capabilities, and supporting roles risk being unclear across echelons.
- Integration of multiple domains poses a cultural challenge.
- LVC-related capabilities can help support training for JADC2-related tasks at AOCs.
- Balancing centralized coordination with decentralized training needs will be critical
  - Centralized LVC resources may be key to executing the complex needs.
- AOCs support training exercises but are less involved as a primary training audience.
- Given the operational and technical complexity of JADC2, as well as its inherently joint nature, there is a risk of siloed capability development.

RECOMMENDATIONS

- The JADC2 cross-functional team (CFT) should lead the distribution of a well-coordinated portfolio of material concerning JADC2 goals, plans, and capabilities.
- In collaboration with AF/A3T, the 505th Combat Training Group should leverage initial qualification training as a mechanism for centralized coordination of command and control (C2) training.
- With oversight from AF/A3T, AOCs should focus on continuation training that involves the complete AOC staff and not just individual sections or units.
- The 505th Combat Training Group and each AOC should incorporate training scenarios that test cultural norms, preparing leadership for potential changes in the delegation of authority and contested C2.
- AF/A3T should consider opportunities to leverage LVC more extensively per the table below, which summarizes opportunities and frameworks for illustrating how LVC may be valuable.
- All aspects of training should involve increased focus on tasking processes and capabilities *across* domains.
- The JADC2 CFT and Joint Staff J7 should leverage developing and existing distributed training systems for JADC2.
- AF/A3T should work with combatant commands, combat support agencies, other services, and major commands to enhance AOC training with space and cyber effects.

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OPPORTUNITIES TO LEVERAGE LVC FOR SUPPORTING JADC2

Opportunities for Supporting JADC2	LVC Relevance
Potential changes in air tasking order (ATO) process	• This would be useful in most stages of the ATO cycle. • Reduce unnecessary white-carding[a] with ATO training. • Facilitate higher fidelity and more-complex in-house training at AOCs.
Potential changes in AOC structure	• Prepare for and enable distributed AOC structure, allowing integration of multiple C2 nodes. • Enable training for cloud-based AOC structure. • Allow integration with more-extensive simulation capabilities not available at all AOCs.
Increased use of distributed training exercises	• Enable increased accessibility and participation. • Reduce unnecessary white-carding, allowing more AOCs to garner training benefits from exercises rather than just support exercises.
Development of distributed training architectures	• Provide an integral and necessary keystone for distributed training. • Allow testing of existing and new distributed training federations and capabilities.
Development of a common information technology architecture	• Provide testing and training capabilities to include space and cyber systems. • Align the software acquisitions process for test, training, and AOC operational systems.

[a] In this context, *white-carding* refers to the practice of artificially introducing an event in a simulated exercise rather than having or using the ability to actually simulate that event.

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