Satellite imagery shows a large fire and a number of destroyed aerial assets on 15 March 2022 in Russian-occupied Kherson International Airport, Chornobaivka, Ukraine, following a Ukrainian attack. (Photo courtesy of Planet via Twitter)

# The Graveyard of Command Posts

## What Chornobaivka Should Teach Us about Command and Control in Large-Scale Combat Operations

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Kherson International Airport, Chornobaivka, Ukraine, is heavily damaged 7 December 2022 after Ukrainian forces destroyed diverse Russian targets there including a Russian command post. (Photo courtesy of the Ministry of Defense of Ukraine)
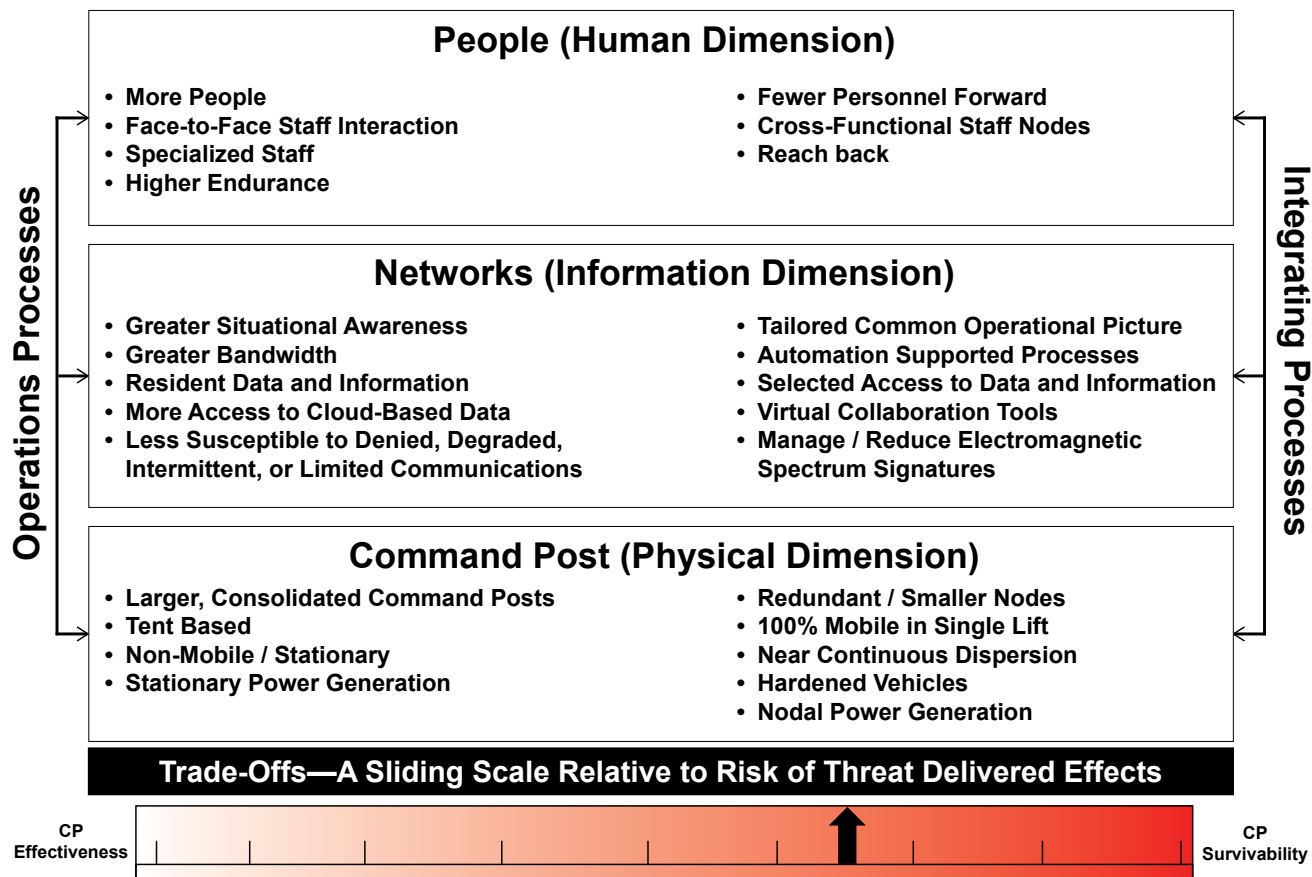
In Ukraine, the village of Chornobaivka is legendary.[1] Songs are written about it.[2] Throughout 2022, the small town and its airfield on the outskirts of Kherson were a meatgrinder for Russian forces. From its original occupation in February to its liberation in November, Ukrainian strikes rained down with a precision and lethality rarely seen in war and allowed a scrappy defender to take down a regional leviathan.[3] Patriotic enthusiasm aside, closer inspection of this hard-won victory reveals that lurking beneath the wreckage of Russian ambitions in the Kherson Oblast is a warning about the vulnerability of legacy command posts that the United States and its allies would do well to heed. The story of Chornobaivka is one of relentless assault on command and control characterized by a systematic attack on Russian command posts at scale and across all tactical echelons.[4] Over the span of eight months, the Ukrainian fires strike complex successfully attacked the headquarters of Russia's 8th Combined Arms Army, the 49th Combined Arms Army, the 22nd Army Corps, the 76th Guards Air Assault Division, the 247th Guards Air Assault Regiment, and their subordinate elements over twenty-two separate times.[5] These attacks significantly degraded the Russians' ability to plan and conduct coordinated operations on the western side of the Dnieper River. The loss of effective command and control sapped Russian momentum and prevented consolidation of gains, which ultimately led to their expulsion. In the process, Ukraine struck down high-level Russian leadership, killing Lt. Gen. Yakov Resantsev, commander of the 49th Combined Arms Army, and nearly killing Lt. Gen. Andrey Mordichev, commander of the 8th Combined Arms Army.[6] Beyond Kherson, this pattern has been similar if less concentrated. Ukrainian attacks on command posts across the country have led to stunning attrition among senior Russian military leaders.[7] This reflects a programmatic approach to striking at the capability and will of the Russian forces by removing their source of purpose, motivation, and direction. By any measure, the Ukrainians' success is impressive. More than 1,500 officers have been killed in Russia's war on Ukraine, including ten general officers and 152 colonels and lieutenant colonels.[8]

Some suggest the Russian experience at Chornobaivka and elsewhere can be explained by the Russians' inability to overcome challenges in professionalism, training, and communications, and a



Lt. Gen. Yakov Rezantsev, commander of the Russian 49th Army of the Southern Military District, is the highest-ranking Russian officer the Ukrainian military claims to have killed. Ukrainian officials assert he was killed 25 March 2022 as a result of a Ukrainian strike on his command post at the Chornobaivka airfield northwest of the city of Kherson. (Photo courtesy of pobeda26.ru/east2west news)

## People (Human Dimension)

- More People
- Face-to-Face Staff Interaction
- Specialized Staff
- Higher Endurance

- Fewer Personnel Forward
- Cross-Functional Staff Nodes
- Reach back

## Networks (Information Dimension)

- Greater Situational Awareness
- Greater Bandwidth
- Resident Data and Information
- More Access to Cloud-Based Data
- Less Susceptible to Denied, Degraded, Intermittent, or Limited Communications

- Tailored Common Operational Picture
- Automation Supported Processes
- Selected Access to Data and Information
- Virtual Collaboration Tools
- Manage / Reduce Electromagnetic Spectrum Signatures

## Command Post (Physical Dimension)

- Larger, Consolidated Command Posts
- Tent Based
- Non-Mobile / Stationary
- Stationary Power Generation

- Redundant / Smaller Nodes
- 100% Mobile in Single Lift
- Near Continuous Dispersion
- Hardened Vehicles
- Nodal Power Generation

**Operations Processes** — **Integrating Processes**

### Trade-Offs—A Sliding Scale Relative to Risk of Threat Delivered Effects

CP Effectiveness — CP Survivability

## Current Command Post Paradigm

This graphic represents the current necessary trade-offs between CP effectiveness and CP survivability, dependent on the threat level. Our current paradigm, and the associated command-and-control systems and infrastructure, necessitates a trade-off in a "fight tonight" scenario. However, implementation of the recommendations in this article will decrease the trade-off, resulting in redundant command post capability that retains both effectiveness and the agility and protection to ensure survivability. (Figure by the Mission Command Center of Excellence)

fundamentally different philosophical approach to command and control.[9] Pinning Russian woes solely on ineptitude, while true to some extent, downplays the effect Ukrainians are having in systematically dismantling their enemy's command-and-control system through multidomain targeting. Furthermore, the Ukrainians are achieving these effects without the benefit of a substantial air force or extensive long-range fires.[10] Limiting this problem to failures in Russian military leadership ignores the fact that technologies and capabilities exist today that can enable and deliver devasting effects on command and control. Potential adversaries, including China, have made attacking our command-and-control systems a stated objective.[11] Specifically, command posts are targeted because they have become easily targetable. Contemporary tented command posts—with their radio

frequency emitting antennas, dozens of generators and vehicles, and extensive support requirements—are easily targetable to even the untrained eye. During large-scale combat operations, these command posts can be easily seen by an ever-expanding array of sensors and just as easily struck by complementary effects throughout the depth and breadth of the battlefield. For anything as ostentatious as a modern command post, no true sanctuary exists.[12] While we may be quick to point fingers at the Russians, Western command posts have significant challenges with survivability. Even where efforts have been made to improve the mobility of command posts, our inability to hide the multispectral signatures of these massive structures coupled with persistent battlefield surveillance and precision weapons negates any benefit achieved and likely renders a second strike unnecessary.[13]

At higher echelons, this survivability problem is exacerbated. [14]

The battle for Chornobaivka brings into focus a theory of warfare, introduced during the Nagorno-Karabakh War of 2020, that lays bare the lethality and transparency of the modern battlefield through the concerted employment of multidomain effects on the command-and-control warfighting function.[15] It reveals an imperative to rethink command posts for this new era of warfare. In the face of this immediate threat, the U.S. Army must transform command and control to incorporate the tenets of multidomain operations (MDO) as it transitions to this new operating concept across all warfighting functions. To fight and win on the modern battlefield in large-scale combat operations, Army command posts can and must become more flexible, agile, and resilient while not sacrificing effectiveness. Otherwise, our command posts will be a place our leaders go to die.

An understanding of how our command posts must evolve begins with an appreciation for the role command posts play in our Army. Having defined their function and current form, it will then be possible to illustrate how that form is unfit for its purpose and at odds with the tenets of MDO. This will enable a discussion on a better approach to facilitating multidomain command and control, with near-term goals and an objective end state optimized for large-scale combat operations.

Army Techniques Publication 6-0.5, *Command Post Organization and Operations*, broadly defines a



A satellite image shows the electronic emissions signature of a brigade combat team (BCT) training at the National Training Center (NTC), Fort Irwin, California. The BCT is attacking southeast to northwest to seize several mountain passes (key terrain), while the opposing force (OPFOR) is conducting a reverse slope defense. The dispersed colored areas at the leading edge of the BCT and the greater intensity area to the lower left are the BCT reconnaissance units and lead maneuver battalions. The bright magenta-colored areas edged with yellow are various command posts and sustainment locations emitting highly conspicuous electromagnetic signatures. This image highlights the challenge of concealing modern-day command posts from detection and attack. The OPFOR at the NTC uses its electronic warfare systems to both generate images like this as training tools to show visiting units what their digital signatures look like from overhead sensors and also to target those units during the exercise using such imagery to simulate the actual threat posed by enemy detection and observation technologies on the modern-day battlefield. (Photo courtesy of Col. Scott Woodward, U.S. Army)

command post as "a unit headquarters where the commander and staff perform their activities" and states that "the commander alone exercises command within a CP [command post] or elsewhere."[16] This statement reinforces the purpose of a command post: to "assist commanders in the exercise of mission command."[17] For those unfamiliar with the term, "mission command" is a philosophical concept in the U.S. Army that represents



The current configuration of the Army tactical command posts poses a major battlefield vulnerability due to size and electronic signature. (Photo courtesy of the U.S. Army)

an approach to command and control that "empowers subordinate decision making and decentralized execution appropriate to the situation."[18] While not every nation or service views command and control the same, most view the purpose of the command post similarly, as a tool for enabling the commander's process for understanding, visualizing, describing, directing, leading, and assessing operations. Any suitable and acceptable form of command post must achieve these criteria.

## Wrong Tool for the Job of Commanders Today

At its core, the current command-and-control dilemma reflects an imbalance in the functional requirements for command posts to be both effective and survivable. Throughout history, as the complexity and scale of war has expanded, so too has the organization, composition, and proliferation of command posts. Commanders and their staffs have tailored these structures to provide the best means to control formations in the chaos of war, deliver good decisions faster than the enemy, and increase effectiveness by leveraging the experience and leadership of the commander. In the nineteenth century, industrial-level warfare bred industrial models for command posts as well as the accompanying bureaucracy to manage them.[19] In many ways, this approach persists even two hundred years later, as represented by the Napoleonic Staff Model, which remains the predominant organizational design.[20] In the early twentieth century, the rise of airpower greatly improved the effectiveness of armies but complicated control and created a need to synchronize a third domain that would be subsequently joined by two others in the twenty-first century. A commander's need for control and





**Top photo:** A close examination of this screen shot of the destroyed Russian army position 13 March 2022 reveals that the Russian command post configuration of vehicles and structures in the early stages of the invasion closely resemble most current U.S. command post configurations. (Photo courtesy of the Ukrainian Armed Forces)

**Bottom photo:** A recent overhead image of a command post taken by a UAV at the National Training Center, Fort Irwin, California, during a training exercise. Vehicles and tentage concentrated in a single location to maintain command and control over maneuvering units is a predictable pattern among many militaries today that is increasingly becoming a battlefield vulnerability due to modern detection and observation technologies that enable rapid targeting of such concentrations. (Photo courtesy of Col. Scott Woodward, U.S. Army)

knowledge across all these areas created a demand for human and technical decision-support tools. While this initially manifested in the form of an ever-expanding

Members of the 1st Battalion, 12th Infantry Regiment, 2nd Infantry Brigade Combat Team, 4th Infantry Division, work inside their mobile tactical operations center at the Joint Readiness Training Center, Fort Polk, Louisiana. (Photo courtesy of the U.S. Army)

functionally dedicated staff, today it also appears in the form of computer servers and the digital applications required for processing and discerning meaning from the sea of data in which our operations are now awash.[21] This insatiable demand for decision-quality information to enable understanding and commander visualization has only increased over time. In the current form, these tools and staff weigh on the agility of the command-and-control system and increase its vulnerability by orders of magnitude.

To increase survivability, commanders sought to protect their command posts by reducing their size, hardening them, splitting them up, camouflaging them, increasing their mobility, and actively defending them against all manner of threats including air, cyber, and electronic attack.[22] Advancing technology has been on both sides of this dilemma. It has provided communications, automation, and information technology to compress the structure of command posts and make them more productive. However, technology also created a gateway into further functionality and capability that added size and structure counterproductive to survivability. Generally, this ebb and flow of effectiveness and survivability has been incremental, with actions and reactions reflected in doctrine, material, and design more evolutionary than revolutionary.

Sometimes, evolution includes mutations that, if left unchecked, can metastasize into a vulnerability that requires a revolution to correct. Such is the case with U.S. command posts over the last twenty years, which have been rendered unfit for their purpose given the speed, complexity, and lethality of large-scale combat operations. Since 2001, the absence of an observable and aggressive threat allowed our command posts to gradually mutate during the Global War on Terrorism. Over the succeeding thirteen years following the invasion of Afghanistan, command posts progressively diverged further and further from a suitable model for large-scale combat operations. At the same time, their organization and systems allowed commanders to have unprecedented levels of control and situational awareness.[23] At times, this threatened the Army's very leadership philosophy of mission command by enabling micromanagement by

Soldiers demonstrate the Command Post Computing Environment prototype at Aberdeen Proving Ground in May 2017. (Photo by Dan Lafontaine, U.S. Army)

command posts that were overpeopled, overprocessed, overnetworked, and understressed.[24] Within the U.S. Army, one of the main reasons this gap expanded is because our entire doctrine, organization, training, materiel, leadership, personnel, and facilities (DOTMLPF) enterprise was oriented on lower tactical echelons to provide the forces and capabilities required for counterinsurgency operations. As an example, within the U.S. Army's training program, the combat training centers evaluated the command posts of brigade combat teams for nearly two decades using a rubric that promoted a comprehensive and process-driven approach to targeting that previously existed only at the division level or above. This incentivized commanders to develop ponderous infrastructure to support capabilities for integrating complex operations without adequately punishing them for the resulting loss of flexibility, agility, and survivability.[25] Those combat training center "lessons," appropriate though they were for that time and mission, inculcated an entire generation of leaders with a sense of invulnerability inconsistent with highly dynamic, mobile, and lethal warfare against a capable enemy. The United States was not the only nation to adopt this approach; our NATO allies who dutifully participated in counterterrorism and counterinsurgency operations around the world followed suit.[26] Even our adversaries, hoping to replicate successes in Operation Iraqi Freedom and concerned with their own expeditionary regional entanglements, expanded the sizes of their headquarters at tactical echelons.[27] Ironically, commander's experience, knowledge, and intuition today are backstopped by an unprecedented system of functional experts and technical tools that significantly reduces their decision risk but exponentially increases risk to mission and their personal safety. While there is not space here to fully examine all the implications of this period for command and control, each component of DOTMLPF must be evaluated independently to assess our experience since 2001 and its effect on the command-and-control system and our command posts. Today, our command posts have mutated away from the lean, mean, killing machines we need and are instead fat and ponderous.

## Putting the Right Tool in the Hands of Commanders

Change is coming. The release of the U.S. Army's capstone doctrine, Field Manual 3-0, *Operations*, in October 2022 codifies a significant departure for all warfighting functions from legacy foundations and seeks to drive the Army to sustained dominance of the land domain (while operating in multiple domains) in the twenty-first century.[28] Recognizing the challenges of the current

environment, MDO emphasize that command posts, as an element of the command-and-control system, must adhere to the tenets of *agility, convergence, endurance,* and *depth*. To optimize our command posts, we must reduce our reliance on the physical dimension (the materiel), increase our utilization of the information dimension (the data), and maximize our relationship with the human dimension (our leaders). These three mandates provide the framework for a new rubric to assess and evaluate command posts across the Army's training programs. To develop a new foundation for command and control,

those processes. If we envision our command posts as less of a place or a thing and more as a service, it may be possible to vastly increase our agility. What happens if a corps, division, or brigade commander arrives, takes control of any command post, and receives the capability of the appropriate echelon with a push of a button? What if command posts at higher tactical echelons were truly fungible based on connectivity and accessibility of data? What if, instead of tents and dozens of vehicles and generators, the command post capability could be delivered in a footprint the size of a personal security

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examining each of the tenets of MDO will help distinguish what truly constitutes an acceptable, suitable, and complete command post design; one that is both effective and survivable in large-scale combat operations against a capable enemy.

**Agility.** By the Army's definition of *agility*, "the ability to move forces and adjust their dispositions and activities more rapidly than the enemy," our current command posts are not providing us with any demonstrable advantage.[29] Agility denotes speed and the nimbleness to change quickly. At present, our command posts are locked in an endless cycle of the work required to establish, disestablish, displace, and emplace to remain survivable and keep pace with operations. This alone disrupts operational tempo and degrades decision advantage even without enemy interference. Increasing mobility by divesting tentage and transitioning to vehicle mounted systems will help but not eliminate this problem. Increasing mobility will not change the fact that when our command posts arrive at their new location, they will not be more than what they were before. For example, a brigade command post cannot rapidly become a division command post, even though a brigade command post may have to assume those roles and functions with less capability if the division command post is destroyed. If we organize our command posts around what is truly important, the commander's processes, then we can be indifferent about what provides

detachment (three to four vehicles)?[30] This approach to achieving the tenant of agility could be a game changer and enhance the commander's advantages in a hyperactive environment. The agile employment of joint and Army capabilities sets conditions for convergence.

**Convergence.** Newly introduced in Field Manual 3-0, the tenet of *convergence* is "an outcome created by the concerted employment of capabilities from multiple domains and echelons against combinations of decisive points in any domain to create effects against a system,

## Corps C2 Vignette

These capabilities enable a scenario where a corps commander, dislocated from the corps command post but collocated with a subordinate brigade commander on the battlefield, is contacted by his staff on a tactical radio to request an unanticipated high-risk and time-sensitive decision. The corps commander immediately accesses the brigade command post capability, and uses a pull-down menu on a common operational picture application enabled by the cloud and mesh network that gives immediate access to the visualization and decision support tools the commander needs to make the decision.

An M1087 Expandable Van Shelter houses the Command Post Integrated Infrastructure System under operational test by the 2nd Infantry Division's 2nd Stryker Brigade Combat Team at Joint Base Lewis-McChord, Washington. (Photo by Sgt. 1st Class Frederick E. Estep, U.S. Army Operational Test Command)

formation, decision maker or in a specific geographic area."[31] In part, convergence is achieved through combined joint all-domain command and control and therefore must be a driving factor in the composition of future command posts. Convergence reminds us that, far from giving up capability at echelon to simplify our activities, any acceptable command post design must be able to achieve even greater effectiveness through more robust integration and interoperability. Command posts that connect sensors, shooters, and decision-makers enabled by machine learning and artificial intelligence will transform the legacy kill chain into a kill web to create "exploitable opportunities that enable freedom of action and mission accomplishment."[32] This mandate for data integration positions decision-quality data that enables commander's processes (e.g., understanding, visualization) at the heart of the modern command post. To retain agility and enable the constant flow of the right data to the right leaders, command posts can no longer rely on legacy stove-piped systems, on-site servers, and the accompanying support mechanisms as the primary means to support decision-making. Instead, we must migrate to the cloud and leverage data mesh and data fabric concepts to ensure data is secure, organized, and

available in a manner that is usable for commanders and their staffs. For those unfamiliar, data mesh and data fabrics are complementary approaches to data management that enable connectivity and accessibility. A data mesh is a decentralized data architecture that federates data production, management, and sharing within and among domains.[33] A data fabric is a domain within the data mesh that automates data integration and enables connectivity and access to find, create, and widely share data products across the breadth and depth of the battlespace, including with joint, allied, and partner forces. These data management concepts within the civil sector enable endurance and agility of our command posts, reducing reliance on single platforms or repositories that have the potential to be trapped and isolated as a result displacing command posts or the effects of enemy actions. Here we begin to see the shift away from the physical dimension and toward the informational, which requires significantly different approaches and skill sets to facilitate operations.

In data-centric command posts, commanders may rely on data development, security, and operations engineers who could expedite the secure development and integration of new applications on operational timelines and forward at the point of need.[34] These data professionals will replace the legacy employment of the operations sergeants responsible for configuring and organizing the network-centric command posts we have today. This would essentially provide commanders with the flexibility to fine tune their command-and-control system based on unique mission requirements and leader preferences. To remain survivable, we must also divest command posts of the physical collocation of anything delivered "as a service" (aaS). This includes communications (CaaS), radios (Raas), and especially, knowledge (KaaS). For those unfamiliar with the as-a-service model, aaS is a disruptive business approach that outsources the burden of ownership-based sustainment that requires the functional expertise and infrastructure

to operate and maintain. Those past practices reinforce dependencies on legacy systems and skill sets, which stagnates innovation.[35] The aaS approach enables rapid adoption of emerging technology and mobility, and it opens the door to competition among providers, which ensures our soldiers have the very best capability available. Consider, for example, the unique and creative ways Ukraine is using Starlink's capabilities without owning the satellites and the associated skill sets and support infrastructure. However, decreasing commanders' reliance on the physical dimension in favor of the information dimension will increase survivability by reducing the overall command post signature and the need to aggregate staffs in a single location. To achieve the full potential of convergence, command posts will need to adapt to such an extent that they will be unrecognizable to the generation of leaders that fought in Iraq and Afghanistan.

**Endurance.** *Endurance*, defined as "the ability to persevere over time throughout the depth of an operational environment," is the next critical tenet of MDO.[36] While more capable and agile command posts provide apparent benefits toward endurance, preserving that command-and-control capability over time will occur in the harshest and most-lethal conditions imaginable. Command posts must demonstrate resilience and persistence in temporary isolation and under austere conditions. This also implies that even highly mobile command posts must be protected in a way that our current expandable vans and tentage are not. They must be armored, and we must develop solutions that deliver scalable capability to units where hardening command posts will be difficult, including our airborne and light expeditionary forces. To this end, we should pursue command post capabilities that are multimodal, with vehicle-mounted capability that can be quickly and easily dismounted to occupy hardened structures and blend into dense urban terrain. Command posts must also be capable of masking their signature to complicate an adversary's targeting by concealing their visual, thermal, electronic, acoustic, and soon, their quantum signatures.[37] Ultimately, if we can reduce the size and structure of command posts at all echelons to a few tactical armored vehicles, the extraordinary signature of our high-tactical and operational command posts will fade into the normalized electromagnetic spectrum and background clutter of a battlefield where armored vehicles are ubiquitous. In this way, we may deny the enemy the ability to discern priority and high-value targets, a valuable skill in an environment that may be characterized at times by a shortage of precision munitions. This approach reinforces the Sun Tzu dictum that "all warfare is based on deception" and applies it to our command



The 4th Infantry Division completes set up of a new division tactical operations center in December 2021 at a Fort Carson, Colorado, training area during the Command Post Infrastructure Integration (CPI2) test. The design of CPI2 enables a division headquarters to be scalable, modular, and agile while reducing the physical area required of tactical operations. (Photo by Maj. Monty Blamires, U.S. Army)

The Department of Defense has selected a mobile power program from Army Futures Command to increase the speed at which on-the-move power capabilities are delivered to the battlefield. (Photo by Dan Lafontaine, U.S. Army Combat Capabilities Development Command, C5ISR Center Public Affairs)

effects across all three dimensions, human, physical and informational, and throughout the entirety of the operational framework while simultaneously protecting its own combat power. These complementary efforts allow friendly forces to apply combat power against enemy capabilities to achieve advantages in time and space. The results can also disrupt the cognitive depth of an enemy, by interrupting or extending their decision cycle, further generating advantageous conditions for a friendly commander. The combined effects across the temporal, spatial and cognitive aspects of depth extend the operational reach of friendly forces.

## The Human Dimension

War, now and in the future, is and will remain a human endeavor. The fact that command posts exist at all speaks to the limits of the commander's unaided human capacity for understanding and decision-making as well as the need to amplify the effectiveness of their leadership beyond their physical reach. Thus, the importance of the human dimension and psychology in command and control during large-scale combat operations cannot be overstated. In examining the value of any current or future command post model, the proximity of leaders matters—more so when employing the U.S. Army's command-and-control philosophy, mission command, which places such a great emphasis on trust, shared understanding, intent, and subordinates' initiative.[40] During large-scale combat operations, commanders must have the ability to be physically present to provide leadership but also to quickly move to where they are needed to gain understanding. From a morale and motivational standpoint, leaders, especially in the land domain, must be seen to share the hardships and danger of those they lead. The trust and cohesion necessary for mission command is derived from a commander's personal stake and involvement in the conduct of operations. Currently, this occurs in a physical sense through "battlefield circulation" and presence at unit locations, which is both time consuming and potentially high risk. Alternatively, a commander can virtually bridge the proximity challenge through voice communications,

posts, thereby setting the tone we hope is reflected in the operations they direct.[38] We must also not forget that survivability, whether physical, informational, or human, is just one aspect of endurance. Endurance also has a sustainment aspect, which implies that whatever command-and-control system is fielded, it must be capable of operations for an indefinite period. In the past, this may have implied a mountain of logistics and personnel to support work-rest-maintenance cycles. In the future, this problem may be overcome by simply transferring mission command to any one of many distributed command-and-control nodes within a constellation of distributed nodes in much the same way industry manages global workflows.

**Depth.** Finally, in assessing future command posts against the remaining operational tenet, *depth*, we can measure the ability of command posts to "extend our operations in time, space or (cognitive) purpose."[39] In the expanded multidomain operational framework, this suggests a command-and-control node that optimizes its effectiveness to exploit or create opportunities in a way that offsets the hyperactive nature of large scale combat operations to give the commander a comparative advantage. This advantage is also achieved through the integration of combined joint all-domain partners, offensively and defensively. It enables the delivery of

but this approach provides limited context and may not always meet the psychological needs of subordinates under stress. At Chornobaivka, insufficient communications were one of the reasons Russian senior leaders were deployed so far forward, even for the simplest operations. Considering this, a command post should have assured and redundant communications that enable a sense of proximity between commanders and staff, and the leaders and the led. Given these challenges and desirable characteristics, imagining a future command post is difficult, but not impossible.

## Organizational Design and Employment of an Objective Command Post

To avoid our own Chornobaivka and provide command and control that possesses the characteristics of agility, convergence, endurance, and depth, an effective and survivable command post must exist in a nonphysical construct. We must aggregate and integrate functions, processes, and capabilities but not the people, equipment, and things that have historically been associated with delivering them. While this may seem to violate the feasibility criteria of course of action development, deeper analysis reveals the technology currently exists, and the world of online gaming is showing us the way. To meet the tenets of MDO, we must rely heavily on both augmented and virtual reality. The Army is already experimenting with both technologies but has yet to fully pursue their utility in the command-and-control space.[41] In a virtual world, commanders could replicate, expand, traverse, and interact as needed with their entire physical command post and never have to leave the room or vehicle they are in. They could move between command posts seamlessly and be present wherever and whenever needed. One vision of future Army command posts could be a proliferation of small three-to-four-armored-vehicle command-and-control nodes that represent what was formerly a "functional staff tent" in the legacy structure. These nodes would be broadly distributed and mobile on the battlefield. Supported by software and data engineers, commanders and staffs would be able to organize these nodes around a variety of tasks, time horizons, or crossfunctional areas. These distributed command-and-control nodes would be connected and able to conduct operations in the physical environment. Enabled by augmented reality, commanders and

staffs could also access an immersive virtual space and whichever command-and-control echelon they needed. This would allow commanders to initialize, configure, and connect to a constellation of command posts and maintain access all data, knowledge, and decision support tools within the data mesh. By flooding the area of operations with a constellation of command-and-control nodes dispersed over wide areas and employing masking techniques to reduce their battlefield signatures, the effectiveness of the most capable enemy's targeting processes would be minimized. If command-and-control nodes operated alongside tactical maneuver elements of similar design, it would further exacerbate the enemy's targeting dilemma. Unfortunately, assured communications would be even more critical in this approach and would require significant bandwidth. However, recent developments in space-based capability and the science of quantum communications indicate that bandwidth may not be a limiting factor in the foreseeable future.[42] Quantum solutions might also allow us to discard our reliance on legacy antennas and the risks associated with electromagnetic signatures on the modern battlefield.

Aside from communications, this approach will require significant work from developers and the synthetic training community to achieve an "Avatar" level of virtual reality where commanders and staff forget that they are interacting in a virtual world.[43] The advantage of a commander who is able to project their presence anywhere on the battlefield without having to be physically present would be revolutionary. The path to the objective end state described here is resource intensive and will take focused and directed guidance from senior Army leadership, partnership with industry, and political buy-in. But it can and must be done.

## Think Big, Start Small, Go Fast, and Institutionalize: A Practical Demonstration

The magnitude of the change suggested above will inevitably draw criticism and opposition and require early "wins" to gain support and momentum. A successful effort to introduce this idea into our command-and-control system will need to start small and demonstrate utility through experimentation. A good test case for a multidomain-operations-capable command post relying on virtual and augmented reality would be to experiment with an organization constantly challenged

to maintain physical and functional integration in an operationally dynamic environment, the division joint air-ground integration center (JAGIC). This small, thirty-person command-and-control node is comprised of both Army and Air Force personnel and liaison elements executing a variety of functions. Currently, they must come together to manage the employment of joint effects effectively and efficiently in the close fight. Despite their value, the problem these organizations inherently have is that, in garrison, they do not exist. When needed for training and operations, JAGICs are formed from the division and air support operations squadron staffs. As such, they are very difficult to form, train, and maintain to a high degree of proficiency, much less expertise, given the demands of manning cycles and garrison activities aligned against them. In this case, a virtual JAGIC could serve as a microcosm for a full command post. Thus, the experiment would simultaneously address an existing real-world and persistent readiness challenge and chart a path toward improved command post capabilities for the entire Army.

## Conclusion: Whistling Past Chornobaivka?

*Oft in the lone church-yard at night I've seen,*
*By glimpse of moonshine chequering through the trees,*
*The school-boy, with his satchel in his hand,*
*Whistling aloud to bear his courage up …*

—Scottish Poet Robert Blair, 1745[44]

Any casual visitor to the Army's National Training Center these days, with a watchful eye on the Ukrainian war through their Twitter feed, can attest that U.S. Army command posts are going to struggle in that environment. While the Army may not be able to implement a revolutionary new command post structure optimized for large-scale combat operations overnight, neither is it helpless if faced with the imminent prospect of war, even against a potential adversary as capable as China. Every day, commanders can start preparing for that environment, assessing their command posts from the standpoint of conducting MDO during large-scale combat operations and with a realistic appreciation for the threat. Leaders at division level and above can help by doing more of the heavy lifting of joint integration, targeting, and other enabling processes for those at the tactical edge. At the same time, the Army must stay focused on the future. The technology is either here, or on the near horizon, to make everything discussed in this article possible. Given the state of the security situation in the world, it is unlikely that we have time to address the challenges of our command posts through incremental changes. The U.S. Army and the West must respond to the lessons of Chornobaivka with a sense of urgency, leadership, and unity of purpose on the modernization of our command-and-control system and command posts. ∎

## Notes

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