

United States Army White Paper

Multi-Domain Battle: Combined Arms for the 21st Century

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3 **Purpose**

4 This paper describes how future ground combat forces, operating as part of joint,
5 interorganizational¹, and multinational teams, will operate to defeat highly-capable peer enemies,
6 control terrain, and project combat power to obtain operational advantage and achieve strategic
7 objectives. Multi-Domain Battle: Combined Arms for the 21st Century emphasizes the need to
8 achieve cross-domain synergy through coordinated, simultaneous actions across contested
9 spaces, and identifies capabilities that future ground forces require to fight and win against
10 increasingly capable enemies in the projected operational environment.² This paper intends to
11 promote discussion on solutions to overcome the problems of future conflict in 2020-2035,
12 inform the development of a future warfighting concept, and drive experimentation and
13 refinement of these solutions.

14
15 **Scope**

16 The scope is focused on ground combat operations against a sophisticated peer enemy threat
17 in the 2020-2035 timeframe.

18
19 **The emerging operational environment**

20 Studies of the emerging operational environment describe a future environment of contested
21 norms and persistent disorder.³ Russia, China and other revisionist states seek to alter the post-
22 Cold War security order by coercing neutrals, partners, and allies through economic pressure,
23 disinformation, and the threat of military force. These actions achieve objectives by creating a
24 fait accompli before the Joint Force can deter those actions or by operating under the established
25 threshold triggering a decisive U.S. response.⁴ Potential enemies will use deception, surprise,
26 and speed of action to achieve their objectives while integrating a combination of economic,
27 political, technological, informational, and military means to exploit seams within established
28 U.S. operating methods. Moreover, these adversaries may use, or threaten use of, nuclear
29 weapons and other weapons of mass disruption or destruction to manipulate the risks of
30 escalation.

¹ Interorganizational refers to elements of U.S. government agencies; state, territorial, local, and tribal agencies; foreign government agencies; intergovernmental, nongovernmental and commercial organizations. (Does not include forces). (Derived from JP 3-08).

² The Joint Operational Access Concept (JOAC) identifies the problem of projecting military force into an operational area and sustaining it in the face of armed opposition by increasingly capable enemies and within contested domains. The JOAC proposes employing cross-domain synergy – the complementary vice merely additive employment of capabilities in different domains such that each enhances the effectiveness and compensates for the vulnerabilities of the others— to establish superiority in some combination of domains that will provide the freedom of action required by the mission.

³ Contested norms involves increasingly powerful revisionist states and select non-state actors using any and all elements of power to establish their own set of rules unfavorable to the United States and its interests. Persistent disorder is characterized by an array of weak states that become increasingly incapable of maintaining domestic order or good governance. Publications supporting this assessment include the Joint Operating Environment 2035; Worldwide Threat Assessment of the U.S. Intelligence Community, Senate Select Committee on Intelligence, Feb 2016; Military and Security Developments Involving the People’s Republic of China 2015, Annual Report to Congress; RAND, The Challenges of the “Now” and Their Implications for the U.S. Army.

⁴ A fait accompli is a thing accomplished and presumably irreversible. (Merriam-Webster Dictionary).

32 Modernized militaries enable
33 aggressive policies of revisionist states by
34 challenging U.S. forces in all domains, the
35 electromagnetic spectrum (EMS), and the
36 battleground of human perception. U.S.
37 forces will likely confront sensor-rich
38 militaries of peer states and proxies
39 employing precision-guided munitions on
40 highly lethal battlefields that can restrict
41 Joint Force freedom of maneuver and
42 action. Adversaries will counter U.S.
43 strengths such as air and maritime
44 superiority, and degrade key capabilities by limiting access to space, cyberspace, and the EMS.
45 Adversaries will also exploit perceived U.S. weaknesses such as time and distance for force
46 deployment, logistics nodes, and vulnerable command and control networks. Highly advanced
47 adversaries studied the manner in which the U.S. coordinates technical reconnaissance, satellite-
48 based communications, and air and maritime power to enable ground freedom of maneuver and
49 overmatch.⁵ The subsequent capabilities developed threaten Joint Force capabilities which turns
50 long-assumed strengths into potential weaknesses. As a result, the Joint Force can no longer
51 assume continuous superiority in any domain.

Highlights of Emerging Operational Environment

- *Aggressive revisionist peer states challenge U.S. and allied interests*
- *U.S. comparative military advantage has diminished*
 - *Presumptive loss of air supremacy*
 - *U.S. forces are challenged in all domains, the EMS, and human perception*
- *Ground combat capabilities and capacities are out of balance for conflict with peer adversaries*
- *U.S. forces are ill postured to deter conflict*

53 Additionally, current U.S. comparative military advantage and the capacity to conduct
54 operations against a sophisticated enemy have diminished. Potential adversaries have made
55 strides to disrupt the effectiveness of U.S. conventional combat power, which is exacerbated by
56 the U.S. and allies reduced capacity and forward presence required to effectively counter these
57 threats based on aligning capabilities towards counter-insurgency operations. Growing
58 adversary air, land, and maritime capabilities with recently developed strike capabilities in the
59 space, cyberspace, and EMS allow adversaries to contest U.S. forces in areas where U.S.
60 dominance has been long assumed.⁶ Thus, U.S. forces will be contested in these areas,
61 increasingly matched or overmatched in ground force capabilities while fighting across an
62 expanded maneuver based battlefield. These developments provide major implications to U.S.
63 Joint Force operations and will continue to do so unless mitigated. This emerging operational
64 environment marks future operations as significantly different from the recent past as
65 adversaries' strategies take advantage of their ability to challenge U.S. superiority.

67 Air supremacy or even air superiority may be unachievable in future wars.⁷ Russia and
68 China continue to improve complex integrated air defense networks that unless suppressed
69 provide protection under which their ground forces can operate more freely from the persistent

⁵ Overmatch is defined as the application of capabilities or unique tactics either directly or indirectly, with the intent to prevent or mitigate opposing forces from using their current or projected equipment or tactics.

⁶ Joint Vision 2020 called for full spectrum dominance wherein that U.S. forces [would be] able to conduct prompt, sustained, and synchronized operations with combinations of forces tailored to specific situations and with access to and freedom to operate in all domains; space, sea, land, air, and information. A key enabler to this was the ability to achieve superiority in all domains and the information environment.

⁷ Air supremacy is defined as that degree of air superiority wherein the opposing force is incapable of effective interference within the operational area using air and missile threats. Air superiority is that degree of dominance in the air battle by one force that permits the conduct of its operations at a given time and place without prohibitive interference from air and missile threats. (JP 3-01).

70 effects of Joint Force airpower. The density of these systems enables adversaries to contest or
71 deny friendly air superiority from the ground, and the resilience of these systems means that even
72 an overwhelming strike against these networks only produces localized and temporary results.⁸
73 Achieving only temporary air superiority poses significant problems for ground combat forces.
74 Forces designed for and accustomed to Joint Force air supremacy will be challenged to execute
75 effective close air support for ground combat, air reconnaissance, and air mobility except against
76 limited objectives. These integrated air defense networks further complicate ground combat
77 operations because the dispersion, deception, and camouflage inherent in their employment
78 inhibit effective targeting of the network which ultimately prevents joint fires from striking
79 throughout the depth of enemy formations.

80
81 Enemy missile capabilities enable deep strike without reliance on aircraft. Peer adversaries
82 possess numerous, modernized ballistic and cruise missiles threatening command and control
83 nodes as well as maneuver on land, at sea, and in the air. Complementing enemy missile
84 capability is a fleet of 4th and 5th generation aircraft, which provides another highly capable
85 method for long-range strike, especially when facing limited friendly ground-based air defenses.
86 To conduct campaigns, Army and Marine forces ashore, designed under the assumption of
87 friendly air and maritime supremacy, currently require large-signature sustainment facilities and
88 command nodes that are vulnerable to such attacks. Similarly, adversary missile capabilities
89 increase hazards to maritime maneuver by placing valuable naval assets at risk. Finally, the
90 extended range and increasing number of these adversary missiles place large and fixed airbases
91 at risk, which further limits the ability to project air power. The adversary missile threat,
92 protected by an effective air defense network, compels the Joint Force to operate more dispersed
93 placing a greater premium on assured command and control to coordinate effective operations.

94
95 The Joint Force cannot assume unhindered access to space, cyberspace, and EMS
96 capabilities critical for current command and control systems to function effectively.
97 Adversaries are developing capabilities to attack U.S. platforms, systems, and networks in space,
98 cyberspace, and the EMS. The Joint Force currently possesses limited countermeasures to such
99 attacks that will degrade certain reconnaissance; command and control systems; position,
100 navigation, and timing (PNT); and disrupt force deployment activities and other logistics
101 operations. Adversaries may also use information to influence U.S. decision makers and
102 domestic and international sentiment. The loss of assumed space, cyberspace and EMS
103 superiority may severely inhibit the effectiveness of stand-off targeting and strikes.

104
105 U.S. ground combat capabilities are out of balance to effectively confront emerging
106 conditions presented by peer adversaries. Enemy ground formations now have parity or
107 overmatch with U.S. forces in many weapons systems' range, lethality, protection, and mobility.
108 For example, the latest generation of Russian and Chinese combat vehicles offer equivalent, and
109 in some cases, superior protection and lethality to U.S. tanks, fighting and amphibious vehicles.
110 Potential enemies have artillery systems with greater ranges and numbers than similar U.S.
111 systems, and have demonstrated the ability to identify targets and mass long range fires.⁹ Absent
112 a modernized U.S. tactical air defense network, adversaries may create cross-domain overmatch

⁸ As an example, Russia has effectively used these systems to achieve air superiority from the ground in the Ukraine.

⁹ Russia recently exhibited an effective tactical-level linkage of UAS reconnaissance capability with long range artillery fires in Ukraine.

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113 using their UAS to locate, track, and target exposed U.S. forces and facilities, and then employ
114 massed direct and indirect fires with greater range and lethality than friendly systems to destroy
115 vital assets and formations.

116
117 Additionally, adversaries can severely limit friendly battlespace awareness by degrading
118 U.S. persistent intelligence, surveillance, and reconnaissance through the use of electronic
119 warfare (EW), air defense, and counter-UAS capabilities. Their all domain reconnaissance and
120 counter-reconnaissance capabilities could potentially nullify the U.S. forces' ability to gain an
121 accurate understanding of the enemy's disposition and movements and the ability to create a
122 rapid decision cycle to exploit opportunities that arise in a fluid situation. A lack of sufficient
123 friendly battlespace awareness, when coupled with adversary advances that threaten disruption of
124 air support and joint fires, decreases Army and Marine forces' ability to win major ground
125 combat operations.

126
127 Adversaries are expected to use long-range air defense and offensive missile capabilities to
128 place all ports, airfields, bases, and movement at sea, in the air, and on land in vicinity of their
129 respective international borders at risk. Current adversary capability developments present an
130 expanded battlefield that can contest U.S. forces from deployment to employment. Recent
131 incidents such as Russian invasion in the Ukraine or Chinese aggression in the South China Sea
132 argue for forward positioned forces that can deter these aggressive actions. However, the trend
133 has been that U.S. ground combat forces not only lack sufficient mass and depth in capabilities,
134 but are also out of position to suitably deter adversaries, assure allies, and deny or defeat enemies
135 if hostilities start. This capability allows adversary conventional and unconventional forces to
136 retain the initiative while operating under a canopy of protection and disrupt the rapid
137 introduction of flexible deterrent options and subsequent build-up of U.S. and allied combat
138 power should deterrence fail. Forward-positioned ground and maritime forces capable of
139 persisting within the arc of enemy long range fires are an important factor for deterring adversary
140 aggression by turning denied areas into contested space or by conducting a delaying action until
141 additional combat power can be deployed.

142
143 Potential adversaries execute aggressive political policies supported by modernized
144 militaries designed specifically to counter the Joint Force's advantages in intelligence,
145 surveillance, reconnaissance, targeting, command and control, and stand-off precision strike.
146 Based on those capabilities, the enemy can gain the initiative by seizing key terrain before the
147 Joint Force can respond, evade joint stand-off fires, and consolidate gains while preventing
148 effective response. To counter these adversary actions, Joint Force organization and operations
149 must be adjusted. Future ground forces must not only contribute to Joint Force freedom of
150 maneuver by projecting combat power into contested domains, but also reestablish ground
151 combat overmatch. U.S. ground combat forces must exploit enemy vulnerabilities, seize and
152 retain key terrain, and consolidate gains for sustainable outcomes. Forces designed under the
153 assumption of friendly supremacy in the air, maritime, cyberspace, and space domains now must
154 possess the capability to contribute to achieving temporary and local superiority in these
155 domains. These forces must also retain endurance and flexibility to continue operations in the
156 face of enemy advancements. The current force structure, when mapped to the future operating
157 environment leaves Army and Marine forces out of balance to perform these actions against
158 these adversaries.

159

160 **Implications of the operational environment**

161 Over the last 25 years, assumptions of air, maritime, space, and cyberspace domain
162 superiority drove the doctrine, equipment, and posture of the Joint Force. These assumptions are
163 proving to be invalid in light of recent changes to peer capabilities and approaches. The Joint
164 Force is now not postured, organized, equipped, or trained properly against these threats and at
165 risk to ensure the Joint Force freedom of maneuver required to support U.S. policy, by deterring,
166 and if necessary, defeating enemies.

167

168 Assessment of the operational environment indicates a need for forward stationed and
169 rotational combined arms ground and maritime combat forces that can disrupt adversary
170 operational designs because they transform denied space into contested space while providing a
171 durable method for projecting combat power. These forces will need to prevent the enemy from
172 achieving a fait accompli, as well as other objectives below the threshold for war.¹⁰ To achieve
173 these aims, Army and Marine forces must be able to rapidly deploy and fight in all contested
174 spaces with organic systems while incorporating joint and partner capabilities. Future ground
175 combat forces must possess the ability to seize, retain, and exploit advantages achieved
176 simultaneously in multiple domains to deter potential adversaries, restrict enemy freedom of
177 action, support Joint Force freedom of maneuver, and consolidate gains for sustainable
178 outcomes.

179

180 **Military problem**

181 U.S. ground combat forces, operating as part of a joint, interorganizational, and
182 multinational teams, are not sufficiently trained, organized, equipped, nor postured to deter or
183 defeat highly-capable peer enemies to win in future war.

184

185 **Solution synopsis**

**Multi-Domain Battle:
Combined Arms for the 21st Century**



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¹⁰ Breedlove, P. M. (Jul 2016). NATO's Next Act, How to Handle Russia and Other Threats, Foreign Affairs.

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Multi-Domain Battle: Combined Arms for the 21st Century requires *ready ground combat forces capable of outmaneuvering adversaries physically and cognitively through extension of combined arms across all domains*¹¹. *Through credible forward presence and resilient battle formations, future ground and maritime forces integrate and synchronize joint, interorganizational and multinational capabilities to create temporary windows of superiority across multiple domains and throughout the depth of the battlefield to seize, retain, and exploit the initiative; defeat enemies; and achieve military objectives.* Simultaneous and sequential operations, using surprise and speed of action to gain psychological as well as physical advantages over the enemy while gaining influence and control over multi-domain battlespace.

Combined arms integrates capabilities in such a way that to counteract one, the adversary must become more vulnerable to another.¹² This application of combined arms from the air, land, sea and space is an established prerequisite for success proven in the past century of conflict. Multi-Domain Battle: Combined Arms for the 21st Century includes not only the capabilities of all Services in the physical domains (i.e. air, land, maritime, and space), but also mission partners across cyberspace, the EMS, the information environment, and the cognitive dimension of warfare. Cross-domain capabilities give commanders options while presenting multiple, simultaneous dilemmas to an adversary or enemy. In executing this concept, ground forces project power outward from land into other domains and contested spaces to support Joint Force freedom of maneuver and action. Thus, U.S. forces affect an adversary in both the physical dimension and cognitive functions creating dilemmas too numerous to counter.

Ground combat forces outmaneuver enemies physically and cognitively. To generate and exploit psychological, technological, temporal and spatial advantages over the adversary, combined arms teams combine reconnaissance, movement, fires, and information holistically to avoid surfaces and identify, create, and exploit gaps (windows of advantage).¹³ U.S. forces simultaneously use signature control, defensive systems, and overwatching fires to establish temporary zones of protection for friendly forces to operate. Synchronizing the exploitation of gaps and seams in enemy intelligence, surveillance, reconnaissance, protection, and strike systems with the establishment of temporary protective zones for friendly forces allows maneuver elements to sequence opportunistic action to exploit enemy vulnerabilities and seize positions of relative advantage.

Units, empowered with decentralized combined arms capabilities, operate as multifunctional battle teams (for the Marine Corps a multifunctional team is the Marine Air-Ground Task Force with enhanced capabilities; the Army envisions multifunctional teams at several echelons with composition to be determined) with an array of cross-domain capabilities.¹⁴ These units are flexible and resilient with the ability to operate in degraded conditions and with sufficient

¹¹ Outmaneuvering adversaries in the cognitive dimension is the use of information to confound the enemy’s situational understanding and decision making, thereby creating advantage for the joint force.

¹² Combined arms is the synchronized and simultaneous application of arms to achieve effect greater than if each arm was used separately or sequentially.

¹³ Surfaces are hard spots—enemy strengths—and gaps are soft spots—enemy weaknesses. (MCDP 1),

¹⁴ A multifunctional battle team is a temporarily task organized combined arms element that possesses cross-domain capabilities and is optimally structured to accomplish a specific mission.

226 endurance to sustain losses and continue operating for extended periods and across wide areas.
227 Multifunctional battle teams possess combined arms and cross-domain capabilities at the lowest
228 practical echelons to enable dispersed operations reducing vulnerabilities to enemy massed fires.
229 Mutually supporting dispersed multifunctional battle teams possess organic capabilities to
230 generate levels of localized domain superiority in the form of temporary zones of protection.
231 The generated areas of control and periods of superiority are not sanctuaries; control is
232 temporary requiring ground combat forces to achieve surprise and sustain high tempo operations
233 to open and exploit windows of advantage.

234

235 **Components of the solution**

236 Executing Multi-Domain Battle: Combined Arms for the 21st Century entails three key
237 components: create and exploit temporary windows of advantage, restore capability balance and
238 build resilient battle formations, and alter force posture to enhance deterrence. Creating and
239 exploiting temporary windows of advantage provides a means to achieve positions of advantage
240 in or across domains, the EMS, and information environment to seize, retain, and exploit the
241 initiative to defeat the enemy. Restoring capability balance and building resilient battle
242 formations is essential to developing credible future forces capable of fighting and winning
243 against adept and elusive enemies. Altering the force posture prevents conflict by providing a
244 credible deterrence through the introduction of ground and maritime maneuver forces with cross-
245 domain fires capabilities into positions of advantage that disrupt potential fait accompli
246 strategies.

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248

Components of the Solution

- Create and exploit temporary windows of advantage
- Restore capability balance and build resilient battle formations
- Alter force posture to enhance deterrence

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254 **Create and exploit temporary windows of advantage**

255 When overmatch in troop strength and combat power is not possible, U.S. forces will create
256 and exploit temporary windows of advantage. In general application, operational and tactical
257 level commanders will use cross-domain fires, combined arms, and information warfare to
258 enable the opening of successive and/or simultaneous windows in depth to allow maneuver to
259 positions of relative advantage. As adversaries contest joint forces in one area, forces will either
260 fight through, endure enemy actions, or bypass these effects by rapidly moving to another area
261 where a temporary window of advantage has been created.

262

263 Opening a domain window may require combinations of integrated, synchronized, and
264 sequenced Joint Force and mission partner capabilities.¹⁵ The timing of initiating cross-domain
265 fires, information warfare, and maneuver is predicated on the expected duration the window of
266 advantage is needed to achieve the desired objective. Friendly forces exploit the windows of
267 advantage to disrupt or dislocate the enemy using simultaneous ground and sea-based maneuver
268 along with lethal and/or nonlethal capabilities. Capitalizing on these windows of advantage,
269 multifunctional battle teams use speed and surprise to seize, retain, and exploit the initiative.

¹⁵ A domain window is simultaneous superiority in selected domains that enables freedom of maneuver.

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270 U.S. forces may employ cross-domain capabilities to attack the enemy’s critical capabilities
271 through the most vulnerable domain(s). The mission dictates how combat forces will apply these
272 capabilities as there is no default approach; every mission requires reevaluation of where
273 vulnerabilities exist or can be created because adversaries are adaptive.
274

275 Maneuver and fires are inseparable and complementary and provide a synergistic effect.
276 Fires and maneuver forces coordinate to plan and execute fire support tasks effectively, defend
277 the force from aerial attack and surveillance, and create exploitable lethal and nonlethal effects
278 supporting a scheme of maneuver. Fire and maneuver places something of value to the enemy at
279 risk compelling him to concentrate increasing his vulnerability to joint fires or remain in place
280 permitting friendly forces to bypass his position, or defeat dispersed forces in detail. When
281 enemy countermeasures to air power and precision fires (such as dispersion, concealment,
282 deception, and intermingling with civilian populations) limit the effectiveness of stand-off fires
283 capabilities, ground-based fires and maneuver provide the commander with additional options.
284

285 This concept calls for the integration of information warfare with fires and maneuver.
286 Information warfare spans several capabilities and functions such as: military information
287 support operations, military deception, operations security, EW, physical attack, special technical
288 operations, information assurance, computer network operations, public affairs, and
289 civil-military operations. By integrating information warfare with maneuver and fires,
290 multifunctional battle teams seek to outmaneuver an adversary in the cognitive dimension by
291 degrading command and control, disrupting weapons and intelligence, surveillance, and
292 reconnaissance systems’ functionality, and impacting key audience perception beyond the mere
293 application of physical power.
294

295 Ground-based fires and information warfare integrated with air and maritime power support
296 the achievement of localized sea and air control. Deep fires, including long-range precision
297 fires, cyber and electronic warfare capabilities, and counter-fires capabilities help create
298 windows of advantage across all domains. These windows of advantage support the conduct of
299 forcible entry, strategic deployment, and sustainment operations.
300

301 Army and Marine maneuver forces, whether ground or sea-based, seek to exploit windows
302 of advantage to close with the enemy, overcome enemy countermeasures, compel outcomes, and
303 consolidate gains. These forces provide lasting effects because they offer endurance and are
304 difficult to displace once in position. Multifunctional battle teams conduct turning movements
305 behind the enemy’s main line of defenses to attack critical targets.¹⁶ When enemy
306 communications and reconnaissance are degraded, these teams infiltrate through dispersed
307 enemy positions to attack from unexpected directions, emplace cross-domain fires in positions of
308 advantage and destroy vital facilities to disrupt the enemy’s defenses by attacking enemy fire
309 support, air defense, sustainment, and command and control systems.¹⁷ While this concept

¹⁶ A turning movement is a form of maneuver in which the attacking force seeks to avoid the enemy’s principle defensive positions by seizing objectives behind the enemy’s current positions thereby causing the enemy force to move out of their current positions or divert major forces to meet the threat. FM 3-90-1.

¹⁷ An infiltration is a form of maneuver in which an attacking force conducts undetected movement through or into an area occupied by enemy forces to occupy a position of advantage behind those enemy positions while exposing only small elements to enemy defensive fires. FM 3-90-1. Infiltration of a large unit likely will not go entirely undetected. Employing advanced counter-intelligence, reconnaissance and intelligence

310 advocates attack through the weakest link in enemy formations, forces must retain the capability
311 to create asymmetric advantage against enemy forces with equivalent combat power. The
312 methods of opening and retaining windows of temporary domain superiority highlight the
313 capabilities required for future Army and Marine forces to conduct Multi-Domain Battle:
314 Combined Arms for the 21st Century.

315

316 **Restore capability balance and build resilient battle formations**

317 Empowering U.S. ground combat forces to operate in conflicts against highly advanced
318 adversaries demands restoring parity or providing overmatch in critical areas across the breadth
319 and depth of the battlespace. Restoring parity also entails improving forces' survivability against
320 attack, which requires capabilities to operate more dispersed over wider areas and in congested
321 and restricted urban terrain. Resiliency and endurance allow formations to survive attacks and
322 execute operations post-attack. Future ground combat forces will have cross-domain capabilities
323 at the lowest practical levels and employ optimized manned-unmanned combined arms teams for
324 both mounted and dismounted operations. Tactical units will be task-organized as
325 multifunctional battle teams for distributed or semi-independent operations minimizing the need
326 for enablers from higher echelons while higher echelon units shape the battlespace and provide
327 key enablers and services to subordinate units as needed.

328

329 Such task organization allows maneuver elements to operate more dispersed to reduce
330 vulnerability to massed enemy fires. Dispersed operations necessitate leaders, Soldiers and
331 Marines that are capable of operating using mission command tenets such as executing
332 disciplined initiative to exploit opportunities or react to unexpected threats within the
333 commander's intent when communications with the commander are blocked or disrupted.
334 Multifunctional battle teams will conduct distributed maneuver with the ability to aggregate
335 sufficient combat power to flexibly respond within time and space to defeat enemy elements.

336

337 Improvements in protection, mobility, range, and lethality of key systems help create
338 advantage allowing ground combat forces to maneuver in close proximity to civilian populations
339 and defeat enemy forces in close combat. Advanced armor, active protection, and hardened
340 electronic systems will enable units to absorb first strikes of enemy direct and indirect fires.
341 Maneuver units will employ manned-unmanned teaming (MUM-T) to protect personnel and
342 penetrate higher risk areas while degrading, denying, and destroying enemy systems and increase
343 capacity.¹⁸ Unmanned systems and MUM-T will also be used to detect obstacles and hazards
344 (such as mines and chemical, biological, radiological and nuclear (CBRN) threats), breach
345 obstacles and clear routes.

346

347 To prevent adversary aviation, UAS, artillery, and missile assets from striking with
348 impunity, forces will employ a highly mobile and robust air and missile defense system. This
349 system will provide early warning, identification, and strike capability and requires adequate
350 capacity to counter repetitive missile salvo fire or multiple air sorties providing defense in depth
351 against air and missile threats with increased capacity to engage multiple targets. Mounted and

capabilities, deception measures, camouflage, concealment and related techniques are critical to success to limit detection and targeting by the enemy.

¹⁸ In the future OE, U.S. forces will often be outnumbered. Use of robotic and autonomous systems helps improve capabilities offsetting enemy numerical advantages.

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352 dismounted friendly elements will have organic capabilities to counter adversary UAS, aircraft,
353 rocket, artillery, and mortar capabilities providing increased survivability and allowing varying
354 levels of freedom of maneuver.
355

356 Multifunctional battle teams will have a family of interoperable UAS for reconnaissance,
357 surveillance and attack missions, often teamed with 5th generation aircraft, possessing the range,
358 endurance, protection, and lethality necessary to operate across the area of operations. As part of
359 the multifunctional battle team, future vertical lift will support scout, attack, assault support and
360 utility lift roles. Future vertical lift will provide increased range to support dispersed forces over
361 wider areas, better operability in degraded visual environments, and the capability for employing
362 precision munitions including air to air capabilities. Improved aviation protection and
363 countermeasures including EW detection, jamming, and attack will enhance survivability in
364 highly contested airspace. Employing future vertical lift with UAS using MUM-T also will
365 increase survivability and effectiveness.
366

367 Improved cross-domain capabilities enable joint freedom of maneuver, deny enemy freedom
368 of action, and support ground combat operations. While Army and Marine forces will have
369 different organic capabilities (e.g. Army long range artillery and Marine organic aviation fires),
370 conceptually, maneuver formations will capitalize on the increased range of fires systems. A
371 multifunctional battle team will have organic fires, with some teams possessing extended range
372 systems that provide deep fires when needed. Cross-domain and counter-fire sensors improve
373 the commander's situational understanding, and enable suppression or destruction of enemy fires
374 systems or maneuver elements. New dual-purposed and improved conventional munitions with
375 higher fuse reliability allow engagement of enemy formations over wider areas with less reliance
376 on precision. Organic cyberspace and EMS sensors, EW attack and jammer capabilities, and
377 automated electromagnetic battle management capabilities allow tactical formations to attack or
378 jam enemy systems while minimizing friendly systems' vulnerabilities.
379

380 To build resiliency and endurance, U.S. forces must adapt how they fight, developing the
381 means to detect and disrupt adversaries while reducing vulnerabilities and performing emissions
382 control and other measures of signature management effectively with a renewed degree of
383 emphasis. In future conflicts, every force should expect to be targeted quickly and precisely if
384 unable to manage its signatures. Unmanaged signatures will be a critical vulnerability as peer
385 competitors experiment with emerging technologies such as advanced detection methods,
386 hypersonic platforms and directed energy weapons. Minimizing or masking system signatures
387 and using concealment, deception, and advanced decoy systems that replicate multiple signatures
388 including thermal and radio frequency will complicate enemy targeting.
389

390 Headquarters and subordinate units alike must be capable of operating with severely
391 degraded communications. U.S. forces have capabilities to detect enemy signatures across the
392 spectrum enabling quick and accurate assignment of meaning to observations and rapid action to
393 exploit opportunities through an effective counter-intelligence, surveillance and reconnaissance
394 capability and enhanced target analysis systems. U.S. forces counter threat UAS-based
395 intelligence, surveillance and reconnaissance capabilities effectively using a robust counter UAS
396 capability capable of detecting, disrupting, and targeting adversary UAS to prevent attack or
397 dissemination of targeting data. These capabilities are reinforced through counter-intelligence

398 capabilities, social media discipline, covered networks, low-profile basing, and a stealthy
399 logistics infrastructure.

400
401 Units will possess the ability to operate with degraded or denied access to space, cyberspace,
402 and the EMS. Optimized command and control systems allow forces to operate while contested
403 in cyberspace and the EMS. Units will attempt to maintain communications and PNT through an
404 internal communication network for maneuver, fires, and sensors that is resilient and self-healing
405 (able to re-route data and communications to the intended recipient).¹⁹ This internal network
406 limits susceptibility to enemy detection or countermeasures, possibly using line of sight
407 transmissions with hard to detect frequencies (such as laser based) and high altitude
408 retransmission balloons to maintain line of sight. Command and control systems allow external
409 connectivity to global support networks; however, units cannot be dependent on continuous
410 connectivity to fight. Systems will allow command and control while moving and dynamic
411 partnering to create tailored teams rapidly between Army and Marine forces and other mission
412 partners. The external network will rely on modular radio frequencies using low emissions to
413 reduce susceptibility to signals intercept and enemy countermeasures. Automated decision tools
414 resident in command and control systems will analyze, filter, and report information helping
415 commanders make informed decisions faster.

416
417 Reducing vulnerabilities inherent in deployment and sustainment activities also supports
418 resiliency of U.S. forces. Dispersed, distributed, and resilient deployment and sustainment using
419 multiple lines of communications will reduce vulnerability to interdiction. Shallow draft
420 transport vessels, amphibious transport capabilities, short take-off and landing aircraft, and future
421 vertical lift capable of intertheater transit allow entry into austere locations and expeditionary
422 advanced bases providing the commander more options. Autonomous sustainment tools will
423 perform predictive analysis allowing supplies to be pushed forward to units. Using unmanned
424 aerial resupply augments the capacity of limited manned systems allowing faster supply
425 operations over dispersed areas and increasing combat capability of engaged units.

426
427 Sustainment forces will conduct convoy operations employing MUM-T techniques with
428 ground transport vehicles. Replacing drivers with autonomous capabilities will free manpower
429 to perform other critical tasks such as security and reconnaissance. Demand reduction efforts
430 provide units that need less fuel, energy, water, and other supplies. Additive manufacturing
431 capabilities will allow units to make repair parts in forward areas. Simplified maintenance (such
432 as line replaceable units) allows repairs at forward locations by the operators, reducing the need
433 to move equipment to higher echelons for repairs. Additionally, forces will have enhanced
434 prolonged care capability at the point of injury to increase personnel survivability because of
435 potential higher casualty numbers against peer threats and possible delays in medical evacuation
436 due to force dispersion.

437
438 Integrating mission partner capabilities helps restore capability balance by increasing
439 capacity to confront adversaries. This integration expands the military's overall warfighting
440 capacity and distributes critical capabilities while complicating adversary targeting. To achieve

¹⁹ An internal network refers to systems for communication internal to a unit. An external network is for communication outside of the unit, such as higher echelons, adjacent units or other partners.

441 effective partner integration, U.S. forces will employ an adaptable command and control
442 architecture that will enable joint and coalition partners to 'plug-in' to the U.S. network.
443

444 Employing these capabilities as described is anticipated to restore parity or overmatch in
445 critical areas and provide the depth, resiliency and endurance needed for success.
446 Multifunctional battle teams will be able to sense, close with, and destroy enemy elements,
447 influence populations, and seize and occupy or control terrain. Units will be fully capable of
448 operations in a lethal operational environment that is laden with enemy intelligence, surveillance,
449 and reconnaissance and saturated by enemy precision guided munitions.
450

451 **Alter force posture to enhance deterrence**

452 U.S. forces are not currently postured or equipped properly to deter peer competitors from
453 acts of aggression, therefore requiring deliberate examination of the mix of forward stationed,
454 rotational, and sea-based expeditionary forces in certain theaters. While long-range strikes or
455 nuclear weapons offer deterrence, adversaries often employ methods to achieve objectives that
456 operate below the thresholds for employing these weapons. Robust enemy defensive networks
457 impose limitations on the effectiveness of stand-off strike capabilities. Ground and maritime
458 forces provide multiple options. Forward positioned forces can deter enemy actions, providing
459 commanders with the capability to challenge enemy air defense and offensive missile networks,
460 in an effort to prevent enemies from achieving their objectives. Ground and maritime forces are
461 also expeditionary and strategically mobile, able to rapidly aggregate to contingencies or
462 reinforce forward deployed formations.
463

464 Ground forces communicate U.S. commitment prior to and during conflict. In the future,
465 Army and Marine forces working with partners will strengthen forward defenses by bolstering
466 partner capacity and resolve to resist aggression and dissuading adversaries who employ methods
467 below the threshold for war. When possible, Army forces may be permanently stationed in
468 identified high risk areas, or move uncontested into allied or partner nations prior to the outbreak
469 of hostilities through exercises or regular rotations. Army forward stationed forces and Marine,
470 sea-based forward presence are complementary. Using the sea as maneuver space and
471 expeditionary advance bases, Marine forces will distribute for activities with partners and rapidly
472 aggregate to deter adversary escalatory actions. Security cooperation activities assure partner
473 states, build relationships and interoperability, enhance situational awareness, and set favorable
474 conditions for inserting follow-on expeditionary forces if diplomacy and deterrence fail.
475

476 Having a ground and maritime combat capability in theater prior to hostilities disrupts
477 enemy defensive networks, turning denied areas into contested spaces. Forward-positioned
478 Army and Marine forces that can persist in the arc of enemy fires and possess reconnaissance
479 and long-range fires capabilities can deter adversary aggression because they restrict enemy
480 freedom of action. These forces also enable greater freedom of maneuver by air and maritime
481 forces through offensive and defensive air and ground-based missile capabilities, EW, and
482 information warfare that directly attack enemy capabilities.²⁰ Forces capable of conducting
483 reconnaissance and counter-reconnaissance in all domains enhance Joint Force awareness and

²⁰ Information warfare spans several capabilities and functions such as: military information support operations; military deception; operations security; EW; physical attack; special technical operations ; information assurance; computer network operations; public affairs; and civil-military operations.

484 prevent the enemy from achieving greater situational understanding. Forward-positioned and
485 resilient cross-domain fires provide additional deterrent value by holding at risk enemy air
486 defense networks, missile launchers and sensors, offensive EMS warfare antennas, and command
487 and control nodes. Should deterrence fail, these resilient forward-positioned forces can conduct
488 delaying action to enable maneuver of additional forces into theater.

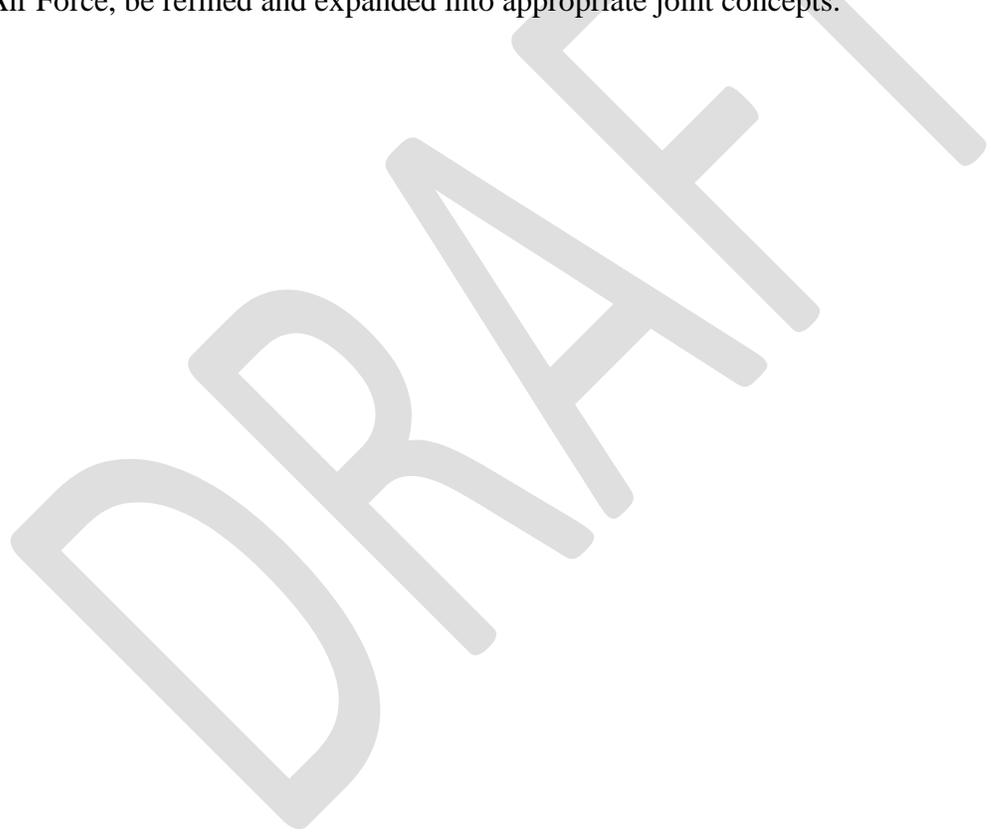
489

490 **Conclusion**

491 This Multi-Domain Battle: Combined Arms for the 21st Century white paper describes a
492 coordinated Army and Marine Corps approach for operating against peer adversaries. It is
493 intended to promote thought and discussion concerning the methods and capabilities that will be
494 required to confront sophisticated threats. It offers specific hypotheses to inform further concept
495 development, wargaming, experimentation, and capability development. This concept
496 encompasses the views of two Services regarding an endeavor that involves the entire joint team.
497 It is therefore published with the expectation that the ideas herein will, in concert with the Navy
498 and Air Force, be refined and expanded into appropriate joint concepts.

499

500



501 Appendix A

502 [Army] - Required Capabilities (RCs)

503

504 The following is a list of key required capabilities to execute the ideas identified in this concept.

505 [It is not a comprehensive list.] To conduct Multi-Domain Battle: Combined Arms for the 21st

506 Century in a highly contested environment, future ground combat forces require the following:

507

508 1. Warfighters, leaders, and teams proficient in applying the principles of mission command
509 conducting decentralized operations independent of higher control, taking prudent risks, and
510 applying cross-domain capabilities (organic and partner) in innovative ways.

511

512 2. The capability to exercise mission command at all echelons in all environments including
513 denied and/or degraded environments such as disruptions to satellite, line-of-sight, and beyond-
514 line-of-site communications, and position, navigation, and timing data.

515

516 3. The ability to command and control dispersed and disaggregated forces, including forward
517 positioned forces and forces on the move.

518

519 4. The ability to use command and control applications to aid leaders in understanding,
520 visualizing, describing, directing, assessing complex problems, and leveraging joint information
521 environment and Army common operating environment standards and technologies while
522 conducting operations in the future operating environment.

523

524 5. Command and control networks that are robust and self-healing, enable expeditionary mission
525 command and reach, provide access and information at the point of need for operations, and are
526 interoperable with joint, multinational and interorganizational partners.

527

528 6. Command posts with significantly reduced EMS signatures configured for rapid movement
529 and emplacement that are survivable against an array of threats and have minimal sustainment
530 demands.

531

532 7. Mobility, protection and lethality to maneuver, survive and defeat enemy forces while in close
533 combat against enemies possessing unmanned aircraft systems, rockets, mortars, artillery,
534 weapons of mass destruction, manned aircraft, and ballistic and cruise missiles.

535

536 8. Modular active protection systems to make combat vehicles and aircraft more survivable and
537 lighter for enhanced mobility, deployability, and fuel efficiency.

538

539 9. The ability to employ robotic and autonomous systems to lighten the warfighter's physical
540 and cognitive workload, increase situational understanding, mobility, protection, lethality, and
541 sustainment effectiveness.

542

543 10. The capability to conduct armed aerial reconnaissance from austere or unprepared landing
544 zones with improved speed, payload, endurance, survivability, reliability and maintainability.

545

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- 546 11. The capability to conduct air movement and maneuver of combat-equipped personnel and
547 equipment from land or sea bases to austere or unprepared landing zones; to transport personnel,
548 supplies, and equipment to forward points of need; and to conduct air medical evacuation even in
549 contested air environments with improved speed, payload, endurance, survivability, reliability
550 and maintainability.
551
- 552 12. The ability to integrate intelligence with operations in all operational environments including
553 under degraded electromagnetic spectrum conditions to support commanders' situational
554 understanding.
555
- 556 13. The ability to share intelligence with allies and partners and provide accurate assessment of
557 the environment to whole-of-government and interorganizational partners to support
558 commanders' situational understanding in all operational environments.
559
- 560 14. Greater cyber, EMS, and information environment situational understanding to facilitate
561 maneuver planning, collaboration, and synchronization.
562
- 563 15. The ability to operate a secure and robust intelligence architecture, encompassing sensors,
564 platforms, and organizations that is scalable and enables timely processing, exploitation, and
565 dissemination, with shared analytics, distributed analysis, and collaboration tools in conditions of
566 limited bandwidth and network outages to support commanders' situational understanding in all
567 operational environments.
568
- 569 16. The ability to conduct continuous reconnaissance and security across all domains and within
570 dense urban and complex terrain at the tactical level to support close combat operations and the
571 operational and strategic levels to shape operations and support employment of long range cross-
572 domain capabilities.
573
- 574 17. The ability to synchronize and employ lethal and nonlethal cross domain fires to project
575 power from land by delivering timely and accurate effects into other domains, the EMS, and the
576 information environment while preventing fratricide and minimizing collateral damage.
577
- 578 18. The ability to locate, detect, classify, discriminate, and identify targets in all domains with
579 precision using Army, joint, or other mission partner sensors and systems.
580
- 581 19. The ability to conduct both dynamic and deliberate targeting in all domains, including
582 prioritizing targets, evaluating windows of vulnerability, completing target mensuration,
583 performing collateral damage estimation, and selecting fires attack options.
584
- 585 20. The ability to clear, gain engagement authorization, and employ, joint, Army, or other
586 mission partner fires rapidly in all domains and the electromagnetic spectrum.
587
- 588 21. The ability to employ long-range precision land-based fires, including ballistic missiles,
589 extended range ground launched multiple rocket systems, enhanced artillery-delivered
590 scatterable mines, and extended range Army tactical missile systems rapidly and effectively.
591

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- 592 22. The ability to strike adversary assets in the maritime domain from mobile land and air
593 systems.
594
- 595 23. The ability to protect the force, populations, and resources from enemy threats including
596 aircraft, unmanned aircraft, missiles, rockets, artillery, and mortars.
597
- 598 24. The ability to execute offensive cyber and electronic warfare strikes at the tactical level.
599
- 600 25. The ability to seize, retain, and exploit an advantage over enemies in both cyberspace and
601 the EMS, while providing mission assurance, protecting command and control systems, and
602 degrading or denying adversaries' access.
603
- 604 26. The ability to confuse enemy intelligence, surveillance, and reconnaissance using deception,
605 advanced decoys and false signatures.
606
- 607 27. The ability to obscure selective parts of the EMS to defeat or degrade adversary detection,
608 observation, and engagement capabilities, and to attenuate electronic attack and directed energy
609 weapons improving force and partner survivability.
610
- 611 28. The capability to rapidly deny enemy forces freedom of movement and maneuver
612 (countermobility) and use of key terrain through terrain shaping while enabling friendly freedom
613 of action and avoiding fratricide and collateral damage.
614
- 615 29. The ability to assure friendly ground forces' mobility including breaching enemy obstacles,
616 conducting route clearance, and gap crossing.
617
- 618 30. The ability to conduct CBRN reconnaissance, detection, protection and decontamination.
619
- 620 31. The ability to use unmanned aerial distribution platforms to support responsive sustainment
621 to dispersed units when weather, terrain, and enemy threats pose unsuitable risk to manned air
622 and ground assets.
623
- 624 32. The ability to enable expeditionary maneuver with future vertical lift through aircraft with
625 improved speed, payload, endurance, reliability, maintainability, survivability, with the ability to
626 operate in all environments.
627
- 628 33. The ability to reduce heavy lift requirements by prepositioning capabilities and supplies
629 forward, including company-level equipment sets.
630
- 631 34. The ability to access, integrate with, and use joint logistics enterprise and joint,
632 interorganizational, and multinational sustainment capabilities to support multi-domain
633 operations.
634
- 635 35. The capability to assess, shape, deter, and influence foreign audiences - people,
636 governments, and militaries.
637

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638 36. The capability to engage with partners on a sustained basis to address shared interests and
639 enhance partners' security, governance, economic development, essential services, rule of law,
640 and other critical functions to protect common security interests.

641
642 37. Sufficient endurance and resiliency within formations to close with and destroy enemy
643 tactical formations and sufficient force capacity to achieve operational and strategic objectives.
644

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