Innovation

Unmanned: The New Normal

By RADM Bob Girrier, USN | August 4, 2016
By RADM Bob Girrier, USN | 372 Days Ago

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A surface warfare officer, Rear Admiral Bob Girrier currently serves as the U.S. Navy's first Director of Unmanned Warfare Systems (OPNAV N99). Most recently, he served as Deputy Commander, U.S. Pacific Fleet, and Director of Operations (J3) for U.S. Pacific Command. At sea, he has commanded the USS Reagan (CSG-7) and USS Nimitz (CSG-11) Strike Groups; served as Navy's forward Mine Warfare Commander; Commodore, Destroyer Squadron 15; and commanding officer of USS Roosevelt (DDG-80) and USS Guardian (MCM-5). He has contributed articles and coauthored three professional books for USNI.

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There's a growing realization that we must leverage the value of unmanned systems across the full range of naval missions—not to pursue "unmanned" for the sake of "unmanned" in a zeal to be more technologically advanced, but because it makes sense, taking us to the next level and beyond. As natural complements to our existing ships, aircraft, and submarines, unmanned systems bring the ability to efficiently increase both the capacity and capability of our force; there are missions where unmanned will bring comparative advantage over existing manned counterparts. In man–machine lash-ups, unmanned technology will take us even further.

Against the backdrop of an increasingly dangerous and volatile world, unmanned systems offer an opportunity to meet defense requirements at every level. Making this case, and making headway on mainstreaming unmanned across all warfare domains, begins with understanding the most fundamental aspects of warfare. Through this deconstruction, the value-added of unmanned becomes readily apparent, cutting through existing practices, communities, domains, and mission sets—all sources of friction when introducing disruptive technology. If we make this case effectively, our force and its many constituents will press to mainstream unmanned as expeditiously as possible. With bottom-up energy and creativity teamed with top-down leadership and fiscal support, we have the best chance to harness unmanned's potential. This is an imperative in a world where competitors and adversaries already are moving out with unmanned technology.

To Understand — *So what? . . . Then what?*

When we think about what we do in the realm of warfighting, it comes down to four essential elements: observing, orienting, deciding, and acting—the OODA loop. Air Force Colonel John Boyd crafted this concept in part from observations of air combat engagements in the 1950s, but its relevance is more broad, and scalable from the tactical to the strategic. In simplest form, we "observe" with sensors, we "orient and decide," then we "act" with effectors. This process takes place across all domains and is iterative. Technology is both accelerating and fusing the steps, taking us to the point of forecasting.

Marine Lance Cpl. Benjamin Cartwright launches the Instant Eye MK-2 Gen 3 unmanned aerial system during an exercise for Marine Corps Warfighting Laboratory's Marine Air-Ground Task Force Integrated Experiment on Camp Pendleton, Calif., July 9, 2016

Increasingly, it is not so much the "with what" (the province of things and the communities that employ them) and the "where" (the domains in which we operate), but rather the "how" and the "how fast." The result is to *understand* and then take appropriate action, faster than the adversary and inside their OODA loop. Protecting one's decision process while confronting the adversary's is increasingly valued today; it is a foundation for both information warfare and the growing realm of electromagnetic maneuver warfare.

Unmanned brings game in each phase of the process, across all domains (traditional and nontraditional), and in doing so improves the speed of response and subsequent ability to adapt—faster than the adversary. Ultimately, the ability to see farther, understand more quickly, act faster, and adapt continuously become the essential elements of a winning team in today's fast paced threat-filled environments. Unmanned systems are key elements in realizing a learning warfighting system that senses, evaluates, acts and, adapts continuously.

If we accept that *the main thing* is to understand—and to be able to take appropriate action, faster than the adversary—then we must plumb our system and processes to function as frictionless as possible, and we must populate these systems with platforms, vehicles, and payloads that permit us to fight in constantly adaptive ways. The ability to adapt as rapidly as possible, with as little friction as possible, with systems and lash-ups that permit adaptability—by design—is essential to winning in today's fast-paced battle environments. This concept is not new. The value of "plug-and-play" is well established in the consumer world as an efficient means to leverage rapidly evolving technology. Coupled with modularity and open architecture, these tools can be put together in adaptive, creative configurations producing *new ways*; and the tools themselves can be adapted, leveraging the best that technology offers, providing *new means*. This approach arms us to first survive, then operate, and ultimately prevail in an increasingly contested world.

Warfighting Toughness

Speed of action and agility are valued in a fight. Improved speed can be realized both in terms of executing *faster* and by executing *differently*, using the same things in new ways. A prime example is how we think about what it takes to execute successfully at the tactical level. Traditionally, it is a linear process progressing through "find, fix, finish"—the sequential steps to consummate full mission execution. Technology and the speed it offers bring nonlinear and cross-domain opportunity. The prospect of executing faster through increased connectivity and multipath solutions is here now.

Sea Hunter*, an entirely new class of unmanned ocean-going vessel gets underway on the Williammette River following a christening ceremony in Portland, Oregon*

Unmanned systems can be an efficient means to populate connection points. Increasing connection points—or nodes—both manned and unmanned, brings density and resilience to our warfighting architectures, whether they be systems, systems-of-systems, or services on demand, and with it the means to prevail in contested environments. Unmanned systems can populate nodes in an increasingly connected/connectable force, bringing the ability to adapt more rapidly to changing environments.

Unmanned systems also bring the possibility of disaggregating functionality for the larger purpose of enabling dispersed fleet operations over much larger areas—scalable and tailorable to ever-changing missions and threats. Over time, many, if not most, of our ships, submarines, and aircraft have evolved into multimission systems, highly capable but also concentrated and expensive. Disaggregating the functions of sensing, understanding, and effecting with unmanned systems brings the potential to more efficiently mass effects without massing force, increase reach, and present the adversary with operational dilemmas.

Value Added

Unmanned systems largely have evolved by matching warfighting need to emerging technology—a requirements pull. Whether as an immediate *extension* to an existing platform, to see over the hill, extend beyond the visible horizon, or augment existing sensors, they've expanded reach in a linear manner. The ability to *distribute and net* unmanned systems also has demonstrated great value, bringing with it improved spatial coverage, to include cross-domain opportunities and reach. This compounds the linear contribution even further. Ultimately, with improvements in autonomy comes the prospect of *human–machine collaborative teaming*, which may well equate to a step change improvement in capability and capacity when compared to forces composed of manned systems exclusively.

Together, these three aspects span the value-added proposition of unmanned systems, natural complements to our existing manned force vice outright replacements. Along this continuum of application is a corresponding relationship that shifts from human-assisted to human-supervised and ultimately to human–machine collaborative teaming. As unmanned systems' use and reliability grow, so too will the confidence we place in them. Trust will drive the pace of man–machine teaming within the larger context of human command and increasing levels of machine control executing human intent.

Fighting at Machine Speed

Sailors unload an underwater unmanned vehicle during mine countermeasures training operations aboard the USS Ponce *(AFSB(I)-15)*

The case for unmanned rests in how it brings value to existing capabilities. Ultimately, fighting at machine speed is to combine what humans and machines do best, to create a sum greater than the parts. Unmanned systems make this vision executable. Unmanned systems complement manned through a continuous process of cognition and execution, where machines and humans interact seamlessly—the essence of teaming.

The speed of calculation and raw processing power machines bring in a deterministic realm coupled with the skill, imagination, and wisdom of humans operating in chaotic environments results in better decisions faster. In the fights of today and into the future, the side that harnesses this lash-up most effectively will prevail. With our fusion of technology and talent, coupled with a warfighting philosophy that values initiative, we're the best equipped force to reap these benefits. A well-trained fighting force armed with these *ways* and *means* becomes super-empowered down to the mission command level, a combination hard to beat.

Editor's Note: USNI will be publishing a three-part series of execution plans—for undersea, aviation, and surface—in upcoming issues of Proceedings.

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