

Delivering Force Design 2030

The MAGTF unmanned aerial system expeditionary (MUX) program
by LtCol Alex Ramthun & Maj David Zyga

As the Marine Corps begins to transform and modernize in accordance with *National Defense Strategy* and *Force Design 2030*, new opportunities have surfaced to rapidly develop and field force-multiplying capabilities to the Marine Littoral Regiment (MLR). The Commandant of the Marine Corps views an effective MLR as “built around human-machine teaming, leveraging AI and unmanned systems, to the maximum extent possible.”¹ As a result, the MAGTF Unmanned Aerial System Expeditionary (MUX) program has emerged as the Commandant’s top aviation acquisition priority to support Naval warfighters in both littoral operations in contested environments and expeditionary advanced base operations.² A family of unmanned systems and capabilities that operate in a complementary manner, MUX plays the critical role of “quarterback” in the maritime domain’s rapidly evolving future operating environment. With primary missions such as airborne early warning, communications and data networking/relay, intelligence, surveillance, and reconnaissance (ISR), electronic warfare (EW), and persistent offensive air support, MUX provides a highly agile and lethality-enhancing “system of systems” capability to support the naval force during contingency operations against peer adversaries.

In October 2020, the Marine Corps received approval for an Assisted Acquisition Approach (AAA) to procure the cornerstone MUX family of systems capability: the MQ-9A Block 5 Extend Range “Reaper” Group 5 Medium-Altitude Long-Endurance (MALE) UAS. The first of several complementary

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A VMU-1 MQ-9 Reaper prepares for flight operations in support of U.S. Central Command.
(Photo courtesy of Col James Frey.)

unmanned air vehicles to execute the MUX strategy, the accelerated launch of the Marine MQ-9A Reaper program and development of its unique payloads represents an important achievement on which to model future major acquisition efforts. Specifically, the Navy and Marine Corps team of stakeholders, to include Headquarters Marine Corps, Department of Aviation, Headquarters Marine Corps, Combat Development and Integration (CD&I), and Program Executive Office for Unmanned Aviation and Strike Weapons, set the conditions for success of the MUX program through three distinct actions.

First, the stakeholders rapidly created fully aligned and supported MUX program requirements and acquisition priorities. By quickly attaining alignment on an achievable set of starting conditions, the stakeholders were able to stimulate a transition from the conceptual phase of the effort to actual program execution in less than six months.

Second, the team of stakeholders leveraged standing Air Force capital investments and contracting solutions to procure the MALE component of the MUX family via an innovative AAA; by tailoring the typical Defense Acquisition System (i.e., DODI 5000 series)

strategy, the MQ-9 program began at a post-Milestone C position, eliminating three to five years of traditional pre-Milestone C efforts.

Finally, the Marine Corps strategically placed Marine UAS pilots and aviation acquisition officers into critical program management and leadership roles within the key MUX strategy execution stakeholder: the Multi-Mission Tactical Unmanned Aerial Systems Program (PMA-266). Providing critical operational and technical expertise, unique knowledge of Marine Corps stakeholders, and exceptional acquisition acumen, these professionals have ensured the effective execution of the multi-billion-dollar MUX program of record in accordance with Marine Corps' vision, priorities, and interests. These combined actions have resulted in the effective development and fielding of a new combat capability, critical for the future vision and transition of the Marine Corps, at an exceptional speed. Thus, the MUX program should be used as a roadmap for the acquisition of complementary capabilities supporting *Force Design 2030*.

Early MUX Program History

The Marine Corps has historically focused on acquiring UAS capabilities with potential for conducting tactical expeditionary operations, such as: RQ-2 Pioneer, RQ-7 Shadow, and RQ-



An artist's rendition of a Marine MQ-9A Block 5 Reaper conducting a mission in the U.S. Indo-Pacific Command Area of Responsibility. (Image courtesy of General Atomics Aeronautical Systems, Inc.)

often resulting in reduced form factor, operational range, endurance, payload capacity, electrical power available, and onboard computing capacity. Overall, these systems are capable ISR platforms; they carry effective electro-optical and passive sensors but maintain limited operating ranges of less than 100nm and lack capacity for large/powerful payloads and munitions.

To address the capability gaps inherent to the Group 3 family of systems, the Marine Corps developed the

2. Long-range, persistent multi-sensor air reconnaissance and surveillance.
3. Long-range, digitally interoperable secure communications network.
4. Long-range, armed aerial escort.
5. Long-range, all weather, persistent offensive air support.
6. Over-the-horizon early warning.
7. Tactical transportation for small unit sustainment.

The ICD also suggested that no single platform would be capable of meeting all required performance parameters and suggested an alternative "Family of Unmanned Aircraft Systems" (FoUAS) approach to closing all capability gaps. With an emphasis on seabasing requirements, early development began with priorities for investigating Group 5 (greater than 1320 lbs maximum gross takeoff weight and operating altitude greater than 18000 ft) air vehicle solutions with tilt-rotor, tilt-wing, or tail-sitter vertical take-off and landing configurations.⁴ Early concepts failed to meet ICD performance parameters and incurred subsequent increasing design complexity and technical risk. Unwilling to jeopardize other high priority aviation programs, the Service struggled to provide consistent baseline funding for continued MUX design development. With a growing technical risk and unclear strategy for MUX, Congress

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21 Blackjack. In addition to operating alongside forward deployed ground forces, the RQ-2 and RQ-21 also have shipboard capabilities. By fielding these Group 3 systems (a maximum gross weight of 1,320 pounds), the Marine Corps accepted performance tradeoffs in exchange for mobility.³ The ability to transport systems via tactical vehicles results in size, weight, and power trades,

MUX requirement, culminating with validation and approval of the Initial Capabilities Document (ICD) by the Joint Requirements Oversight Council in 2016. The ICD described seven critical capability gaps inherent to future MAGTF/Naval Force operations in anti-access/area denial environments:

1. Long-range, persistent electromagnetic spectrum operations.

applied significant program marks to the budget, further stunting the development of bespoke air vehicle solutions.

MUX Requirements and Acquisition Priority Alignment

Both the *2018 National Defense Strategy and Force Design 2030* provided a new sense of urgency and energy for the MUX program by posturing the Marine Corps to support great power competition and the wider employment of unmanned aviation assets. The Capabilities Development Directorate (CDD) of CD&I reprioritized requirements for MUX, focusing on fielding Airborne Early Warning, ISR, EW, and Data Networking/Relay capabilities over Offensive Air Support and Cargo/Logistics Transport solutions. An April MUX requirements clarification letter codified these changes, which also deprioritized the requirement for shipboard operations and emphasized the need for a high Technology Readiness Level air vehicle solution. Additional guidance from the Commandant of the Marine Corps in 2019 to rapidly field cost-effective MUX air vehicle solutions further refined the direction of the effort.

With requirements established in 2020, the MUX program stakeholders quickly met to collectively realign to a new set of baseline acquisition program priorities: schedule, cost, and performance. First, the stakeholders established schedule as the top program priority. Because of the feverish pace of peer adversary military innovation and the accelerated requirement to enhance MLR training, the Marine Corps required MUX early operational capability (EOC) solutions to field by the end of fiscal year (FY) 2023. Second, MUX cost was declared as a close-second priority to program schedule. Marine Corps divestments from legacy systems provided a fixed program budget to rapidly develop and procure MUX FoUAS capabilities.⁵ Finally, with schedule and cost acting as fixed variables in the program acquisition baseline, system performance became the trailing MUX program priority. As a result, the stakeholders would use the system performance variable to act as



A VMU-1 MQ-9 Reaper returns from a mission in support of U.S. Central Command. (Photo courtesy of 1stLt John Coppola.)

the trade space for all key program decisions. These clearly defined and firmly established program acquisition priorities focused the stakeholders to rapidly take actions for MUX next steps.

The MALE Assisted Acquisition Approach

With technical requirements and acquisition priorities in place, the stakeholders then focused efforts on creating an optimal strategy, grounded in speed, to procure the first MALE Group 5 component of the MUX FoUAS. Typical and traditional acquisition strate-

decision and projected manufacturing lead time would deliver the MALE capability after threshold EOC.

In addition to schedule risk, beginning a Group 5 UAS program from the ground up would require significant capital and human resource investments for the Marines. With only fixed funding from internal Marine Corps divestments of legacy programs, the Marine Corps lacked the capital to create and sustain a new and robust program structure in a short period. To mitigate both schedule and cost risk, PMA-266 developed an innovative acquisition strategy

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gies normally require five to ten years to develop and deliver capabilities to the operating forces. In the case of MUX, with schedule as the top priority and EOC only three years away, PMA-266 explored rapid acquisitions approaches, such as Middle Tier Acquisitions and Other Transaction Authorities, to meet the aggressive fielding timeline. However, these rapid approaches, because of the requirement to develop a new air vehicle, still required a minimum of two years for development efforts. Regardless of the final MALE air vehicle selected, the Milestone C production

within the *DODI 5000.02* framework, called an AAA. This strategy enabled the Marine Corps to partner with another Service to conduct an interservice acquisition. In this case, the servicing agency and the Marine Corps would enter into an agreement, where the servicing agency performs acquisition activities on the Marine Corps' behalf. Given the requirement to rapidly field a proven Group 5 UAS, the MUX stakeholders found partnering with Air Force's MQ-9A Reaper Program via an AAA offered the Marine Corps many distinct advantages:

- Procuring a mature system with millions of proven combat flight hours, negating development and technical risk for the air vehicle.
- Capitalizing on previous and future Air Force robust capability developments to reduce Marine Corps investment costs.
- Repurposing air vehicle research, development, test, and evaluation funding to accelerate Marine Corps mission-specific payload development efforts.
- Leveraging a “hot” air vehicle production line, forging large investments normally required to purchase factory tooling, develop vendor relationships, conduct workforce training, etc.
- Using the MQ-9’s mature and wide global supply chain to reduce sustainment costs.
- Partnering with the Air Force program office to mitigate the duplication of human resource staffing.
- Capitalize on the ongoing Contractor-Owned, Contractor-Operated



Marines from VMU-2 launch a Q-21A Blackjack unmanned aerial vehicle during Exercise BLACK SHADOW at Fort Stewart, GA. The MQ-9 begins to replace Q-21s in 2021. (Photo courtesy of LCpl Gavin Umboh.)

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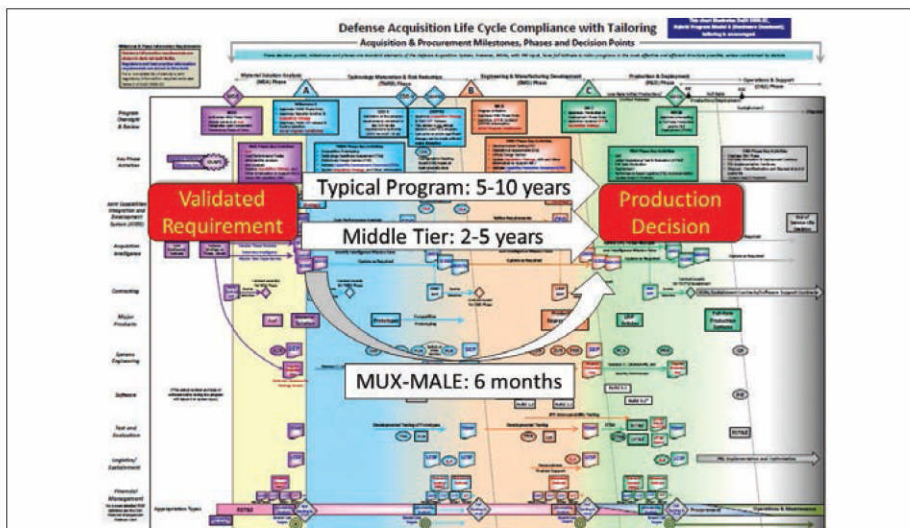


Figure 1. Marine Corps MQ-9 Assisted Acquisition Approach Timeline Comparison. (Figure provided by author.)

MQ-9 experience supporting Marine Corps interests in United States Central Command, specifically the 70 pilots and sensor operators the Service will have qualified on the MQ-9 by the end of FY21.

sity, high-demand talent pools. Because of the inconsistent program baseline funding and unclear requirements and priorities, no 8059 or 7315/7318 qualified officers, let alone any Marines, were assigned to PMA-266 and supporting

The Marine Corps must continue staffing PMA-266 appropriately in the future with 8059 and 7315/7318 Marines in order to ensure program success.

By using the AAA, PMA-266 tailored and streamlined a traditional acquisition strategy to support beginning the MALE air vehicle program at the Milestone C production decision. (See Figure 1). In October 2020, six months after finalizing requirements and program priorities, then Assistant Secretary of the Navy for Research, Development and Acquisition, the Honorable James F. Geurts, designated MUX/MALE a post-Milestone C Acquisitions Category II program of record. Since this event, the Marine MQ-9 program remains on track to deliver this critical capability to the warfighter on or before EOC.

Role of Marine Aviation Acquisition and UAS Professionals

Marine Corps MOS 8059 Aviation Acquisition Officers and 7315/7318 UAS Officers both make up low-den-

MUX prior to FY20. This created a sub-optimal situation, where other service officers and government civilians struggled to align with and advocate for Marine Corps' interests. When the MUX program began to rapidly expand to support priorities serving *Force Design 2030*, senior executives leveraged temporary manpower solutions to inject Marine Corps officers into PMA-266, ensuring Marine uniformed advocates and stewards for the Service's top aviation priority.

Upon arrival, these Marine acquisition and UAS professionals successfully guided the program office with regard to the accelerated sense of urgency, emerging warfighter requirements, and prioritizing products over processes. They leveraged their military career experience and credibility to quickly form positive relationships across the community

stakeholders, enabling all program advocates to align and execute decisions more effectively. They also brought immense expert operational knowledge, particularly unique to *Force Design 2030* and UAS operations, to mentor the cadre of career civilian acquisition professionals. Overall, the 8059 and 7315/7318 officers supporting MUX act as the key link between the program office and the operating forces. The Marine Corps must continue staffing PMA-266 appropriately in the future with 8059 and 7315/7318 Marines in order to ensure program success.

Conclusion

A pillar of *Force Design 2030*, the MUX acquisition program is good news for the Marine Corps. Strong alignment on program requirements and acquisition priorities has led to an accelerated pace of effort. Leveraging previous Air Force investments in MQ-9 and tailoring an AAA to procuring the MALE element of the MUX family has both significantly reduced schedule and cost risk for the Marine Corps. Placing 8059 aviation acquisition and 7315 UAS officers strategically into the MUX program office has secured stewardship and advocacy for the Marine Corps' top priority aviation effort. As other programs begin to scale to support *Force Design 2030*, they should use MUX as a strong example to follow.

Notes

1. U.S. Senate, *Statement of General David H. Berger, Commandant of the Marine Corps, before the Senate Armed Services Subcommittee on Readiness and Management Support*, (Washington, DC: September 2020).
2. Gen David H. Berger, "Force Design 2030 Annual Update," (Washington, DC: April 2021).
3. Chairman of the Joint Chiefs of Staff, *3255.01: Joint Unmanned Aircraft Systems Minimum Training Standards*, (Washington, DC: October 2011).
4. Ibid.
5. Gen David H. Berger, *38th Commandant's Planning Guidance*, (Washington, DC: July 2019).



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