The Need for Development Operations Squadrons

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Introduction

Since its formation in 1947, the United States Air Force has evolved into the premier standard when it comes to air combat and capabilities development. However, in our 73 years of controlling air supremacy, we as a service have grown accustomed to a sluggish, outdated acquisitions cycle that has led our operators to the state of complacency when it comes to receiving technology that is already years behind the "state-of-today;" this has tied our Air Force to the will of our partners in the defense industrial base (DIB). Additionally, there is a massive disconnect between our operators and engineers, and their ability to apply the latest capabilities to the problems that are being faced in the field. Organizations are popping up within the Air Force and the United States Government (USG) that are breaking the status quo of acquisitions and research, development, test, and evaluation (RDT&E). Within the Air Force we have organizations that are tasked to "exploit the current and future potential of existing… systems[1]" and "to address needs that involve mission applications and operational concepts requiring specialized expertise [for] projects on accelerated timelines[2]" including groups such as the Air Force Tactical Exploitation of National Capabilities (AF TENCAP) and the Rapid Capabilities Office (RCO).

However, organizations like TENCAP and the RCO do not solve the "common operator" issues that plague our bases. Interestingly, within the Air Force there exists a cadre of officer and enlisted professionals in both rapid acquisitions and technical specialties who are not being utilized to their optimal potential. Ideally, the Air Force could exploit the theory of Development

[1] Air Force Tactical Exploitation of National Capabilities (TENCAP)." Western States Legal Foundation, 2001, www.wslfweb.org/docs/roadmap/irm/internet/isr/cat/html/aftencap.htm#:~:text=(U)%20AF%20TENCAP%20resulted%20from,training%2C%20exercise%20participation%20and%20wargames

[2] "Rapid Capabilities Office." U.S. Air Force, 28 Aug. 2009, www.af.mil/About-Us/Fact-Sheets/Display/Article/104513/rapid-capabilities-office/.

and Operations (DevOps) from the software development world to our physical platforms. Enabling this practice on the front lines would allow the operators and engineers to build a bridge between mountains of R&D technologies and our current operational platforms, allowing the operator to pick and choose the capabilities that will serve them appropriately versus pushing a particular capability. This will prevent "valley of death" where technologies fall when being lobbed between the mountains. Establishing DevOps units would be a culture change that allows the US Air Force to gain an important asymmetric advantage against our adversaries.

The Status Quo: Today's state of RDT&E, Fielding, and Modernization

The DoD's and other agencies' acquisition processes rely on the Federal Acquisitions Regulation (FAR) as "the primary [process] for use by all executive agencies in their acquisition of supplies and services with appropriated funds[3]" since April 1984, with its history going back to the Armed Services Procurement Regulation of 1947[4]. Our procurement process is extensive, frightening, and at times burdensome (Figure 1). In addition, processes are in place to ensure that requirements and capabilities are being developed as intended. However, such rules add exponential time into delivery of a weapon system. For instance, the F-22 first flew as a test

[3] "Federal Acquisition Regulations System." Acquisition.gov, Aug. 2020, www.acquisition.gov/browse/index/far.
[4] U.S. Library of Congress. Congressional Research Service. e Federal Acquisition Regulation (FAR):Answers to Frequently Asked Questions, by Kate M. Manuel, L. Elaine Halchin, Erika K. Lunder and Michelle D. Christensen. R42826. 2015

platform in 1997, yet did not achieve Initial Operating Capability until 2005. After delivery, modifications and upgrades add onto the timeline for operator use.

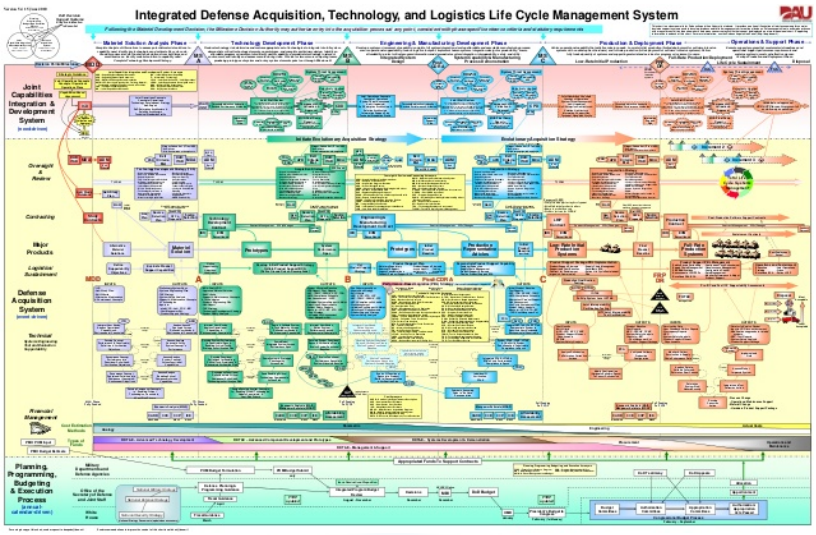

***Figure 1**: OSD AT&L Defense Acquisition Process Chart*

When weapon systems do receive updates, they are within the realm of overhauling a subsystem to expand a feature or to extend the lifetime of the weapon itself. Rarely does an air platform go into depot to add a feature that the operator requests. This is due to the nature of how the Air Force and DoD focus on the product and not the end user. In addition, historically the USG did not own much of the intellectual property of its systems, and it was not until 2016 that the Air Force would own the technical baseline of its products. In the end, the lack of tactically and technically minded personnel embedded at the operational level has created a frustrated warfighter and disconnected acquisition corps that will lead to loss of life if/when we are faced with conflict, particularly a near-peer competitor

DevOps and the DevOps Squadron

Before the outbreak of World War II, the British government cataloged the nation's scientist and engineers, and linked them with appropriate military elements to expedite the

RDT&E and exploitation against a technologically superior (at the time) Germany. With this forethought, the British were able to weaponize their greatest minds to quickly develop scale-tipping inventions like centimetric radar. Throughout WWII, the technical branches liaised with their military element to offer technologies and modify them in real-time based on field experiences. Reginald Jones, the father of Scientific and Technical Intelligence, later would say that "we could rarely give the services exactly what they needed, we could persuade them to modify their demands in the light of what we knew we could do so new weapons appeared quickly and yet the services had already thought out how to use them[5]". In 1939, British engineers embraced the aspects of DevOps before the term was officially defined.

In the software world, DevOps is the blending of "operations experts who work closely with development teams to get continuous deployment right; to build highly distributed systems that are resilient; and yes, to answer the pagers in the middle of the night when [things] goes down[6]."In the Air Force, the DevOps Squadron (DOS) would be the focal point for operators to work closely with technical and acquisition experts The driving force behind the DOS is a continuous feedback loop that "allow[s] high-speed delivery of high-quality solutions to accelerate the implementation of new [capabilities][7]." The vision in this paper is to organize the squadrons like the 53rd Test and Evaluation Group divides its units to particular missions and specialties. The main wing would be the mothership, to take requirements and input from in/out of the wing to the outside world of Air Force commands, AFRL, the DoD, and industry. Within the squadrons, there would exist the "boots on the ground" technical and acquisitions experts.

[5] Dilke, Fisher, director. *The Secret War*. BBC, 1977.
[6] Davis, Jennifer, and Ryan Daniels. *What Is DevOps?* O'Reilly Media, Inc., 2018.
[7] Hill, Thomas. Personal interview. 22 July 2020.

On the technical side, the Air Force can pull from a pool of officers and enlisted members, who are experienced in the various theories of their technical specialties and the operational application of their trade. These members would be the ones who present new findings and technologies to the operators. A key difference from what is normally done today is the technical integrators would not force a particular solution on the operator. Instead, this would be two-way conversation, allowing the engineers to expose the operators to what is out on the market in particular capabilities, and allowing the operators to assess how they would utilize said capabilities. Simultaneously, the operators would have direct access to technical experts to start conversations with needs and issues they experience.

On the acquisitions side, a particular System Program Office (SPO) would have a detachment of its people at the operational base where a weapon system sits to oversee the day-to-day execution of the modification and modernization efforts. For example, the B-2 SPO sits at Wright-Patterson AFB, Ohio where they oversee the execution of the enormous budgets and programs that keep the bomber flying. However, the SPO's detachment would be at the DOS at Whiteman AFB, Missouri where flying and maintenance operations occur.

The critical aspects that will promise success for the DOS and the Air Force as a whole is the integration of the DOS and SPOs, and the adaptation of the Digital Enterprise Environment. Anytime a modification or upgrade is performed on an operational air platform, extensive test and evaluation must be performed to guarantee safety of flight. This is even more scrutinized when the components being modified are flight critical like avionics or weapon controls. The critical relationship with a SPO's chief engineer will allow for "high-speed delivery of high-quality solutions." The implementation of the Digital Enterprise Environment will allow the DOS to "facilitate collaboration to improve integration of system of systems to meet the mission

needs and develop a platform and process to support Air Force modernization efforts across multiple functional areas." Additionally, it will "provide traceability of system requirements across systems' lifecycle; [exploiting] an environment that fosters innovation, experimentation, and demonstration from concept development to fielding; enable rapid prototyping to deliver capabilities faster and quickly respond to changing threats and requirements.[8]"

Conclusion

Today the United States Air Force relies on an outdated approach to fielding and modernizing our operational equipment that has its roots from the start of the Cold War. In contrast, our adversaries have embraced an asymmetric approach that has accelerated them to their current state. By empowering our operational units to adapt the DevOps concept, we can exploit our latest developments not only in the DIB but in the private industry, something that our near-peers do not necessarily have full access to exploit if certain technologies are under the ITAR listing or sanctioned under US law. Establishing the structure and authorities for a DevOps unit also enables us as an Air Force to exploit the technical talent pool we have in our officer and enlisted ranks. Additionally, by employing our own Blue Suiters to do this development, we as an Air Force retain organic capabilities and intellectual property, allowing us to do what and how we want with the solutions that we create. If implemented wisely with the correct stakeholders, the concept of DevOps and the deployment of such units will allow the Air Force to own the battlespace within Air, Space, and Cyberspace for years to come.

[8] Jones, Roger, *USAF Digital Engineering Strategy to Implementation,* 2019, PowerPoint Presentation

Appendix

For further inquiries on this topic, feel free to contact me at either of my emails at marcin.owczarczyk.1@us.af.mil or mzo4371@gmail.com. Thank you to the AUAR staff for allowing me to research this topic. In particular, I'd like to thank Maj Bryan Ralston and Mr. Thomas Hill for their help and mentorship.