Lessons Learned in Combined Developmental and Operational Test: Ten Years of F-15 Testing by the OFP CTF

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EXTENDED ABSTRACT: The expression “Combined Test Force” has become a widely used term across the US Air Force to describe a variety of organizational structures involved in flight test. In some cases, government and contractor workforces are “combined.” Other organizations combine test management (test planning, resourcing and reporting) with test execution. This article will focus on the combination of Development Test (DT) and Operational Test (OT) management at Eglin Air Force Base, Florida. Since its establishment in 2001, the Operational Flight Program Combined Test Force (OFP CTF) at Eglin has grown to be a successful example of how to integrate the management of DT and OT for Air Force fighters. This paper will explain how the OFP CTF operates, describe some of its success stories, and present lessons learned that are applicable to other platforms and possibly other types of testing.

Over the last 20 years, combat engagements have proven the F-15 to be an extremely robust and flexible platform that has not been equaled by any adversary. Both the F-15C and E versions undergo regular software and hardware upgrades on a 3 to 4 year cycle, replacing obsolete functionality and introducing new capabilities to keep these airborne assets relevant to current and planned combat requirements. These software "suite" upgrades are managed by the OFP CTF, located at Eglin AFB. The OFP CTF is a squadron-level organization that reports to both the 46th Test Wing and 53rd Wing for respective DT and OT management. DT funding and tasking come from the AFMC F-15 System Program Office (SPO) at Wright-Patterson AFB, Ohio, while OT funding and tasking come from the ACC Requirements Office (ACC/A8A) at Langley AFB, Virginia. The workforce in the CTF is an integrated mixture of military, government civil service and contractors, comprising roughly 100 individuals, with the positions divided approximately equally between ACC and AFMC.

Prior to the formation of the OFP CTF, F-15 test management and execution were spread across the country in separate organizations. The DT and OT progression was a linear, non-federated process that took place in various geographically and organizationally independent entities. This organizational construct meant that the transition from DT to OT resulted in a complete and simultaneous changeover of nearly all test personnel, including program managers, aircrew, and test engineers. This changeover resulted in an inefficient transition and contributed to habitually late fielding of software for the F-15. To mitigate the DT/OT changeover, an “OT Fam” (familiarization) period was often planned near the end of DT to give the ACC aircrews and maintainers time to become familiar with the new software and hardware before a formal OT evaluation began. However, this was often insufficient and typically OT units would still require an additional spin-up period between the end of DT and start of OT. An additional contributor to delayed fielding and cost overruns was OT rejection. When a new system started OT, it was common for ACC crews to find major flaws that required them to stop OT and send the product back to DT for a solution to be implemented and verified. Problems found in OT tended to disrupt schedules for both the ACC test units as well as the AFMC test units, which had often already begun to reconfigure their jets for the next test program. The OT phase for F-15 OFPs prior to Suite 5 typically stretched from 12 to 18 months due to these problems found late in the process.

Combining the DT and OT management functions into a single squadron-sized CTF at Eglin corrected the problems of this non-federated model. This action consolidated the Edwards and Eglin F-15 test fleet and co-located all primary DT and OT personnel and test program management functions at one location. Increased efficiencies and savings were almost immediately realized. The most significant change responsible for improving F-15 test management was the appointment of a single test project manager (PM), who was responsible for managing the entire OFP test evolution from the beginning of DT all the way through the end of OT. In addition, shared resources (aircraft, range resources, data and IT infrastructure) and test events between DT and OT are the most commonly understood benefits of combined, integrated testing. Critical to success is the decision for which events and resources are appropriate to share. Generally speaking, significant benefits can be leveraged by allowing the OT community to have an early assessment of the DT product, thus decreasing the risk of a flaw or deficiency remaining undetected until commencement of formal OT events. PMs must balance the benefits and risk by following this approach, but the accomplishments and lessons learned by the OFP CTF have provided noteworthy successes.

In addition to this foundational material, this paper includes a detailed analysis of the F-15 Suite 6 OFP test program by comparing the historical model for OFP testing to the current OFP CTF construct. Several efficiencies are discussed and analyzed, including the increase in product robustness, decrease in fielding timeline and significant financial savings. Other lessons learned from the OFP CTF's 10 year history will also be presented, including the relative value of investing in combined test management over combined test execution, why open communication is critical, and how the architecture of the team's "geography" matters. Future focus areas are briefly presented including a discussion of adding Air National Guard involvement in F-15C OFP testing to reflect that platform’s ongoing transition out of the Active Duty fleet, and the potential for expanding the F-15’s model of combined test management to other similar platforms like the F-16. With a proven model of combined test management that has saved as much as $24M for each 3-year OFP development cycle while still maintaining the effectiveness of DT and OT flight test execution, the efficiencies that could be realized by expanding this model to other platforms should not be ignored in today’s tight budget environment!