RESEARCH SUMMARY

Assessing Missile Defense Flight Test Plans

Between 2009 and 2019, the Missile Defense Agency (MDA) in the Department of Defense (DOD) conducted 37% of its ballistic missile defense system flight tests as scheduled. Researchers from the Institute for Defense Analyses (IDA) conducted an independent assessment to identify causes for cancellations, delays and modifications, and they provided recommendations for improvement.

A team of IDA researchers, led by Joseph Buontempo and John Hong, interviewed officials and assessed relevant documentation from MDA and DOD. Using an IDA-developed taxonomy, the team found that between 2017 and 2022, about two-thirds of flight test cancellations, delays and modifications appear to have stemmed from causes internal to MDA. The causes are equally split between intentional factors (e.g., test objective changes) and unintentional factors (e.g., developmental delays).

The team found that adjustments and cancellations may partly originate from an increase in MDA's ambition for testing. Flight test reports and interview subjects from DOD and MDA revealed an upward trajectory not only in the number of tests, but also in the complexity of test systems and scenarios. However, the expanded scope of objectives has not been matched with a similar expansion in funding or human capital. Further, test ranges, infrastructure, databases and software tools are aging, introducing additional challenges.

IDA also found that poor coordination between MDA and external parties contributed to flight test planning inefficiency. MDA requests feedback on plan updates at 23 different steps throughout the Integrated Master Test Plan (IMTP) — MDA's annual test planning document.

IDA

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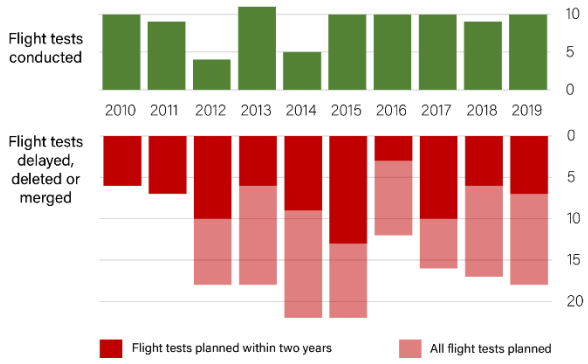


IDA analysis of flight test execution

The IMTP helps ensure that future tests are conducted in accordance with established standards and objectives. However, the iterative feedback process can be burdensome, causing some participants to skip opportunities to provide early feedback and leading MDA to make last-minute adjustments. Late changes to flight tests also stem from external testers being involved late in the detailed planning process for a specific test. When these testers and other external parties call for corrections near the test date, MDA's ability to adapt to unanticipated modifications deteriorates, worsening the prospects of timely execution. This situation can lead not only to test cancellation and delays, but also to the use of alternative testing methods that offer lower-confidence results than flight-based testing.

The IDA team proposed a number of actions that MDA can take to improve planning and evaluating flight tests:

— Assess the costs and benefits of allocating more time for pre-flight testing.

— Assess the necessity of stakeholder coordination at all 23 steps in the IMTP.

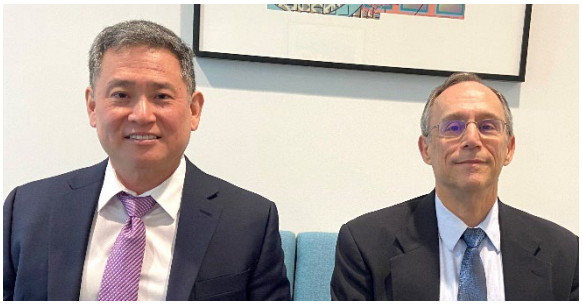
— Involve external testers in initial detailed test planning meetings.

— Develop a taxonomy to monitor flight test changes and use the results to improve future flight test planning and execution.

— Develop a traceable end-to-end mapping that links test objectives to verification so that progress can be measured.

— Establish a formal tracking procedure to better understand the degradation when relying on lower-confidence verification methods other than flight testing.

For more information, see IDA Paper P-30853.



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