Ensuring US National Aeronautics Test Capabilities

When NASA created its Aeronautics Test Program (ATP) in 2006, it gave the program a lofty mandate: not just to make certain that the agency is able to meet its own aeronautics testing needs, but to ensure that the United States has the test capabilities required to advance its position in aeronautics leadership. Timothy J Marshall, Deputy Director, ATP, reviews how this has led to a strategic plan for ATP and how this impacts its customers

At the time of ATP's creation, the strategic support and financial resources for NASA's ground test facilities were insufficient to ensure that strategically important aeronautics test capabilities in the United States were operating optimally, priced appropriately, and being positioned to meet future national aeronautics testing needs. NASA recognized that if it did not manage its unique national test resources effectively, economic and competitive processes would lead to inefficiencies and the possible loss of critical capabilities.

Composition of the ATP portfolio was based on research results published by the RAND Corporation in 2004 for NASA and the Office of the Secretary of Defense, titled *Wind Tunnel and Propulsion Test Facilities – An Assessment of NASA's Capabilities to Serve National Needs*. In that watershed report, many NASA ground test capabilities were categorized as strategically important to the nation and using that criterion as a basis, specific wind tunnel facilities were down-selected by NASA to comprise the ground test portion of the ATP portfolio. Subsequently, flight test capabilities in ATP were selected on the basis of analysis documented by NASA in a 2006 Program Decision Memorandum and were added to the ATP portfolio in 2007.

Now in its sixth year of operations, the Aeronautics Test Program continues to have its work cut out for it: its customer base has continued to shrink and facility utilization has declined by more than 50% from 2006 levels. This significant decrease is attributable to several factors, including: the overall decline in new programs and projects in the aerospace sector; the impact of computational fluid dynamics on the design, development and research process; and the reduction in research testing within a large sector of the ATP customer base—NASA's Aeronautics Research Mission Directorate in Washington, D.C. Retirement of the Space Shuttle Program and recent perturbations of NASA's Constellation Program will only exacerbate this downward utilization trend.

Utilization is a critical factor for ATP because the program relies on customer-generated revenue to recover a substantial portion of its facility operating costs. Sustained reductions in utilization are an indicator of excess capacity and, in some cases, low-risk redundancy (i.e., several facilities with similar capability and overall low utilization that can be consolidated with little risk to the nation). However, it must be noted that low utilization may not necessarily translate to lack of strategic importance, as some

facilities with low utilization are nonetheless vital in the long run. Therefore, it is crucial that ATP periodically assess which of its test capabilities are strategically important, address the challenges associated with divestment (if necessary) and determine a viable approach to both sustainment and improvements of the remaining infrastructure.

Strategic concerns for ATP are rooted in several areas of program responsibility, including: ownership and management of capabilities; understanding national aeronautics research testing needs; forecasting test capability demand; sustaining a competent workforce; strategic alliances and partnerships; test facility health; test capability upgrades; and user price stability.

Given the significance of these national concerns, it becomes imperative that ATP, on behalf of both NASA and the nation, right-size its portfolio of aeronautics test facilities and fill the capability gaps between current and future test requirements. Fiscal realities imply that low-risk redundancies must be eliminated to free up funds. Users fees must be properly set to ensure adequate revenue as well attract the work that advances U.S. aeronautics. And finally, explicit reliance relationships and agreements must be established between entities that have previously operated independently: today neither NASA, nor the Department of Defense, nor the private sector can afford to provide independent capabilities.

Appropriately setting the price for user occupancy will help generate needed revenue to defray the cost of ownership for ATP's national test infrastructure while. Reducing low-risk redundancies and eliminating associated costs will enable NASA to invest in new technologies and capabilities in support of U.S. aeronautics leadership in the future. Establishing effective reliance agreements across NASA and the Defense Department will help ATP ensure the best possible use and sharing of the nation's aeronautics test capabilities. All of this will require a new level of cooperation and a long-term view from both test customers and stakeholders. It also calls for a forward-looking strategic plan that can guide progress and assure transparency. Completed in October 2009, the ATP strategic plan flows from its vision and mission and is aimed at achieving program goals and objectives over the next five years.

The ATP strategy is built around several core principles. For example, the program is committed to national stewardship and ensuring healthy and available aeronautics test capabilities - not just for NASA but also for the nation. Its capabilities must evolve to maintain relevance and meet future test requirements. The program is committed to the principle of availability, not necessarily ownership. In other words, NASA does not have to own and operate all needed test facilities - ATP will ensure the agency can access them through strategic partnerships and reliance agreements. ATP is also committed to the public good. That is, NASA has a role in providing test capabilities that are not economically viable as an independent business and not available elsewhere. And finally, ATP believes that its test capabilities can support aeronautics research and development as well as test and evaluation.

One of ATP's most significant objectives involves the National Partnership for Aeronautics Testing (NPAT), established by a memorandum of understanding in January 2007, between the NASA Administrator and the Undersecretary of Defense for Acquisition, Technology, and Logistics. The NPAT

Council is co-chaired by NASA's Associate Administrator for aeronautics research, Dr. Jaiwon Shin, and the Defense Department's Director of the Test Resource Management Center, Dr. John B. Foulkes. Council members include senior government officials from NASA and the U.S. Army, U.S. Navy, and U.S. Air Force.

The objective of the NPAT Council is to provide a forum for the Defense Department and NASA to consult with one another and with other affected activities to facilitate the establishment of an integrated national strategy for management of aeronautical test facilities owned or operated by both parties. The NPAT Council conducts studies, addresses issues, and develops approaches and strategies for close cooperation between the parties with respect to the management and operation of aeronautical test facilities.

Significant collaborative activities resulting from the NPAT include establishment of the National Force Measurement Technology Competency at NASA's Langley Research Center in Hampton, Va., and the joint testing of a wind tunnel model in NASA and Defense Department transonic wind tunnels.

The Facility Aerodynamics Validation and Operations (FAVOR) model project recently conducted cooperative wind tunnel testing that will provide engineering insight into facility processes, data reduction, flow quality and comparative data assessment for several important U.S. transonic test facilities. Comparison was made using test data obtained on the same model/balance/sting in the Air Force's Arnold Engineering Development Center 16T, NASA's Ames Research Center 11 foot, NASA's Langley Research Center NTF, and NASA's Glenn Research Center 8x6 Supersonic wind tunnels.

Because U.S. leadership in aeronautics depends on ready access to technologically advanced, efficient and affordable aeronautics test capabilities, the Aeronautics Test Program has been busy ensuring, mostly through strategically directed investments, that NASA’s aeronautics test capability is available, affordable and reliable. The program has fostered healthy and highly effective working relationships involving NASA research and development programs, NASA research centers and the U.S. aerospace industry. ATP has also established a strong, high-level partnership with the Defense Department as well as working relationships with several of its field centers.

However, the program continues to face challenges, some more formidable than those facing the program when it was first established. Opportunities and threats abound, particularly with respect to ATP’s aging facilities, long-range forecasting of wind tunnel test demand, workforce issues and deciding the best approach to investing in new capability across the portfolio. Its new five-year strategic plan will help ATP continue progress in these and other vital areas and focus its energies and resources on the capabilities and opportunities that prove to be the most strategically important for both NASA and the nation.

For more information on ATP, including a comprehensive description of its capabilities, please see http://www.aeronautics.nasa.gov/atp/index.html.

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