



Launch requires a series of intricate processes working in concert to ensure successful results. In the national security space (NSS) arena, launch success is not only desirable, but critical to ensuring the nation's space capabilities. Due to the detailed and thorough inspection process that these unique payloads require before being ready to go into space, NSS missions have traditionally required an extensive amount of preparation time.

The purpose of Agile Launch is to identify opportunities to create and deliver increased value in mission assurance processes in shorter timeframes without causing additional risk. Aerospace developed the original Launch Verification Matrix (LVM), a task list that is used to certify that each launch vehicle is ready for its spaceflight. The LVM has been used to support the Atlas V and the Delta IV families of evolved expendable launch vehicles and has been adapted for the SpaceX Falcon 9 GPS-III mission to ensure the flawless mission assurance that national security space depends upon.

Working from the LVM baseline, Aerospace is evolving mission assurance processes utilizing technological advancements, efficiency opportunities, and educated resource allocations to meet the needs of the emerging fleet of launch vehicles preparing to serve national security space. Agile Launch is more than an adaptation of existing tools; it is the opportunity to rethink the mission assurance process in a rapidly developing industry.

### Why Agile Mission Assurance is Essential to National Security Space

This is an exciting time for space. New entrant launch systems are being developed and built with different paradigms and processes and increasing levels of automation and process control. Increasing numbers of non-NSS launches are driving the need for more efficient mission assurance to uncover potential issues early and avoid delay, to tailor approaches for launches with a customer-determined higher risk tolerance (adaptive mission assurance), and to be responsive to emergent customer needs.

Agile mission assurance seeks to evolve Aerospace's processes by:

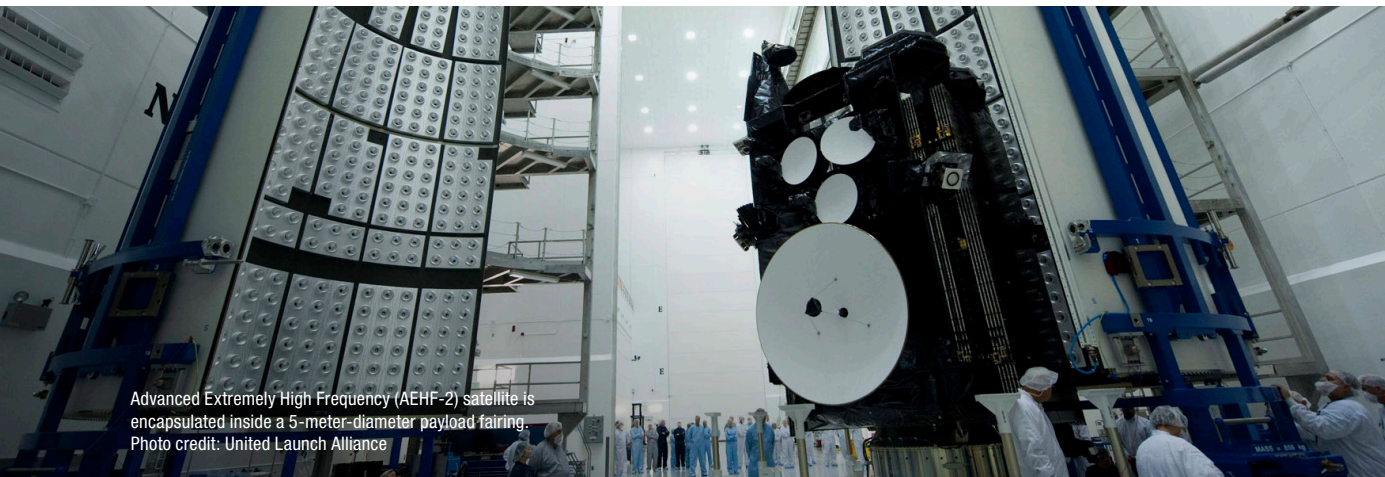
- Leveraging new technology and methods
- Evolving processes for disruptive influences
- Adapting to new acquisition strategies and business models
- Estimating risk for changing definitions of mission success



Falcon 9 lifts off from Launch Complex 39A (LC-39A) at NASA's Kennedy Space Center in Florida. Photo courtesy SpaceX.

### Agile Launch facts

- › Agile Launch identifies opportunities to create and deliver increased value in mission assurance processes in shorter timeframes without adding additional risk
- › Agile mission assurance is essential to the future of national security space (NSS) to ensure faster, more responsive launches
- › Aerospace provides leadership in Agile Launch with the development of processes like the Multi-mission Manifest
- › A standard Launch Unit, or Launch-U, will enable multi-manifest payloads to be configured more quickly and efficiently, giving mid-sized satellites more efficient launch opportunities



Advanced Extremely High Frequency (AEHF-2) satellite is encapsulated inside a 5-meter-diameter payload fairing.  
Photo credit: United Launch Alliance

## Multi-mission Manifest

Small payloads have traditionally been considered “secondary” to the “primary” larger payloads they have accompanied in a rideshare. However, the current paradigm shift toward disaggregation of satellite constellations has created new requirements for high-priority multi-satellite payloads. Focused on the best use of launch vehicle space along with the appropriate prioritization of missions, multi-mission manifest refers to the operational requirements and augmentations to primary systems that come from multiple payload approaches for small, medium, and large satellite vehicles.

These approaches include:

- Traditional ridesharing with a primary payload
- Co-manifest, where two payloads of different design with the same mission priority are launched in the same payload stack
- Dual-manifest, where two identical payloads share a launch to orbit

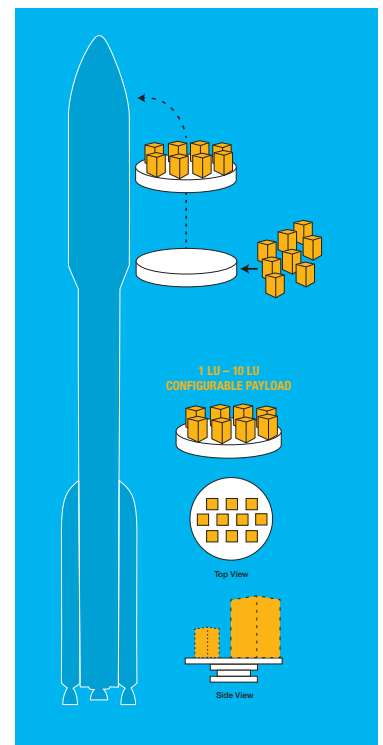
Significant changes are being incorporated into the technical and programmatic launch baseline to accommodate multi-mission manifest, offering a variety of enterprise solutions for resilience to national security space systems.

## Launch-U

For developers of midsized small satellites—approximately the size between a toaster and a small refrigerator—the biggest hurdle is not creating the satellite itself but launching them into space. Launch costs are expensive so these midsized smallsats often need to hitch a ride on a larger payload sponsored by government, civil, and commercial entities. Ridesharing on a payload adapter that can accommodate multiple satellites helps to make better use of cargo space on launch vehicles. However, integration issues remain as each individual small payload has its own size and engineering requirements. This also requires an extensive time commitment to negotiate the satellite’s placement and resolve any integration issues with the larger payload. Developing a standard Launch Unit, or Launch-U, for midsized smallsats will enable rideshares to be configured more quickly and efficiently, resulting in more launch opportunities at a lower cost. Aerospace is driving the Launch-U conversation by assembling representatives from industry, academia, and government to set the midsized smallsat standard.

## The Aerospace Corporation

The Aerospace Corporation is a national nonprofit corporation that operates a federally funded research and development center (FFRDC) and has approximately 4,000 employees. The Aerospace FFRDC is aligned to support the most critical programs of the Department of Defense and the nation, and to serve as its customers’ innovation partner across the space enterprise. Consistent with the competencies outlined in our sponsoring agreement, Aerospace provides strategic value through independent, intellectually rigorous, relevant, and timely products and services. With three major locations in El Segundo, Calif.; Colorado Springs; and Washington, D.C., Aerospace addresses complex problems across the space enterprise and other areas of national significance.



An artist's concept of a Launch-U payload configuration.