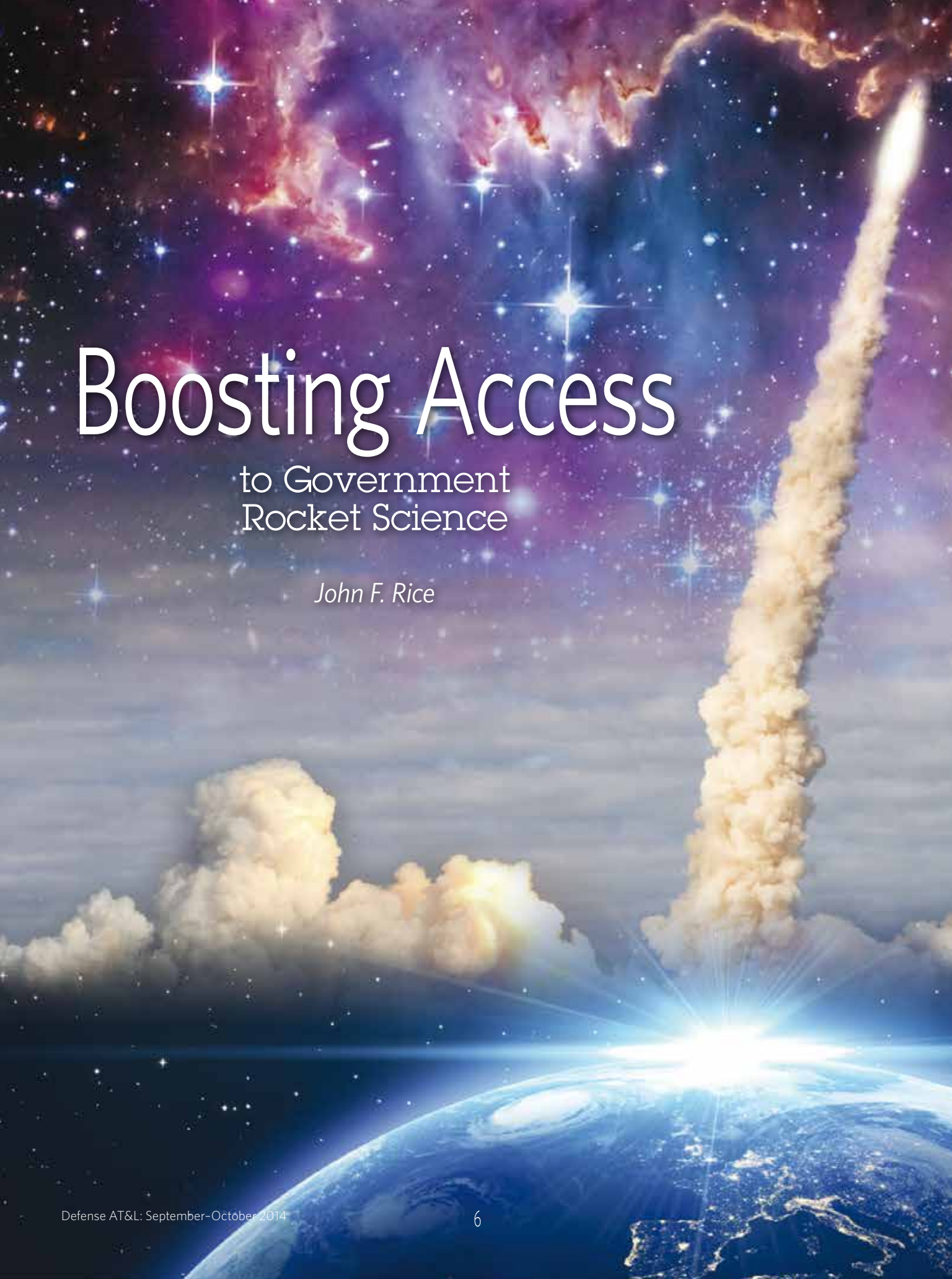

# Boosting Access

## to Government Rocket Science

*John F. Rice*

Retirement of the Space Shuttle and Constellation programs has created significant ripple effects in Department of Defense (DoD) missile and rocket acquisition. Notably, the decline in propulsion system skills and capabilities has led to a decrease in technology advances. This is exemplified by DoD's reliance on Russia for Atlas V rocket engines to launch military payloads. Enter the Defense Acquisition University (DAU) and its Mission Assistance for the National Institute for Rocket Propulsion Systems (NIRPS). DAU's South Region led a study for NIRPS, a joint DoD-NASA virtual organization, to assess issues relating to the propulsion industrial base. The results include an innovative framework for developing flexible, yet binding, agreements that promote commercial access to government resources.

NIRPS was established by NASA as a forum to address Section 1095 of the 2012 National Defense Authorization Act (NDAA). The Act directed development of a national rocket propulsion strategy to foster collaboration and coordination among multiple DoD components and NASA to reinvigorate the propulsion industrial base. Systems potentially benefitting include Atlas and Delta launch vehicles, the Space Launch System (SLS), the Theater High Altitude Air Defense system, Patriot Advanced Capability–3, Helicopter Launched Fire-and-Forget Missile System, Advanced Medium-Range Air-to-Air Missile, and Javelin.

A recent example of public-private collaboration is NASA's use of a Space Act Agreement (SAA) to enable Sierra Nevada Corporation (SNC) access to the Agency's expertise. Specifically, the Marshall Space Flight Center (MSFC) in Huntsville, Ala., will support SNC in its development of the Dream Chaser spacecraft. SNC has had a relationship

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with MSFC, through an SAA signed in 2012, using Marshall's expertise and resources to perform wind tunnel testing on various configurations of the Dream Chaser.

SAAs are flexible partnerships that allow NASA to work cooperatively with industry to develop and transfer technology in support of national priorities and NASA's mission. They are derived from the Space Act of 1958, which authorizes NASA to enter into "other transactions" outside of contracts, leases and cooperative agreements. These agreements are collaborative research and development efforts that provide for an ongoing exchange of NASA assets—personnel, use of facilities, expertise, equipment and technology—to private partners. Federal Acquisition Regulation (FAR) compliance is waived for SAAs.

Similar laws and regulations led to DoD agreements with commercial users of its resources. For example, Title 10 of U.S. Code § 2539b addresses Public-Private Partnering Authorities to make available U.S. Army facilities, equipment and personnel for private users. The 2539b-derived requirements, unlike those of the SAAs, require FAR compliance.

The U.S. Army Aviation and Missile Research Development and Engineering Center (AMRDEC) at Redstone Arsenal, Ala., has developed a § 2539b-derived Test Agreement for propulsion testing at its ranges. Industrial partners taking advantage of this approach at AMRDEC include small-to-large aerospace and defense firms. Range assets include solid rocket stands, liquid rocket stands and an explosives test range.

While these statutes and associated agreements have been employed effectively, they were not universally designed for efficiency. As a result, DAU was approached by NIRPS to conduct experimental development and to review such acts/agreements—specifically for the U.S. rocket propulsion industry—and recommend a streamlined framework. NIRPS is especially interested in simplifying agreements since the retirement of the Space Shuttle has led to deterioration of the national propulsion industrial base. Streamlined government-industry agreements enable both new entrants and existing suppliers to access valuable government resources in a timely, coordinated manner so as to expedite the development of new technologies.

## Approach

DAU completed systematic interviews in 2013 to identify and assess public-private partnerships established by the DoD and NASA. Such partnerships enable the propulsion industry to access U.S. government facilities and expertise. Given the scope of this task, the study was limited to propulsion test activities. However, extension to propulsion research, development, manufacturing and operations is possible with the framework.

Examples of agreements in use by contacted organizations (see Table 1) are provided below. These existing mechanisms and their guiding statutes accommodate a variety of scenarios for engaging industry.

***DoD:***

- Test Service Agreement (U.S. Army)
- Test Agreement and Cooperative Agreement (AMRDEC)
- Department of Transportation/Federal Aviation Administration Launch Act (WSMR)
- Cooperative Research and Development Agreement (NAWC, WSMR)
- Commercial Service Agreement (NAWC)
- Test Requirements Document (RTC)
- Test Use Agreement (RTC)
- Other transactions (U.S. Army) (10 U.S.C 2371)
- Letter of Agreement (WSMR/WSTC)

***NASA:***

- Space Act Agreement
- Enhanced Use Agreement
- Commercial Space Launch Act Agreement
- Cooperative Research and Development Agreement
- Exclusive Use Agreement (permit, lease)
- Request for Information
- Transfer ownership via General Services Administration
- Shared use with other customer or government

### *Table 1. Government Propulsion Organizations Contacted*

- U.S. Army, White Sands Missile Range/White Sands Test Center (WSMR/WSTC)
- U.S. Army, Program Executive Office Missiles and Space (PEO M&S)
- Missile Defense Agency (MDA)
- NASA, Stennis Space Center (SSC)
- NASA, Marshall Space Flight Center (MSFC)
- U.S. Navy, Naval Air Warfare Center Weapons Division (NAWCWD)
- NASA, Michoud Assembly Facility (MAF)
- U.S. Army, Aviation and Missile Research Development and Engineering Center (AMRDEC)
- U.S. Army, Redstone Test Center (RTC)
- U.S. Air Force, Arnold Engineering Development Complex (AEDC)
- Federal Aviation Administration (FAA), Office of Commercial Space Transportation
- DAU Contracting Department and Engineering Department
- U.S. Army Corps of Engineers, Engineering and Support Center
- NASA Glenn Research Center, NASA Plum Brook Station
- U.S. Army, Army Materiel Command (AMC), Office of the Command Counsel

Atlas V launches third Advanced Extremely High Frequency Satellite for the U.S. Air Force in September 2013.
United Launch Alliance photo.

## Initial Findings

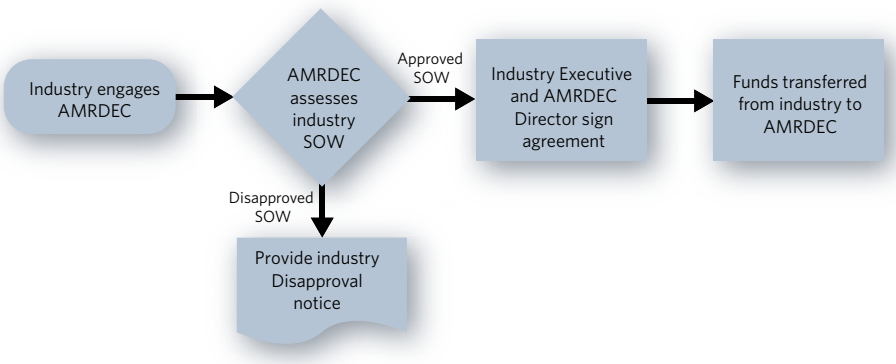
Templates for a subset of these agreements were provided as best practices by NASA and DoD organizations contacted. The samples demonstrated the practical tailoring of agreements that can be conducted specifically under the Space Act and U.S.C. 2539b. The AMRDEC Test Agreement is an example of a streamlined 2539b agreement through which the Army provides facilities and expertise. The agreement is typically shorter than five pages and has been used for laboratory demonstrations tied to testing. The industry user simply provides a statement of work (SOW) with expected level of effort to the test organization. This is then reviewed and approved or disapproved by an Army legal representative. The company president and AMRDEC Center Director co-sign the approved agreement, and work commences. The industrial partner then provides reimbursement to AMRDEC. Rates are determined at AMRDEC's leadership level. The simplified Test Agreement workflow is depicted in Figure 1.

Another noteworthy example, a 2539b-derived Commercial Services Agreement (CSA), was provided by the U.S. Navy's Naval Air Warfare Center Weapons Division (NAWCWD). Table 2 provides a description of the features and requirements of the CSA. These are common to most public-private agreements utilized by the federal government.

## Analysis and Recommendations

The structured interviews and example agreements revealed that NASA and DoD have significant experience with industry engagement and are making strides through use of the Space Act, Public-Private Partnering Authorities, the Commercial Space Launch Amendments Act of 2004 (49 U.S.C. § 70101) and implementations of such statutes. However,

### *Figure 1. AMRDEC Test Agreement Process*



## *Table 2. NAWCWD CSA Features*

Common features—From NAWCWD Web site

***Commercial Services Agreements (CSAs)***
***Purpose and Benefit***

A variety of vehicles encourage working relationships between federal laboratories and non-federal, U.S.-based commercial entities (e.g., private companies, state and local governments, and academic institutions). These agreements allow federal organizations to work with commercial customers to perform laboratory and range test events at DoD installations. The arrangement is win-win for government and industry.

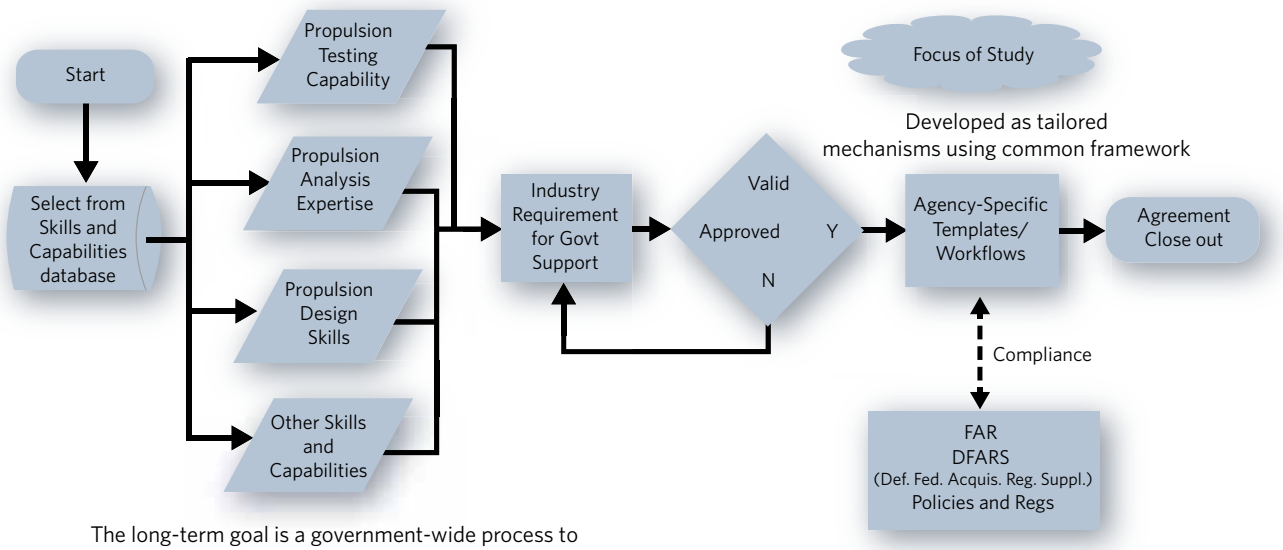
***General Requirements for CSAs***

- Must be in the best interest of the U.S. government
- Must be on a non-interference basis
- Must be cost-reimbursable with funding received in advance. Payments may be incremental
- Work cannot be guaranteed or warranted
- U.S. government must be held harmless against all claims
- U.S. government may not compete with private industry
- No other similar capability exists
  - Or the capability exists, but other sources cannot meet time requirements
    - Or other sources cannot provide adequate security or safety
    - Or other sources do not want the specific work
    - Or the only available U.S. businesses that can provide the needed services are also competitors
    - Or other sources cannot provide a unique combination of integrated products/services

the interviews yielded inconsistencies in the streamlining of government-industry agreements. The problem areas included both the formation and the execution of agreements—hence, the structure of the agreement and the workflow in getting agreements approved were identified as issues.

DAU explored a more adaptable solution to ensure binding mechanisms enable, rather than impede, utilization of infrastructure, expertise, equipment and support services. As a result, the following study question was posed: "Can a novel framework be devised to streamline binding mechanisms for industry's use of government rocket propulsion resources?" Initial study guidance from NIRPS was to explore a cross-governmental solution given the diversity of governmental agencies and activities across the propulsion sector. Since 2539b is DoD-specific and the Space Act is NASA-specific, the solution would need to accommodate a variety of scenarios while adhering to federal acquisition

## *Figure 2. Selection and Template Generation for Government Resources*



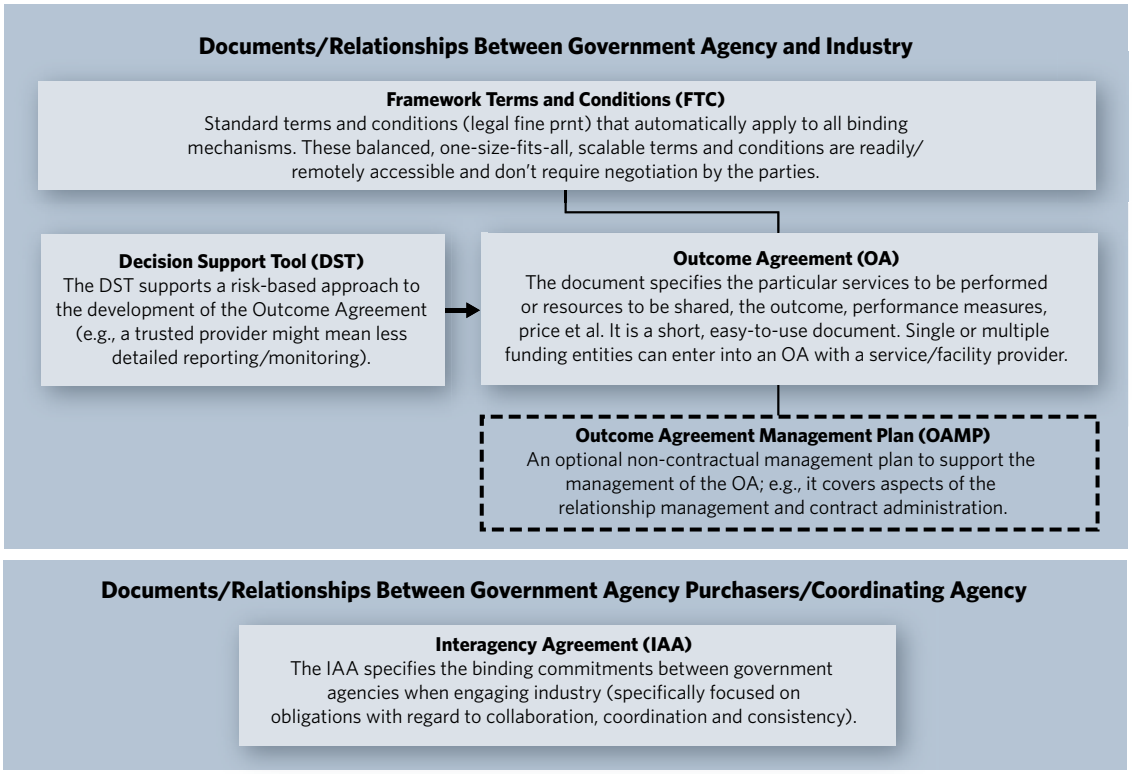

The long-term goal is a government-wide process to streamline industry access to federal propulsion assets.


Sierra Nevada Corp. recently announced the expansion of its Dream Chaser program team and scope of work in Huntsville, Ala., with the signing of an SAA Annex with NASA's Marshall Space Flight Center.
NASA photo.

requirements. A novel approach has been developed whereby capabilities- and skills-based templates could be chosen from a database (see Figure 2).

Using this process, a skill/capability could be chosen from a central repository and the "if-then" conditions that follow would be agency-specific or interagency-based. In Figure 2, various propulsion skills are depicted from an interagency database. The industry user could select the government resource needed to assist in product development. The requirement(s) for government support would then be proposed and subsequently validated by the government resource provider. Templates and workflows based on the Space Act, 2539b and related policies would be generated to yield a government-industry agreement.

## *Figure 3. Outcome Agreement Framework*



The U.S. Army utilizes Test Service Agreements to provide industry users with services for conducting tactical missile research, development and technology demonstrations.
U.S. Army photo.

The templates could then be structured using the Outcome Agreement Framework in Figure 3. This framework was derived from a model utilized by the government of New Zealand (www.procurement.govt.nz) for its private-public partnerships. The model was discovered during an extensive literature search and could be repurposed for this effort. It would yield generic mechanisms to accommodate a diversity of life-cycle activities, organizations and legal/contractual scenarios. As depicted, an Outcome Agreement (OA) would be the core product with Framework Terms and Conditions providing the legal bounds of the mechanism. A Decision Support Tool (DST) would enable a risk-based development by identifying preferred industry users. An Outcome Agreement Management Plan would support the management of the OA. An Interagency Agreement would provide the binding commitments among government entities with respect to industry engagement.

The features of this framework are explained in the diagram in Figure 3. Of note is the DST, which would base the tailoring of agreements on risk and the notion of a trusted provider. Risk management is commonly practiced across government agencies with supplier risk management a subset of the practice. Given a risk model and a set of parameters to assess potential issues, the DST would be a useful tool to streamline the approval process for propulsion industry users.

The creation of this framework is a step toward answering the question of whether such a model can be developed and effectively applied. A follow-on study is planned to apply the framework in a pilot scenario such as a rocket component test at a DoD or NASA test facility.

## Planned Study

During the Phase Two study for NIRPS, DAU-South plans to assess both the resource selection process and the agreement framework and collaborate on their usage in a typical scenario. Government policies will be explored further to determine whether additional streamlining is allowable and how industry innovation can be accommodated through such efficiencies.

The product of this effort will be a decision methodology that allows adaptive, streamlined commercial use of government propulsion resources.

A contractual framework, intended to reduce bureaucracy and serve the taxpayer and national interests while adhering to legal requirements, is the expected result of this consulting effort. Through continued studies, it is expected DAU will provide a significantly improved method to enable industry access to government propulsion resources.

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