



The Role of Entrepreneurial Companies in Achieving U.S. Civil Space Goals

NASA's raison d'être is, or should be, U.S. aerospace technology competitiveness

Many policymakers and managers ask the question what should NASA do (given that NASA exists), but fewer ask *why* should NASA exist in the first place? (Put differently, *why might we create a NASA if one did not already exist?*)

NASA's predecessor organization, NACA, was created primarily to advance the U.S. aerospace industry's technological competitiveness. This remained a major purpose for NASA even through several human spaceflight projects into the 1990s. At that point aerospace technology investments were redirected mostly towards supporting FAA programs and NASA's own space transportation development needs. After 2005, almost no competitiveness investments remained.

This not only denies NASA a feedstock of technologies to enable new exploration and science programs, it eliminates opportunities for smaller, more creative companies to participate in NASA's programs. The result is that NASA has effectively walled itself off from the most dynamic segment of the aerospace industry. Not only does the agency therefore fail to stimulate U.S. competitiveness at its entrepreneurial leading edge, NASA suffers from a lack of relevance to an increasingly high-profile and large-job-growth-potential sector.

Continue Commercial Outreach Efforts Like COTS, Suborbital Science

NASA has, in recent years, attempted some specific programmatic efforts to stimulate and benefit from commercial space transportation industry developments. The largest of these is COTS, and it should be continued and broadened. The newest and most politically fragile is the former NASA AA for Science's proposal to use commercial suborbital human spaceflight vehicles to conduct earth and space science missions more affordably and capably than current suborbital platforms. A recent workshop sponsored by NASA Ames with the Personal Spaceflight Federation and the Universities Space Research Association demonstrated that there is very strong scientific potential for using these new vehicles to do breakthrough science. NASA's new leadership should ensure that this potential is fully realized by funding RLV-focused experiments as well as flight purchases.

Stop trying to kill the golden goose of entrepreneurship

Many NASA program managers acknowledge the potential for innovation and cost-saving of working with small NewSpace companies, but they often nevertheless attempt to force these companies to adapt themselves to standard NASA contracting and business practices. Small firms willing to invest private capital to help achieve a specific technology development objective at a fixed price for NASA are instead told they must bid cost-plus, and they may or may not retain intellectual property they bring to the table. Some NASA managers prefer the flexibility to change



programmatic direction in mid-project, or even avoid the challenge of thinking through requirements up front, and therefore shun firm fixed price contracts. All of this serves to exclude, however unintentionally, commercial entrepreneurial firms from participating in NASA programs, or worse still, begins to make those firms more government-centric and less commercial.

Use prizes, but realize their limitations

Prizes can be an excellent tool for surfacing very creative approaches to technical challenges with no apparent solution path. By reaching out to the broadest possible community of innovators, NASA can “crowdsource” a problem to find new solutions, or at least paths toward solutions. This also allows the agency to build a sense of public participation and ownership in its programs, with significant political benefit.

That said, prizes are a limited tool. First, to stimulate a broad community of participants, the required level of effort must be within the financial means of those participants. Because a prize is not by itself a business case for an investment, outside financing is usually impossible. Sometimes it is possible to align a prize with a potential market – such as in the case of the Ansari X-Prize – thereby enabling outside investment and larger efforts towards harder challenges, but this in itself limits the class of problems open to solution-by-prize.

It should be clear that where there are one or more commonly-understood paths to a solution, focused R&D efforts are a more appropriate tool to produce rapid innovation. However, wherever possible NASA should fund parallel paths, and encourage creative approaches by non-traditional participants. At times it may make sense for NASA to use several mechanisms, including prizes, to avail itself of different levels of “creativity” (with corresponding levels of schedule risk).

Finally, prizes are not the only way to cast a wide net. Broad Agency Announcements, with short white paper submissions leading to medium-length proposals for small fixed-price definition/design or experimental technology demonstration contracts, can enable a very broad range of participation. A recent successful example of this was NASA’s exploration technology procurement used in 2004.

NASA cannot succeed in a vacuum

To achieve its space exploration and science goals, NASA requires a thriving U.S. commercial space industry. It is not, however, exclusively NASA’s job to ensure that such an industry exist. The Departments of Commerce, Transportation, and State all have important regulatory and/or promotional roles to play. Also, the Defense Department, as a colleague in developing and utilizing space capabilities, can be a strong ally in achieving U.S. commercial space competitiveness.

Specific issues for collaboration include fundamental ITAR reform, preserving a “learn by doing” regulatory regime for commercial human spaceflight, and funding technology development partnerships among NASA aeronautics centers, DOD laboratories, and entrepreneurial RLV developers (just as NACA did in the early days of aviation).

Therefore, NASA must actively engage, and occasionally sublimate its institutional biases to cooperate with, these other agencies. It must do this not only to foster an industrial base that enables U.S. civil space goals, but also jointly achieve economic growth and national security through U.S. commercial space leadership.