



Commercial Spaceflight Federation Responds to Recent Misperceptions Related to U.S. Human Spaceflight

Washington, D.C., July 12, 2010 – As a strong supporter of a robust NASA human spaceflight program, the Commercial Spaceflight Federation is releasing the following statement to address topics related to human spaceflight, including commercial human spaceflight. Please see items below on the topics of capability, safety, and cost savings:

Topic: Capability

MYTH: *“The new plan hands over Low Earth Orbit spaceflight to unproven companies.”*

FACT:

- **The Commercial Crew Program will include the use of highly proven launch vehicles such as the Atlas V, which has achieved a perfect record of 21 consecutive successful flights to orbit.** In addition to Atlas V, the commercial Delta IV has 13 consecutive successful flights, and the Falcon 9 recently reached orbit on its first flight, with over a dozen more Falcon 9 flights scheduled in the next few years.
- **The Commercial Crew competition will include highly experienced firms, including major aerospace prime contractors, such as Boeing, which is developing the CST-100 commercial crew capsule under CCDev, and Boeing has built nearly every U.S. human spacecraft since Mercury.** The list of companies winning CCDev or COTS demonstrates the wide experience base of potential competitors, such as Boeing (158,000 employees), United Launch Alliance (3,900 employees), Orbital (3,600 employees), Sierra Nevada Corporation (2,000 employees), and SpaceX (1,000 employees).

MYTH: *“Commercial spaceflight has yet to ‘prove cargo before crew.’”*

FACT:

- **Commercial companies, such as United Launch Alliance, have already proven the ability to successfully carry high-value cargo to orbit.** Given the urgency of closing the gap, Commercial Crew should be promptly started. Only two companies are developing cargo capabilities under the NASA Commercial Orbital Transportation Services (COTS) program, so it is not logical for the other companies to be forced to “wait” for the completion of the COTS Cargo program.

- **The Department of Defense already trusts commercial launch vehicles such as the proven Atlas V to launch cargo worth billions of dollars per mission and which the safety of our troops overseas depends on.** These vehicles are also entrusted by NASA to handle some of the most safety-critical applications in the civil space sector. For example, the Atlas V is Category 3 certified by NASA for launch of NASA's most critical payloads.

MYTH: “Commercial Crew will take ten years to develop.”

FACT:

- **Developing a low Earth orbit Gemini-class capability (which is the historical human spaceflight project most similar to Commercial Crew) is a simpler, and therefore shorter, task than developing an Apollo or Orion-class capability.** The first piloted Gemini flight to orbit was achieved only about 3 years and 3 months after McDonnell accepted Contract NAS 9-170 to develop Gemini. Today, the fastest way for America to regain its ability to send astronauts to the International Space Station is to develop a simple Gemini-class capability rather than waiting for a more complex Apollo-sized system.
- **Because Commercial Crew funds multiple redundant capabilities, schedule delays with any one company will not delay the availability of astronaut launch capability.** Commercial Crew is actually less vulnerable to schedule slips than a program such as Ares I that has only one provider. With Commercial Crew, a delay with a single competitor does not increase the “gap,” because other competitors are progressing in parallel, while under the old plan, each delay with Ares I does increase the “gap.”

MYTH: “Commercial Crew will take tens of billions of dollars.”

FACT:

- **The historical data from the low Earth orbit Gemini Program, the human spaceflight project most similar to commercial crew, disproves this assertion.** As the Augustine Committee stated, “Gemini is the closest historical program in scope to the envisioned commercial crew taxi. ... In GDP-inflator-corrected FY 2009 dollars, the DDT&E [design, development, test, and evaluation] cost of this program was about \$2.5-3 billion, depending on the accounting for test flights.” Since that time, technology for human spaceflight has benefited from 40+ years of technology advances and lessons learned. If Gemini were built today, it would likely cost even less to develop.
- **Cost prediction curves that use Apollo and Orion as key sources of data in estimating the cost of commercial crew are “comparing apples and oranges.”** This is because commercial crew capsules are serving a simpler mission (and thus will cost less) than the far more capable Apollo, Space Shuttle, or Orion vehicles. Commercial crew vehicles will transport crew to and from the International Space Station in low Earth orbit, but will not need the added capabilities needed for deep space missions to the Moon, asteroids, or Mars as Orion was designed to do.
- **Commercial crew does not require spending money to develop new launch vehicles, only capsules.** The launch vehicles already exist: Atlas V has flown 21 consecutive times to orbit successfully; Delta IV has flown 13 consecutive times to orbit successfully; and Falcon 9 just had a successful flight to orbit. Not needing to develop all-new launch vehicles is a substantial cost advantage of Commercial Crew.

MYTH: *“The new plan ‘places all our eggs in one basket’ by using commercial services.”*

FACT: The exact opposite is true: the previous plan relies 100% on Ares I for launching crew into space, while the new program funds multiple redundant capabilities to transport crew to LEO. This will mean that NASA’s human spaceflight program will no longer be solely dependent on any one single domestic vehicle—a major benefit. America will finally have “assured access to space” for astronauts, similar to how military satellites have assured access to space by using both the Delta and Atlas. Achieving “assured access” for astronauts, via multiple commercial capabilities, will dramatically improve our ability to fully utilize the International Space Station.

MYTH: *“Commercial Crew represents a radical departure from current national policy.”*

FACT: Commercial Crew is, in fact, a continuation of existing national policy:

- **The 2008 NASA Authorization Act endorsed commercial crew**, stating:
“In order to stimulate commercial use of space, help maximize the utility and productivity of the International Space Station, and enable a commercial means of providing crew transfer and crew rescue services for the International Space Station, NASA shall... issue a notice of intent, not later than 180 days after the date of enactment of this Act, to enter into a funded, competitively awarded Space Act Agreement with two or more commercial entities for a Phase 1 Commercial Orbital Transportation Services (COTS) crewed vehicle demonstration program.”
- **Similarly, the 2008 NASA Appropriations House report endorsed commercial crew**; it “encourage[d] NASA to consider exercising its option for the Commercial Cargo (COTS) Capability D (crew transport) as soon as possible...”
- **Additionally, National Security Presidential Directive-49, issued by President Bush in 2006, stated, “Departments and agencies shall use U.S. commercial space capabilities and services to the maximum practical extent,”** and also stated, “It is in the interest of the United States to foster the use of U.S. commercial space capabilities around the globe and to enable a dynamic, domestic commercial space sector.”
- **In June 2004, the Aldridge Commission on implementation of the Vision for Space Exploration recommended that “NASA recognize and implement a far larger presence of private industry in space operations... most immediately in accessing low-Earth orbit.”** The Aldridge Commission added, “the Commission believes that commercialization of space should become a primary focus of the vision and that the creation of a space-based industry will be one of the principal benefits of this journey.”
- **A quarter-century ago, the law that created NASA, known as the Space Act, was amended to specify that NASA is to “seek and encourage, to the maximum extent possible, the fullest commercial use of space.”**

Topic: Safety

MYTH: *“The data shows commercial vehicles are less safe than other vehicles such as Ares I.”*

FACT:

- **The demonstrated track records of commercial vehicles, combined with numerous upcoming manifested flights, means that the family of commercial vehicles already has, and will continue to have, a much stronger track record than other vehicles such as Ares I.** The Atlas family of rockets has had over 90 consecutive successes including 21 consecutive successes for Atlas V, and additional unmanned flights will occur over the next few years before any astronaut flights begin. Similarly, many flights of the Delta and Falcon vehicles have already occurred or will occur before astronauts would be placed onboard. Astronauts will not be flying on vehicles that lack a solid track record.
- **By contrast, NASA was planning to place astronauts on just the *second* full-up orbital flight of the Ares I system.** Ares I would have many fewer test flights than Atlas V, Falcon 9, or Delta IV. Furthermore, the first crewed flight of Ares I will not occur until the year 2017 as determined by the Augustine Committee. Thus, at the planned rate of two Ares I flights per year, it would take the Ares I rocket until at least the year 2025 to match the demonstrated reliability that the Atlas V rocket already has today. That is, the commercial rocket has a fifteen-year head start on safety.
- **Demonstrated reliability through multiple actual flights to orbit is crucial because paper calculations have historically been insufficient to capture the majority of failure modes that affect real, flying vehicles—especially new vehicles flying their first few missions.** As the Augustine Committee stated, “The often-used Probabilistic Risk Assessment (PRA) ... is not as useful a guide as to whether a new launch vehicle will fail during operations, especially during its early flights.” Demonstrated reliability is crucial.
- **The Department of Defense already trusts commercial vehicles, such as Atlas V and Delta IV, to safely launch multi-billion-dollar national security payloads upon which the safety of our troops overseas depends.** These vehicles are also entrusted by NASA to handle some of the most safety-critical applications in the civil space sector. For example, the Atlas V is Category 3 certified by NASA for launch of NASA’s most critical payloads, and is also certified for launch of nuclear payloads, such as NASA’s New Horizons spacecraft with radioactive plutonium onboard, which demands extremely high safety levels for launch.

MYTH: “*The Commercial Crew Program will be held to lower safety level expectations than alternative programs would.*”

FACT:

- **Safety is paramount— private companies understand that they will not be in business if the systems they develop are not safe.** In fact, private industry recognizes that it must increase safety from that demonstrated in the past in order to fulfill its vision of greatly increasing human activity in space.
- **Commercial industry is planning to meet or exceed the safety standards that NASA applies to its own vehicles.** The initial NASA version of NPR 8705.2, “Human-Rating Requirements for Space Systems,” was released over five years ago, so industry has had access to this data for an extended period. For example, United Launch Alliance has begun work on an Emergency Detection System (EDS) for the Atlas V using funds awarded by the NASA Commercial Crew Development (CCDev) Program and access to NASA documents including NPR 8705.2B and other NASA documents.

- **NASA will be there every step of the way.** The Commercial Crew program is a partnership between NASA and industry. NASA will have oversight during design, testing, manufacturing, and operations. As the customer, NASA will also have go/no-go authority over the readiness of each mission to fly.

MYTH: *“The astronaut community does not believe that commercial spaceflight is safe.”*

FACT: **Thirteen former NASA astronauts who have accumulated a total of 42 space missions, stated in an October *Wall Street Journal* op-ed that commercial spaceflight can be conducted safely.** The astronaut signatories were Buzz Aldrin, Byron Lichtenberg, Charles Walker, Hank Hartsfield, Jake Garn, Jim Voss, John Herrington, John Lounge, Kathryn Thornton, Ken Bowersox, Norman Thagard, Rick Searfoss, and Robert Gibson. These thirteen astronauts have collectively flown a total of 42 space missions and logged a total of 2 years and 48 days in space aboard six different space vehicles including Gemini, Apollo, Space Shuttle, Soyuz, Mir, and the International Space Station. These astronauts stated:

“We believe that the commercial sector is fully capable of safely handling the critical task of low-Earth-orbit human transportation. ... As astronauts, we know that safety is important. We are fully confident that the commercial spaceflight sector can provide a level of safety equal to that offered by the venerable Russian Soyuz system, which has flown safely for the last 38 years, and exceeding that of the Space Shuttle. Commercial transportation systems using boosters such as the Atlas V, Taurus II, or Falcon 9 will have the advantage of multiple unmanned flights to build a track record of safe operations prior to carrying humans. These vehicles are already set to fly over 40 flights to orbit in the next four years.”

Topic: Cost Savings

MYTH: *“Commercial spaceflight capabilities will be no cheaper than Ares I for servicing the International Space Station.”*

FACT:

- **The development cost of Ares I plus a crew-launch-capable Orion is at least \$35 billion, which is 6 times more expensive than the Commercial Crew Program that will develop multiple redundant systems.** The \$35 billion cost figure is a direct NASA quote from the June 17, 2009 *New York Times*, which stated: “In an interview, Steve Cook, manager of the Ares Project at the Marshall Space Flight Center in Huntsville, Ala., said that the cost estimate for developing the Ares I and seeing it through its first manned flight was \$35 billion.” Independent cost estimates are even higher than \$35 billion.
- **In addition, the per-flight costs to transport astronauts to the International Space Station on Ares I would significantly exceed that of simpler commercial systems.** The Augustine Committee report stated, “The Ares I and Orion would be a very expensive system for crew transport to low-Earth orbit. Program estimates are that it would have a recurring cost of nearly \$1 billion per flight, even with the fixed infrastructure costs being carried by Ares V.”
- **There are at least four distinct reasons for these cost savings under Commercial Crew:**

- **Proven launch vehicles already exist**, such as Atlas V, and others have demonstrated successful orbital flights, such as Falcon 9, substantially reducing the amount of new hardware needing development.
- **Higher flight rates and satellite launches:** Commercial vehicles also launch commercial communications satellites and national security payloads, leading to an increased flight rate that reduces per-flight cost. By contrast, NASA-unique vehicles are prohibited from launching commercial satellites, so there are usually fewer flights to share costs among.
- **The mission is simpler:** Low Earth Orbit transportation is less difficult than extended missions to the Moon, so a capsule built just for LEO is less expensive.
- **Competitive forces and pay-for-performance:** Unlike traditional programs, commercial procurements utilize fixed-price, pay-for-performance, milestone-based agreements and leverage the power of competition between multiple providers.

MYTH: *“Commercial Crew will not save NASA money if non-NASA human spaceflight markets are slow to develop.”*

FACT: Non-NASA human spaceflight markets are not the primary source of cost savings for the NASA customer: The sources of cost savings to NASA – which still apply even if non-NASA human spaceflight markets are slow to develop – are the following: proven launch vehicles already exist, higher flight rate from satellite launches reduces per-flight costs, the LEO mission is simpler, and pay-for-performance leverages the power of competition. While it is true that non-NASA human spaceflight markets have implications for regulatory frameworks and corporate business approaches, they are not the primary source of cost savings for the NASA government customer. The benefits of additional commercial markets for human spaceflight are to increase the safety, reliability, and diversity of the services offered and further reduce the cost to NASA.

MYTH: *“Full utilization of the Space Station can be accomplished by relying on a government option rather than a fully-funded Commercial Crew system.”*

FACT: Space Station servicing is an urgent need that requires the quicker, simpler solution of the Commercial Crew program that is optimized just for the Space Station. Heavy-lift systems designed to go beyond low Earth orbit are far more capable than is needed for low Earth orbit operations, so for the specific mission of Space Station servicing they are neither cost-effective, nor available in a timely manner. While it is entirely appropriate for NASA to develop heavy-lift systems for exploration, those systems are not the solution to the needs of the Space Station. Because Commercial Crew and heavy-lift serve entirely separate missions, our ability to utilize the Space Station depends entirely on whether Commercial Crew is robustly funded.

MYTH: *“Diverting money from Commercial Crew to fund Constellation would still allow NASA to service the International Space Station.”*

FACT: Commercial Crew does not contain sufficient money to fund Constellation. The \$6 billion requested for the Commercial Crew program is much smaller than the \$35 billion

Ares I-Orion effort, not to mention that Ares V costs would be significantly larger. Diverting money from Commercial Crew would only fund a small fraction of a system that, even if fully funded, would not come online until 2017 or later, increasing the spaceflight gap and jeopardizing our utilization of the International Space Station.

MYTH: “Commercial Crew could risk a large “bailout” if a company fails to perform.”

FACT: Commercial Crew does not risk a large “bailout” for the following reasons:

- **No one single provider is treated as “Too Big to Fail,”** because multiple commercial capabilities are funded. If one competitor falls behind, the government has multiple alternatives. This contrasts favorably with winner-take-all, cost plus programs like Ares I, where the government has to pay “whatever it takes” to finish the project since there are no alternatives.
- **Cost per system is much less than Ares I:** Because of this substantial difference in cost, a given percentage cost overrun for Ares is much more expensive than the equivalent overrun for a commercial system.
- **Pay-for-performance:** Unlike a traditional cost-plus program where the government pays the cost of development no matter how high, a commercial milestone-based program does not commit the government to spending money until progress is shown.
- **“Assured access to space”** is available because choosing multiple commercial winners means that the probability of every single provider failing to deliver is less likely than the probability of a single lone system, such as Ares I, failing to deliver.

MYTH: “The Department of Defense’s attempt to use the Total System Performance Responsibility (TSPR) model in the 1990s shows commercial crew cannot succeed.”

FACT: In Tom Young’s hearing examples, Total System Performance Responsibility was applied to programs that were developing cutting-edge technology and attempting feats never before accomplished, which stands in contrast to a Commercial Crew Program that is similar to the 40-year-old Gemini Program. Specifically, Tom Young cited cost overruns for the FIA (Future Imagery Architecture) program and SBIRS High (Space-Based Infrared System) program, both programs that involve the development of new cutting-edge technologies that had never before been demonstrated. By contrast, the Commercial Crew Program uses existing launch vehicles and well-established technologies to duplicate a capability first achieved over 40 years ago with the Gemini Program, and therefore does not fit in the same category as the Future Imagery Architecture and SBIRS High programs. Commercial Crew is a perfect example of a program where commercial acquisition techniques are appropriate and beneficial.

MYTH: “NASA is the only customer for commercial launch providers.”

FACT:

- **Launch vehicles such as Atlas, Delta, and Falcon already have multiple customers today for the launching of satellites and cargo.** The Augustine Committee report, in the section on Commercial Crew, pointed out “the existing markets of ISS cargo to low-Earth orbit, science and national security space satellite missions, and commercial satellite launches.” The costs of the launch vehicle are thus already shared among multiple customers.

- **While the satellite market alone is sufficient to increase flight rates and reduce per-flight costs to NASA, other markets also exist for the crew capsule:**
 - Sovereign clients: This term refers to U.S.-allied nations paying American commercial companies to fly their national astronauts to space, generating American jobs in the process. Sovereign clients are friendly nations seeking to expand their existing space program, create “first astronaut” national heroes, conduct industrial and scientific research on-orbit, or bolster national prestige. Bigelow Aerospace, whose founder has committed an investment of \$500 million, told the *New York Times* last month that the company has visited countries including Japan, South Korea, Singapore, the Netherlands, Britain and Sweden to determine interest in the sovereign client market. Demand from sovereign clients has also been demonstrated by the fact that since 1978, the United States and Russia have flown almost 100 guest astronauts representing 30 countries, often in exchange for in-kind services but sometimes for payment. As a recent example, in 2008 South Korea paid Russia \$20 million to launch South Korean astronaut Yi So-yeon.
 - Private individuals: over \$150 million has been already paid by private citizens to travel on a Soyuz to the Space Station. In fact, the demand for this service has continued to increase despite the Russians doubling their prices from under \$20 million to over \$35 million per seat, with the price now at about \$45 million. Furthermore, when Commercial Crew taxi services begin in the United States, prospective astronauts, who are often business leaders running companies, will no longer have to spend half a year training in Russia with limited contact with the outside world— so demand will no longer be dampened by that burden.
 - Industrial clients, such as large scientific corporations represent another potential source of demand for on-orbit access.
- **Investment in the commercial spaceflight industry offers the opportunity for America to win back a larger share of the international launch market.** Norman Mineta, who served under the Bush Administration as the Secretary of Transportation, and under the Clinton Administration as the Secretary of Commerce, stated in a recent op-ed, “With Russia, China and India close on our heels, the only way we can maintain our hard-won leadership in space transportation is by employing America's unique entrepreneurial strength. Obama's new plan for NASA does exactly that.”