

December 2011

NATIONAL  
AERONAUTICS AND  
SPACE  
ADMINISTRATION

Acquisition Approach  
for Commercial Crew  
Transportation  
Includes Good  
Practices, but Faces  
Significant Challenges

U.S. Government Accountability Office

GAO90

YEARS

1921-2011

ACCOUNTABILITY ★ INTEGRITY ★ RELIABILITY

## Why GAO Did This Study

Following the recent retirement of the space shuttle, the National Aeronautics and Space Administration (NASA) lacks a domestic capability to send crew and cargo to the International Space Station. NASA has been funding private industry development of space transportation capabilities since 2005 with the intent of purchasing these services commercially. NASA's commercial efforts to transport cargo are well under way, but its efforts to transport crew are in their infancy. The risks associated with transportation of crew are greater than its cargo efforts because human lives are at stake.

GAO is required by the NASA Authorization Act of 2010 to assess NASA's strategy for acquiring commercial crew services. Specifically, GAO addressed how NASA's planned approach for commercial crew services aligns with good acquisition practices and the challenges it faces in implementation. GAO reviewed NASA's plan; compared it to good acquisition practices identified in prior GAO reports, regulations, and the elements required to be addressed in the act; and interviewed program officials to obtain further information on the approach.

## What GAO Recommends

GAO is recommending that NASA reassess its approach for commercial crew services prior to initiating its procurement because of the impact of reduced funding levels on the approach and establish a timeframe and criteria to use for deciding whether to purchase additional services from the Russians. NASA concurred with our report and recommendations.

View [GAO-12-282](#). For more information, contact Cristina Chaplain at (202) 512-4841 or [chaplainc@gao.gov](mailto:chaplainc@gao.gov).

# NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

## Acquisition Approach for Commercial Crew Transportation Includes Good Practices, but Faces Significant Challenges

### What GAO Found

NASA's planned approach for acquiring U.S. commercial crew transportation faces significant challenges that could impact its success, although it includes some good acquisition practices. Specifically, NASA's current funding level for its program is lower than anticipated and may not allow NASA to award multiple contracts, which is its key element for maintaining cost control by sustaining competition through all phases of its commercial crew transportation program. Moreover, the critical need to transport crew to the space station beginning in 2016 requires an aggressive program schedule that may not be attainable given NASA's experiences with past government and commercial development efforts.

Among the good practices that NASA adopted in its planned approach is the use of firm-fixed-price, performance-based contracts for the remaining program phases. NASA also plans to define high-level requirements before it awards contracts, and expects to minimize chances for requirements changes by allowing contractors maximum flexibility in developing vehicles and systems that can meet their private sector business needs as well as NASA's needs. In addition, NASA has established a new process for obtaining insight and providing oversight of contractor's progress that will be in place when the next phase of contracts are awarded. The insight that NASA obtains needs to provide sufficient data for NASA to monitor the need to change course for the program, and provide sufficient lead time to purchase additional seats on the Russian Soyuz vehicle, if needed. Moreover, effective implementation is key to the success of any acquisition approach, as success cannot be attributed to any one aspect of it, such as contract type or oversight processes.

NASA's current funding level is almost 50 percent less than the funding level it anticipated when developing its acquisition approach. As a result, NASA's ability to execute its approach as currently planned is unlikely. For example, if NASA cannot maintain more than one contractor for its next phase of commercial crew development, its prospects for competition for subsequent phases are weakened. Although private investment is anticipated, without government investment the market alone may not continue to grow and provide more than one contractor that would be able to compete for subsequent phases. As a result, NASA could become dependent on one contractor for providing crew transportation services to the space station, which increases the risk that the government will pay more than anticipated as few or no competitors will exist to help control market prices.

Finally, the overall schedule for the commercial crew transportation program is aggressive and leaves little room for any potential delays, though experience in developing space flight systems both traditionally and commercially indicates that there is significant schedule risk. This risk is also heightened given the inexperience of some of the potential commercial providers. Moreover, the strategy does not make it clear when and how NASA would need to make a decision to purchase additional flights on the Russian Soyuz vehicle, should the schedule for commercial efforts slip or if the proposed systems are not successful. Given that the lead time for purchasing a flight on the Soyuz is 3 years, not having a decision point could create additional risks of having no access to the space station for an extended period of time.

---

# Contents

---

Letter		1
	Background	3
	NASA's Planned Acquisition Approach for Integrated Design of Commercial Crew Systems Emulates Good Practices	10
	Challenges Remain for the Commercial Crew Program in Meeting Its Long-Term Programmatic Objectives	14
	GAO's Detailed Observations on NASA's Procurement Review	19
	Conclusions	23
	Recommendations for Executive Action	24
	Agency Comments	25
Appendix I	Comments from the National Aeronautics and Space Administration	26
Appendix II	GAO Contact and Staff Acknowledgments	28
Tables		
	Table 1: NASA Space Act Agreements for First Phase of Commercial Crew Development (CCDev 1)	5
	Table 2: NASA Space Act Agreements for Second Phase of Commercial Crew Development (CCDev 2)	5
	Table 3: NASA's Procurement Approach and GAO Observations by Key Element	20
Figures		
	Figure 1: Timeline of NASA's Commercial Crew Program Phases	7
	Figure 2: NASA's Insight/Oversight Model for the Commercial Crew Program	10

---

---

## Abbreviations

CCDev 1	Commercial Crew Development 1st phase
CCDev 2	Commercial Crew Development 2nd phase
DTEC	Design, Test, Evaluation, and Certification
FAR	Federal Acquisition Regulation
IDC	Integrated Design Contract
NASA	National Aeronautics and Space Administration
PIT	Partner Integration Team

This is a work of the U.S. government and is not subject to copyright protection in the United States. The published product may be reproduced and distributed in its entirety without further permission from GAO. However, because this work may contain copyrighted images or other material, permission from the copyright holder may be necessary if you wish to reproduce this material separately.



G A O

Accountability \* Integrity \* Reliability

United States Government Accountability Office  
Washington, DC 20548

---

December 15, 2011

The Honorable John D. Rockefeller IV  
Chairman  
The Honorable Kay Bailey Hutchison  
Ranking Member  
Committee on Commerce, Science, and Transportation  
United States Senate

The Honorable Ralph M. Hall  
Chairman  
The Honorable Eddie Bernice Johnson  
Ranking Member  
Committee on Science, Space, and Technology  
House of Representatives

Following the retirement of the space shuttle in July 2011, the National Aeronautics and Space Administration (NASA) lacks a domestic capability to send crew and cargo to the International Space Station. In anticipation of this, over the past several years, NASA has begun to look for ways to stimulate the commercial sector to provide these capabilities. For example, NASA began funding private development of space transportation capabilities in 2005 with the intent of eventually purchasing services commercially. NASA's commercial cargo efforts, which NASA identified as an incremental step to crew transport, are well under way with noncrewed missions to the space station planned for 2012. However, its commercial crew efforts are in their infancy and include significantly greater risks than its cargo efforts because human lives are at stake. For example, because humans will be transported for these missions, the vehicles will need to meet requirements for human safety that are not necessary when transporting cargo.

NASA is attempting to implement an approach that addresses the heightened risks associated with transporting crew but that requires a significantly lower amount of government investment as compared to the agency's prior human spaceflight development efforts. As a result, NASA has developed a new acquisition approach for the Commercial Crew Program that will require the agency to alter its traditional approach for human spaceflight to low-Earth orbit, both from a programmatic and acquisition standpoint. NASA expects that this new approach will allow it to leverage private sector financial investments, foster innovation, and benefit from commercial market forces to obtain commercial crew

---

services for a reasonable price. To obtain these benefits, however, NASA will be giving up some control over requirements and cost data. NASA's success in implementing its commercial crew approach is critical because until crew transportation services are available from U.S. companies, NASA will have to rely on foreign entities to make use of the nation's nearly \$50 billion investment in the space station.

The NASA Authorization Act of 2010<sup>1</sup> required NASA to conduct a review to determine the most cost-effective means of procuring commercial crew transportation capabilities and related services in a manner that will ensure the appropriate level of accountability and transparency and provide maximum efficiency. Additionally, NASA was required to identify measures to address risk management and means of indemnification of commercial providers of such capabilities and services, measures for quality control and safety oversight, and the application of federal oversight processes within the jurisdiction of other federal agencies.

The act also required GAO to assess NASA's procurement system review and submit a report to the appropriate congressional committees no later than 90 days after NASA submitted its review to Congress. NASA issued its *Commercial Crew Procurement System Review* report, which discusses its approach to the integrated design phase procurement, on September 16, 2011. Our report discusses (1) NASA's overall approach to procuring commercial crew transportation services and our assessment of the approach compared to good practices for acquisition management, (2) the challenges NASA's Commercial Crew Program faces moving forward, and (3) whether NASA's procurement system review addresses key elements outlined in the legislation and our observations related to selected key elements as necessary.

To determine the extent to which NASA's *Commercial Crew Procurement System Review* aligns with best practices for acquisition management, we reviewed and analyzed the agency's procurement approach and compared it with practices identified in GAO's prior work as being effective in reducing costs and risks and requirements found in the Federal Acquisition Regulation (FAR) and NASA acquisition policies and regulations. To determine the extent to which NASA's procurement approach met key elements of the legislation and any remaining

---

<sup>1</sup>Pub. L. No. 111-267, § 403(b)(3).

---

challenges NASA's Commercial Crew Program is facing going forward, we reviewed and analyzed NASA's report and compared it with the legislative reporting requirements, relevant FAR and NASA acquisition guidance, and information highlighted in GAO's prior work on the development of major acquisitions. We also interviewed agency officials to clarify NASA's planned procurement activities and obtain further information about how the agency will evaluate offerors' proposed work plans, schedules, and prices.

We conducted this performance audit from November 2011 to December 2011 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

---

## Background

In 2004, President George W. Bush announced his Vision for Space Exploration, which included direction for NASA to pursue commercial opportunities for providing transportation and other services to support the space station after the retirement of the space shuttle and to pursue government exploration missions beyond low-Earth orbit.<sup>2</sup> As such, in 2005 NASA established the Commercial Crew and Cargo Program to facilitate the private demonstration of safe, reliable, and cost-effective transportation services to low-Earth orbit. NASA's approach marked a change in philosophy for how the agency planned to service the space station—by encouraging innovation in the private sector with the eventual goal of having the government buy commercial transportation services at a reasonable price instead of extending the use of the space shuttle, spending billions to purchase seats on the Russian Soyuz vehicle, or developing its own vehicles. In 2010 Congress authorized the extension of the operation of the space station through at least September 30, 2020,<sup>3</sup> thus increasing the importance of obtaining cost-effective crew and cargo services for an additional 5 years.

---

<sup>2</sup>See NASA, *The Vision for Space Exploration* (Washington, D.C.: February 2004).

<sup>3</sup>National Aeronautics and Space Administration Authorization Act of 2010, Pub. L. No. 111-267, § 503.

---

## NASA's Commercial Cargo Effort

In 2005, NASA established the Commercial Orbital Transportation Services program to develop and demonstrate commercial cargo transportation capabilities. As we reported in May 2011, Space Exploration Technologies Corporation (SpaceX) and Orbital Sciences Corporation are making progress in completing milestones under funded Space Act agreements<sup>4</sup> with NASA, but both are working under aggressive schedules and have experienced delays in completing demonstration missions. SpaceX successfully flew its first demonstration mission in December 2010, but the mission was 18 months late.<sup>5</sup> NASA expects that commercial cargo deliveries to the space station will begin in 2012.

---

## NASA's Initial Commercial Crew Development Efforts

In 2010, President Obama further directed NASA to transition the role of transporting humans to low-Earth orbit to commercial space companies.<sup>6</sup> As this direction was initially provided through the prior year's budget process, in 2010, NASA entered into funded Space Act agreements with several companies to develop and test key technologies and subsystems to further commercial development of crew transportation services. This effort was NASA's initial Commercial Crew Development effort or CCDev 1. Table 1 lists the five companies awarded the initial agreements, which ended earlier this year after an investment of almost \$50 million was made by NASA.

---

<sup>4</sup>Space Act agreements are transactions other than contracts, leases, and cooperative agreements. Congress granted NASA the authority to enter into these types of transactions in the National Aeronautics and Space Act of 1958 to give the agency greater flexibility in achieving its mission. Under a funded Space Act agreement, appropriated funds are transferred to a domestic partner, such as a private company or a university, to accomplish an agency mission. These agreements differ from FAR contracts in that they do not include requirements that generally apply to government contracts entered into under the authority of the FAR. Unfunded agreements accomplish the same goals but no appropriated funds are transferred. Under such agreements, the company can benefit from NASA's experience, guidance, and advice and NASA can gain insight into the company's system. For more information see GAO, *Key Controls NASA Employs to Guide Use and Management of Funded Space Act Agreements Are Generally Sufficient, but Some Could Be Strengthened and Clarified*, [GAO-12-230R](#) (Washington, D.C.: Nov. 17, 2011).

<sup>5</sup>GAO, *Commercial Launch Vehicles: NASA Taking Measures to Manage Delays and Risks*, [GAO-11-692T](#) (Washington, D.C.: May 26, 2011).

<sup>6</sup>White House, *National Space Policy of the United States of America* (Washington, D.C.: June 28, 2010).



**Table 1: NASA Space Act Agreements for First Phase of Commercial Crew Development (CCDev 1)**

Dollars in millions

<b>Company</b>	<b>Scope of work</b>	<b>Award value</b>
Blue Origin	Develop launch escape system and produce a composite crew module pressure vessel.	\$3.7
The Boeing Company	Develop seven-crew capsule and display capability demonstrations of subsystems.	18.0
Paragon Space Development Corporation	Develop Environmental Control & Life Support, Air Revitalization System Developing Unit.	1.4
Sierra Nevada Corporation	Develop a lifting body spacecraft including design, development, and testing of subsystems.	20.0
United Launch Alliance	Develop a modular emergency detection system.	6.7
<b>Total</b>		<b>\$49.8</b>

Source: GAO presentation of NASA data.

In 2011, NASA awarded a second set of funded and unfunded Space Act agreements worth nearly \$316 million to four companies to progress their design and development of vehicles and key subsystems important to human spaceflight safety. In addition, NASA awarded unfunded agreements to three companies to enable it to better understand how each company's existing spaceflight system or system concept can be used in commercial transportation services. Table 2 lists the seven companies awarded funded and unfunded agreements for the second phase of development, known as CCDev 2.

**Table 2: NASA Space Act Agreements for Second Phase of Commercial Crew Development (CCDev 2)**

Dollars in millions

<b>Company</b>	<b>Scope of work</b>	<b>Award value</b>
Alliant Techsystems	Develop commercial launch system.	<i>Unfunded</i>
Blue Origin	Develop a space vehicle design for takeoff and vertical landing.	\$22.0
The Boeing Company	Continue development of crew capsule including maturing design and integration.	112.9
Excalibur Almaz	Develop space vehicle spacecraft concept.	<i>Unfunded</i>
Sierra Nevada Corporation	Develop a lifting body spacecraft.	105.6
Space Exploration Technologies, Corporation	Develop and escape system for crew.	75.0
United Launch Alliance	Accelerate potential use of existing launch vehicle (Atlas V).	<i>Unfunded</i>
<b>Total</b>		<b>\$315.5</b>

Source: GAO presentation of NASA data.

---

## NASA's Planned Approach for Developing Commercial Crew Transportation Capabilities

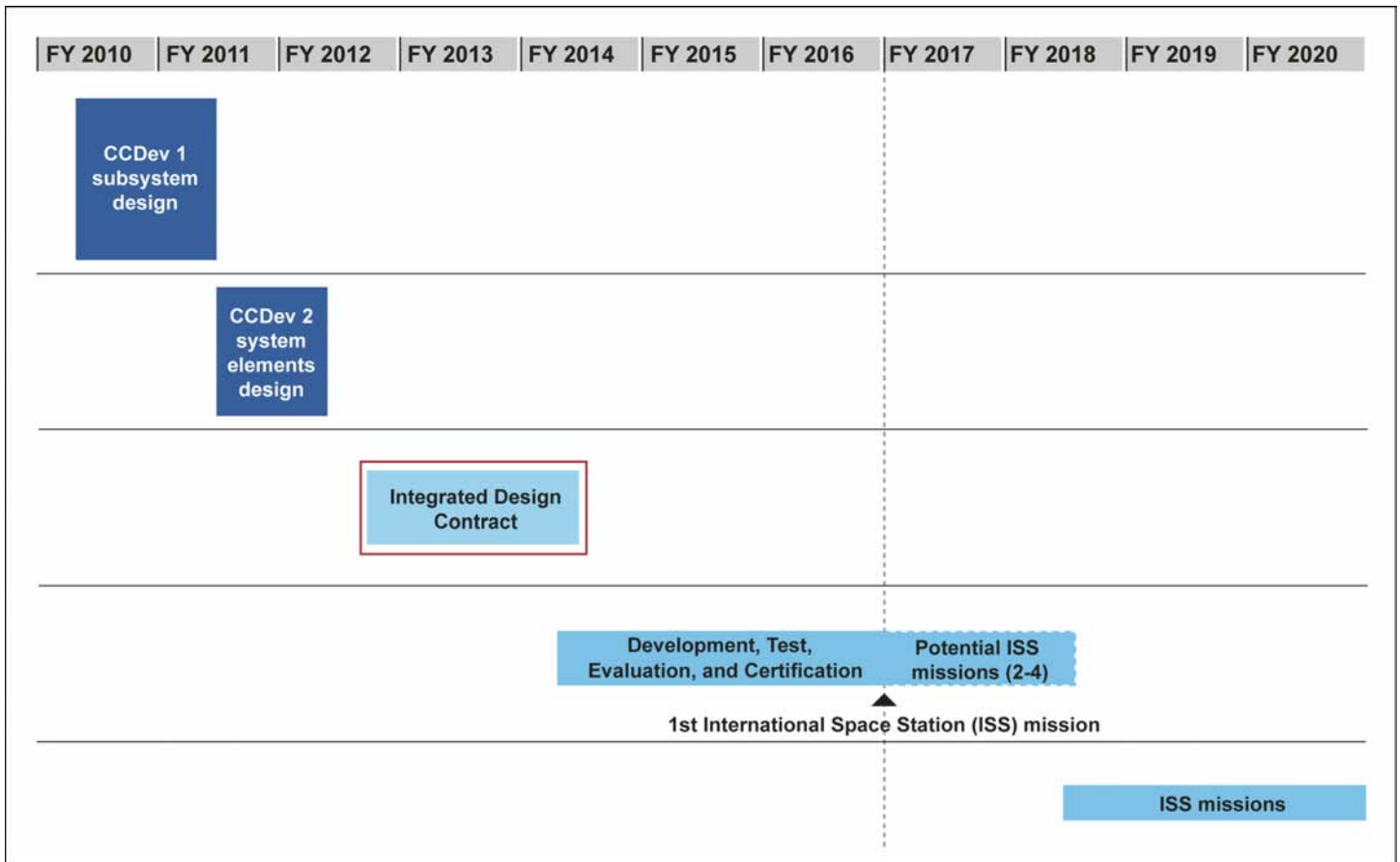
To date, NASA has helped stimulate commercial development of crew and cargo transportation services through its use of funded Space Act agreements. NASA's approach included having contractors provide significant financial investment in the development of their transportation systems. NASA's intent was to encourage private sector innovation by having commercial partners maintain ownership of the space vehicles and systems they develop, while NASA would receive the ancillary benefits of being able to eventually use the emerging commercial products to procure safe, reliable transportation services to the space station at a reasonable price. NASA's overall approach is to maintain competition as long as possible for each phase of its effort.

While preparing its approach for the next phases of its commercial crew efforts, NASA conducted legal analysis of the benefits and risks associated with the range of acquisition instruments available and determined that the agency would be unable to levy its human spaceflight safety requirements under a Space Act agreement. We have also reported that use of these agreements limits NASA in its ability to influence the agreement partners in their approach.<sup>7</sup> As a result, NASA is planning to award FAR-based contracts for its next two acquisition phases—(1) Integrated Design Contract (IDC) and (2) Development, Test, Evaluation, and Certification (DTEC). Figure 1 provides a timeline summarizing the phases of NASA's efforts to obtain commercial crew transportation services from its initial development efforts through its plans for awarding contracts for commercial crew transportation services.

---

<sup>7</sup>[GAO-11-692T](#).

**Figure 1: Timeline of NASA's Commercial Crew Program Phases**



Agreement  
 Contract

Source: GAO representation of NASA data.

Beginning with the IDC phase, NASA plans to award multiple performance-based, firm-fixed-price contracts using full and open competition. NASA's approach includes having performance-based milestone requirements for which a contractor will only receive payment after NASA determines that the contractor has successfully achieved a milestone defined in its contract. The milestones will be tailored to each contractor's planned development and may include design reviews or system demonstrations. Although NASA's contractors will be required to submit cost data for each of the milestones, given that NASA expects

---

adequate price competition for the IDC phase, no certified cost and pricing data will be required to be submitted for this phase. According to NASA, an ancillary benefit of waiving this requirement is that the reporting burden on the contractors will be eased. NASA issued a draft Request for Proposals for the IDC in September 2011, and plans to release the final Request for Proposals with fully defined level one and two—or high-level—requirements for this phase in December 2011. During the IDC phase, NASA expects that its contractors will progress from a preliminary design through the equivalent of a Critical Design Review, which includes demonstrating that its system design is mature.<sup>8</sup> A key deliverable at the end of the contract period will be a certification plan detailing how the contractor plans to meet NASA’s certification requirements for transporting the agency’s astronauts.

According to agency officials, the IDC phase is expected to last approximately 21 months. The Commercial Crew Program plans to issue a separate, formal solicitation and hold a full and open competition in mid-fiscal year 2014 for DTEC activities. To provide an incentive for contractors to submit proposals under the DTEC solicitation, the resulting contract award, according to NASA, will likely include a small number of missions to the space station following certification of each contractor’s system. Following certification of contractors’ crew transportation systems at the end of the DTEC phase, NASA plans to award separate contracts to one or more companies to obtain commercial crew transportation services.

Throughout this process, NASA plans to institute a new approach to government insight and oversight, which it hopes will help commercial industry maintain an efficient way of doing business, but will allow NASA to maintain access to contractor analytical and test data. For example, the Commercial Crew Program plans to acquire insight through the use of an assigned Partner Integration Team (PIT). This group, comprising experts from key technical areas across NASA, will work side by side with the

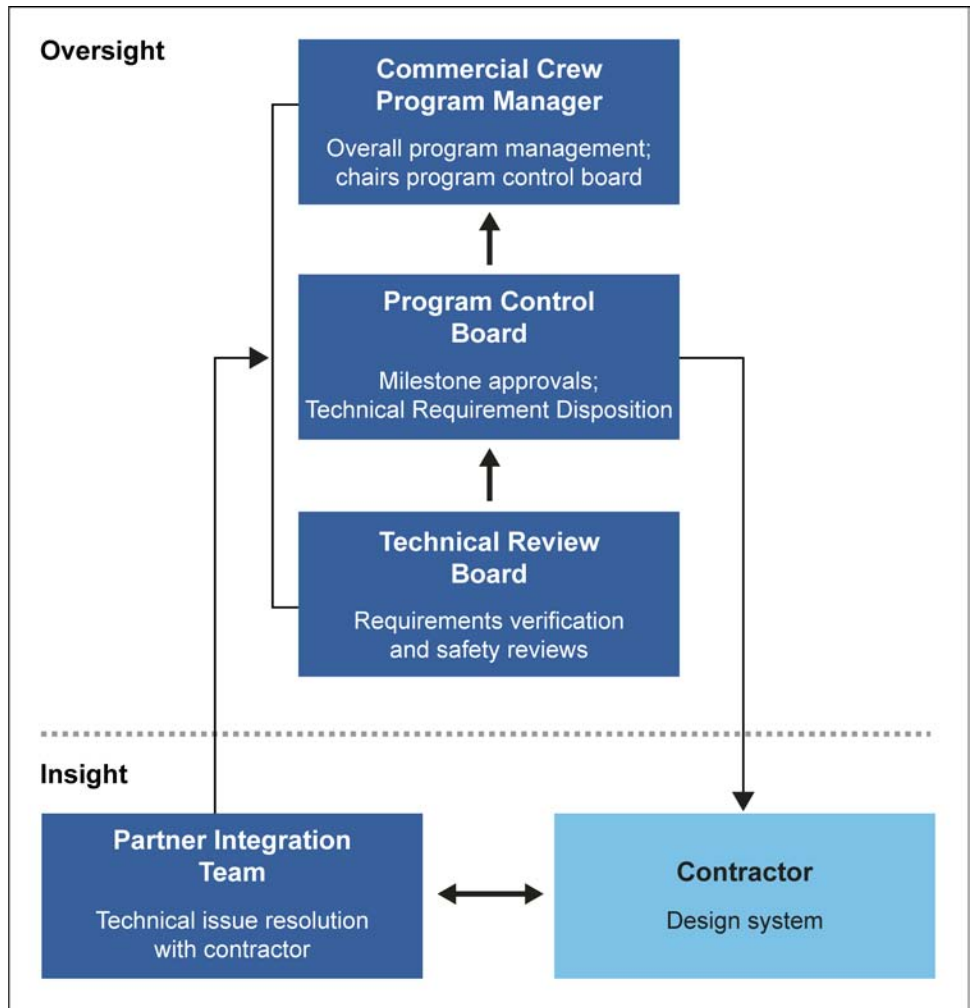
---

<sup>8</sup>The preliminary design, which is evaluated at the Preliminary Design Review, must meet all system requirements with acceptable risk and within the cost and schedule constraints, and is used to establish the basis for proceeding with the detailed design. The Critical Design Review evaluates the maturity of the design to determine whether it is appropriate to proceed with the final design and the fabrication phase. NASA Interim Directive 7120-97 *NASA Space Flight Program and Project Management Requirements*, which is the interim directive for NASA Procedural Requirement 7120.5D, contains NASA’s most recent requirements.

---

contractor's engineers and will coordinate the support of additional NASA expertise to aid contractors in the resolution of any technical issues. The PIT will not be required to approve any products, as NASA's Commercial Crew Program Manager will be the program approval authority. In addition, some PIT members will be co-located at or near the contractor's facility. As an additional part of NASA's oversight, the Program Manager will rely on the Program Control Board and Technical Review Board. For example, the Program Control Board, chaired by the Program Manager, will have the authority to determine changes to performance milestone criteria or NASA requirements and to approve milestones. The Technical Review Board, in support of the Program Control Board, will review any proposed requirements changes and manage the safety review process. Figure 2 illustrates NASA's new insight/oversight model.

**Figure 2: NASA's Insight/Oversight Model for the Commercial Crew Program**



Source: GAO representation of NASA data.

## NASA's Planned Acquisition Approach for Integrated Design of Commercial Crew Systems Emulates Good Practices

NASA's approach for acquiring commercial crew transportation for the IDC phase is consistent with several good acquisition practices, including the use of firm-fixed-price, performance-based contracts for the remaining program phases, high-level requirements defined before award of the IDC phase contracts, and a new contractor oversight process that will be established before the contracts are awarded. While we have identified several areas of NASA's acquisition approach for the IDC phase that are in line with good acquisition practices, these plans alone will not guarantee success. NASA's success will depend on effective

---

implementation of its current acquisition approach, but success cannot be attributed to any one aspect of it, such as contract type or oversight.

---

## Multiphased Competitions and Firm-Fixed Pricing

NASA's approach of dividing its acquisition into phases, which contractually separates developing an integrated design from the development, test, evaluation, and certification of a design helps limit the financial risk that can be experienced during long periods of performance and allows for additional competition for each future phase. Each phase will include shorter periods of performance, for example, the IDC phase will be only 21 months. Additionally, as noted, NASA intends to maintain more than one contractor for the IDC phase, and to competitively award contracts for the DTEC phase with the intention of securing a better price through competition. As an additional element of NASA's plans to control the program's costs in this next phase, NASA plans to award firm-fixed-price contracts.

We have reported that the use of firm-fixed-price contracts—along with well-defined requirements and a sufficient level of knowledge about critical technologies—presents the least risk to the government.<sup>9</sup> Firm-fixed-price contracts place the onus on the contractor to provide the deliverable at the time, place, and price negotiated by the contractor and the government. In addition, firm-fixed-price contracts place the maximum risk on the contractor as well as full responsibility for all costs and any resulting profit or loss. We have also reported that promoting competition can help save the taxpayer money, improve contractor performance, and promote accountability for results.<sup>10</sup> NASA's plans are consistent with these practices in that it plans to competitively award performance-based firm-fixed-price contracts under which the contractor will only receive payment of fixed amounts upon successful completion of each milestone. However, given that some contractors are developing these complex systems for the first time, NASA may need to provide additional funding to help the contractors if the need for requirements changes arises; therefore, the government may be at risk of price increases even under a firm-fixed-price contract.

---

<sup>9</sup>GAO, *Defense Acquisitions: Managing Risk to Achieve Better Outcomes*, [GAO-10-374T](#) (Washington, D.C.: Jan. 20, 2010), and *Defense Acquisitions: Assessments of Selected Weapon Programs*, [GAO-10-388SP](#) (Washington, D.C.: Mar. 30, 2010).

<sup>10</sup>[GAO-10-374T](#).

---

## Fully Defined High-Level Requirements for Performance-Based Contracts

NASA has also indicated that it plans on having fully defined high-level requirements prior to award of the IDC phase contract. This step is in line with good practices for system acquisition and is necessary to most effectively utilize a firm-fixed-price contract. For example, we have often reported that poorly defined requirements have significant consequences to time, funding, and technology development; therefore, requirements should be set prior to program start.<sup>11</sup> Additionally, poorly defined requirements can contribute significantly to cost increases even under a firm-fixed-price contract because, as stated earlier, the government may need to provide additional funding to the contractor to meet changes to the scope of work because of government-directed requirements changes. In a June 2011 report, the NASA Inspector General raised this issue as a challenge for NASA to address in its consideration of using a firm-fixed-price contract for its commercial crew efforts.<sup>12</sup> NASA officials told us that the agency began a concentrated effort to develop commercial crew transportation requirements in December of 2009. As a result, by the time the technical requirements are finalized for release in the final Request for Proposals for the IDC phase, NASA will have been maturing, refining, and defining the commercial crew requirements for 2 years. In addition, NASA officials stated that the agency is committed to having zero undefined or “To Be Determined” requirements when the final Request for Proposals is scheduled to be released in December 2011. NASA officials stated that having fully defined requirements further enhances the feasibility and benefits of using a firm-fixed-price contract.

In addition to minimizing the chances for requirements changes, NASA officials stated that their approach to requirements definition will allow contractors maximum flexibility in developing vehicles and systems that can meet their private sector business needs as well as NASA’s need to cost effectively provide safe crew transportation services to and from the space station. Specifically, NASA plans to only define high-level system integration requirements for its performance-based contract. Performance-based contracts encourage contractors to be innovative and to find cost-effective ways of delivering services. NASA’s approach allows

---

<sup>11</sup>GAO, *Briefing on Commercial and Department of Defense Space System Requirements and Acquisition Practices*, [GAO-10-315R](#) (Washington, D.C.: Jan. 14, 2010), and *Defense Acquisitions: Managing Risk to Achieve Better Outcomes*, [GAO-10-374T](#) (Washington, D.C.: Jan. 20, 2010).

<sup>12</sup>NASA Inspector General, *NASA’s Challenges Certifying and Acquiring Commercial Crew Transportation Services*, IG-11-022 (Washington, D.C.: June 30, 2011).



---

contractors flexibility in determining the system, subsystem, and component requirements necessary to meet NASA's higher-level requirements. This is a different approach than NASA has normally taken on human spaceflight efforts, where NASA has defined the requirements a contractor must meet in detail and at a number of different levels. This reduces the number of requirements from the thousands to the hundreds. According to NASA officials, the final Request for Proposals will include about 300 requirements related to crew safety and performance of the transportation system, and 148 compliance standards for vehicles that will interact with the space station. NASA's contracting for an end product of a crew transportation system, without specifying each requirement for designing or producing it, is consistent with the principle tenet of performance-based contracting. In doing so, however, the government cedes control of lower-level requirements. Consequently, when such an approach is applied to complex, risky, unique endeavors—such as space crew transportation—strong government involvement is needed to mitigate risks and provide sufficient oversight to understand the critical technologies and features of the contractor's design.

---

### Establishing Contractor Oversight Processes Before Contract Award

NASA has developed a new insight/oversight model to provide the agency with a mechanism for insight and oversight of key acquisition areas while the contract is executed. NASA's new insight/oversight model establishes PITs of NASA experts who will work side by side at contractor locations to provide advice to the contractor on the development of the commercial transportation system and insight to NASA review boards regarding approvals for requirements changes and milestone accomplishments. In addition, this new insight/oversight model is structured to provide the Commercial Crew Program Manager with ultimate approval authority for all contractor activities, which provides an established mechanism to hold contractors accountable. As we have previously reported, good practices have shown the importance of independent oversight of cost, schedule, and performance risk and decision-making authority delegated to program manager level as keys to ensuring good program outcomes.<sup>13</sup> NASA began using elements of its new insight/oversight model in the CCDev 2 phase of the program. Although the new insight/oversight model seems to be a reasonable attempt to provide oversight in the unique atmosphere established by the

---

<sup>13</sup>[GAO-10-315R](#).

---

Commercial Crew Program, it is too soon to determine if it is being implemented in an effective manner. For example, milestone approvals will need to be made based on sufficient insights from the partner integration teams, and both the contractors and NASA team members must be willing to report on negative progress, if it occurs. Moreover, NASA will have to remain vigilant in evaluating whether the contractors will be able to provide crew transportation systems within required time frames because of the potential that some contractors will have limited experience developing such systems and the challenges NASA will face as the program moves forward.

---

### Challenges Remain for the Commercial Crew Program in Meeting Its Long-Term Programmatic Objectives

Although NASA's acquisition approach for the IDC phase appears reasonable in that it employs several good acquisition practices that limit the government's risk, NASA faces significant challenges to successful implementation. These challenges include whether the commercial market will materialize to support adequate competition, NASA receiving much-lower-than-anticipated funding for its approach, an aggressive program schedule, and the program's ability to obtain sufficient data on actual costs to evaluate prices.

---

### Commercial Market for Crew Transportation Services May Not Materialize to Help Ensure That Multiple Contractors Are Available to Facilitate Competition

As NASA recently reported, the potential size of the market for commercial crew transportation services depends on a variety of factors, including technical, schedule, financial, and regulatory issues. Because of the uncertainties associated with these factors, the forecast for the demand for commercial space transportation services is unclear. The government's need for regular cargo deliveries and crew rotation for the space station provides a foundation for private sector development efforts. However, whether the market will continue to grow in private sector areas of use, such as space tourism and research, is unknown and was raised as a challenge to NASA's commercial crew efforts by the NASA Inspector General in June 2011.<sup>14</sup> In August 2010, the Federal Aviation Administration held a workshop with industry representatives and reported that there is little evidence of a commercial human spaceflight market at the current prices, which are in the millions of dollars per

---

<sup>14</sup>NASA Inspector General, *NASA's Challenges Certifying and Acquiring Commercial Crew Transportation Services*, IG-11-022 (Washington, D.C.: June 30, 2011).

---

person.<sup>15</sup> The administration's report noted further that no such business case exists on a purely commercial basis in the United States at this time. Currently, a small number of U.S. companies are involved in developing space transportation systems, which could provide for competition for the current IDC phase. However, many would not be likely to continue development efforts if not supported in some way by government funding, which could limit the market for future competition. The Federal Aviation Administration reported that the more experienced space flight companies unanimously agreed that they cannot see a viable business case for their companies to provide commercial crew transportation services unless the government takes specific actions, including some that would reduce the level of private investment required and help stabilize the industry. If the market does not grow sufficiently, the number of contractors who would be in a position to compete for the DTEC phase may not be adequate to provide competition. The government may also end up supporting contractors to maintain a U.S. presence in the space transportation market and provide critical capabilities, as is the case with the Department of Defense's Evolved Expendable Launch Vehicle program. As a result, NASA could end up paying higher-than-anticipated prices for services if the commercial market does not develop sufficiently to allow market forces to drive lower prices.

---

### Lower-Than-Anticipated Funding Jeopardizes NASA's Planned Approach

NASA's funding level for fiscal year 2012 is almost 50 percent less than it anticipated when it developed its approach for the Commercial Crew Program; therefore, the main premise of its procurement approach to control costs—competition—may no longer be viable. Specifically, NASA's primary planned method for price control for the DTEC phase is competition. The agency's current acquisition approach of making awards to at least two contractors through the IDC phase depended on it receiving total funding of \$1.7 billion for the effort—\$850 million each fiscal year for fiscal years 2012 and 2013—as requested in NASA's fiscal year 2012 budget submission. The Consolidated and Further Continuing Appropriations Act, 2012,<sup>16</sup> provides NASA with \$406 million for the program for fiscal year 2012. As a result, NASA cannot fully fund its current plan for the IDC phase, thereby possibly weakening its prospects

---

<sup>15</sup>Federal Aviation Administration, *Report on the Commercial Human Spaceflight Workshop* (Washington, D.C.: August 2010).

<sup>16</sup>Pub. L. No.112-55, 125 Stat. 552, 623 (2011).

---

for competition as a primary method of price control. If NASA cannot make awards to more than one contractor for the IDC phase, it has no guarantee that more than one contractor will be able to compete for the DTEC contract given the likelihood of a lack of a commercial market to drive further private investment. As a result, NASA could become dependent on one contractor for developing and providing launch services to the space station. Reliance on a sole source for any product or service increases the risk that the government will pay more than expected, since no competitors exist to help control market prices. Such a situation occurred with the Department of Defense's Evolved Expendable Launch Vehicle program, which now depends on a sole-source provider.<sup>17</sup> Pending further budget reductions expected in coming years, NASA may not be able to fund the DTEC phase as planned. NASA stated in its *Commercial Crew Procurement System Review* that it would need to reassess its approach for the Commercial Crew Program if it did not obtain funding at the level it requested.

---

<sup>17</sup>The Department of Defense (DOD) began the Evolved Expendable Launch Vehicle (EELV) program in 1995 to provide a new generation of launch vehicles to ensure affordable access to space for government satellites. The program initially adopted a commercial acquisition strategy with some similarities to the one NASA is proposing for its Commercial Crew Program. Four companies initially competed at the onset of the EELV program, but were eventually narrowed down to two companies—Lockheed Martin and the Boeing Company. These companies eventually created a joint venture known as the United Launch Alliance (ULA). In 2000, new market forecasts showed a dramatic reduction in the expected demand for commercial launch services and the robust launch market upon which the DOD based the EELV acquisition strategy did not materialize. As a consequence, estimated prices for future contracts for launch services increased, along with the total cost of the program. The Federal Trade Commission (FTC) initially opposed the ULA joint venture because of its potential to limit competition in the launch industry, but DOD stated that the benefits of the joint venture to national security outweighed the loss of competition, and FTC allowed the joint venture to proceed. GAO recently reported that competition to provide government launch services has historically been minimal in the EELV program; demand for launch vehicles is low, and the EELV program continues to award sole-source contracts to ULA. Some DOD officials believe that the lack of competition has contributed to increased prices and that competition could incentivize ULA to find efficiencies and restrain prices while broadening the provider pool and bolstering U.S. access to space. These officials also believe that because DOD has limited access to contractor and subcontractor cost and pricing data, DOD may not be able to effectively assess whether prices are fair and reasonable. GAO, *Evolved Expendable Launch Vehicle: DOD Needs to Ensure New Acquisition Strategy Is Based on Sufficient Information*, [GAO-11-641](#) (Washington, D.C.: Sept. 15, 2011).

---

## Program Schedule Is Aggressive

The overall schedule for the Commercial Crew Program is aggressive and leaves little room for any potential delays. NASA's planned approach relies on contractors to be in a position to provide transportation services for crew beginning in 2016. NASA has contracted for seats on the Russian Soyuz vehicle for the crew services it requires through early 2016. Under its current acquisition approach, NASA plans to procure seats for crew transportation to the International Space Station from the private sector through 2020, when the space station is expected to be retired. If the schedule slips too far beyond 2016 and NASA has not effectively developed a contingency plan, NASA risks spending billions on a commercial crew program that could only be needed to support the space station for the few years remaining until its current planned end of operations in 2020. This is exacerbated by the fact that NASA is planning to include several missions to the space station during the DTEC phase, the contracts for which are expected to be completed in 2013. Such delays are likely based on NASA's experience with developing space flight systems both traditionally and commercially. For example, we reported in May 2011 that the Ares I project, which was originally intended to be operational in 2010, pushed its launch readiness date to 2015 and is now being restructured into a new program that will not be able to fly astronauts until at least 2016.<sup>18</sup> Also in May, we reported that NASA's Commercial Orbital Transportation Services program's demonstration missions have been delayed by nearly 2 years and they continue to slip.<sup>19</sup> The risk of schedule delays is also heightened given the inexperience of some of the potential commercial providers who may be awarded contracts for the IDC phase.

In addition, if NASA's efforts at stimulating a U.S. commercial space transportation industry do not progress as planned, the U.S. capability gap will lengthen and will result in the need for a contingency approach of relying on the Russian Soyuz vehicle to transport crew to the space station. The decision to purchase seats on the Soyuz vehicle will likely be required, however, long before NASA has confidence that its commercial efforts will or will not succeed, as the lead time for acquiring additional Soyuz seats is 3 years. Specifically, NASA will likely need to decide by the end of 2013 whether to purchase additional seats. At that point, contractor vehicles will not have even entered the test and integration

---

<sup>18</sup> [GAO-11-692T](#).

<sup>19</sup> [GAO-11-692T](#).

---

phase of development where, as we have previously reported, issues tend to manifest and result in cost and schedule delays.<sup>20</sup>

Though the issue of deciding when and whether to purchase seats on the Soyuz vehicle was raised by the NASA Inspector General as a challenge for NASA in June 2011,<sup>21</sup> this challenge is not yet resolved. Specifically, NASA did not provide GAO any information on the criteria it plans to use to determine whether it would need to purchase additional Soyuz seats, nor a time frame by which it plans to make such a decision. In addition, the issue of purchasing seats on the Soyuz vehicle is further complicated by restrictions contained in the Iran, North Korea, and Syria Non-proliferation Act (INKSNA).<sup>22</sup> These restrictions prohibit NASA from making certain payments to Russia in connection with the International Space Station unless the President determines that Russia is taking steps to prevent proliferation to those countries. NASA received a statutory exemption from this restriction in 2006 and an extension of the exemption in 2008, which has allowed it to continue to purchase seats on the Russian Soyuz vehicle; however, the current exemption expires in 2016.<sup>23</sup> According to NASA officials, the agency has begun working toward resolution of this issue, because a decision on whether NASA's exemption will be extended further is needed before it can make its decision in 2013 regarding purchasing additional seats that might be needed beyond 2016.

---

### Limited Data on Actual Costs for Assessing Prices

It is unclear if NASA will obtain sufficient details on the actual costs associated with various subsystem designs during the IDC phase to provide sufficient insight for its assessment of the costs for the DTEC phase and pricing for future crew transportation services. NASA's current approach entails collecting data on costs during each phase of the program as it reviews and assesses the progress of the contractor and using these data to adjust its estimates of costs for future phases. For

---

<sup>20</sup>GAO, *NASA: Assessments of Selected Large-Scale Projects*, [GAO-11-239SP](#) (Washington, D.C.: Mar. 3, 2011).

<sup>21</sup>NASA Inspector General, *NASA's Challenges Certifying and Acquiring Commercial Crew Transportation Services*, IG-11-022 (Washington, D.C.: June 30, 2011).

<sup>22</sup>Iran, North Korea, and Syria Nonproliferation Act, 50 U.S.C. § 1701 note.

<sup>23</sup>Consolidated Security, Disaster Assistance, and Continuing Appropriations Act, 2009, Pub. L. No. 110-329, Div A, § 125 (2008).

---

example, NASA will require contractors to submit “other than certified cost and pricing data” to substantiate their proposals. In addition, contractors will be required to include an estimate of their lifecycle costs and the price they will charge for transportation services as part of their proposal for the IDC phase contract, along with a basis for the estimates. Further, contractors will be required to submit cost data for each milestone during the IDC phase. NASA plans to use this information to support the development of its cost estimates for the DTEC and transportation services contracts. While this approach may be sufficient for NASA to establish a basis on which to evaluate prices for each subsequent phase of the design and development of commercial systems, it is unclear whether the data collected during the IDC phase will be sufficient to give NASA adequate information to make an informed decision on the relative costs of purchasing seats on the Russian Soyuz vehicle versus the costs of purchasing commercial crew transportation services. In recent testimony, a NASA official stated that the agency does not have an estimate of what the commercial transportation services are likely to cost, but it is expected to be less than the cost of obtaining services via the Russian Soyuz vehicle. Although NASA expects the costs will be less, a decision on the need to purchase additional seats on the Soyuz will be needed prior to NASA having obtained more updated cost data from contractors in the DTEC phase. Therefore, NASA will likely not have sufficient information to determine the costs of commercial crew transportation services compared to the cost of purchasing Soyuz seats at the time of its next purchase decision.

---

## GAO’s Detailed Observations on NASA’s Procurement Review

Although NASA’s *Commercial Crew Procurement System Review* addresses the key elements required in its mandate—cost-effectiveness, accountability, transparency, maximizing efficiency, risk management, safety, quality control, other applicable federal oversight, and indemnification—some aspects of NASA’s approach remain unclear and contribute to the challenges discussed above. For instance, while NASA’s review touches on elements of its planned second phase, or DTEC, it is primarily focused on its near-term IDC phase. NASA officials said they intend to initiate procurement planning for the DTEC phase within 3 months of awarding the IDC contract. Table 3 provides NASA’s approach by key element and includes our observations.

**Table 3: NASA’s Procurement Approach and GAO Observations by Key Element**

Key element	NASA procurement approach	GAO observations
Cost-effectiveness	<p>NASA’s approach relies on two primary mechanisms to better ensure cost-effectiveness—use of a firm-fixed-price contract and competition through multiple contractors. NASA officials emphasized the importance of competition as the primary method for price control.</p> <p>NASA plans to determine the fairness and reasonableness of proposed prices by developing government cost estimates and ranges for potential systems, based on historical human spaceflight programs. An independent government cost estimate will also be developed for comparison with industry offeror’s prices for the IDC phase.<sup>a</sup> Contractors will be required to submit with their proposals uncertified cost and pricing data, as well as a basis for the estimated price for each milestone of the proposed work scope. NASA believes that it has a fairly good understanding of the basis of various cost projections through its extensive interactions with industry over the last 2 years.</p> <p>Contract awards will be based on best value—taking into consideration the potential contractors’ safety and technical merits, including past performance, as well as their offered prices.</p>	<p>As discussed, because NASA was not funded at the level requested in its budget submission, it may be unable to fund multiple contractors for the IDC phase, which could limit the number of providers able to compete for the DTEC phase and beyond. In such an instance, NASA risks losing its primary mechanism for cost control.</p> <p>Some of the potential contractors do not have a past performance record; additionally, many of the contemplated systems are new and therefore do not have an established cost history. This could affect NASA’s ability to have useful information to consider in making its best value determination.</p>
Accountability	<p>NASA’s approach relies on three primary mechanisms to better ensure accountability: (1) pay for performance milestones, (2) certification requirements for crew transportation services, and (3) NASA’s insight/oversight model.</p>	<p>NASA’s approach allows for flexibility in the types of systems being designed, as well as in the pace at which contractors’ design and development activities will proceed. However, NASA’s review did not provide detailed information on how it will validate individual partners’ certification plans and requirements and verify that they meet program needs.</p> <p>NASA’s insight and oversight model is a culture shift for the agency. Given that this is a new approach, its effectiveness has yet to be established and will need to be closely monitored by NASA.</p>



Key element	NASA procurement approach	GAO observations
Transparency	<p>NASA's approach relies on two primary mechanisms to better ensure transparency—the insight/oversight model and having limited data rights (NASA had no rights to contractor's data under the CCDev 1 and CCDev 2 Space Act agreements).</p> <p>NASA's contract will require relatively expansive data access that, according to NASA officials, will provide the program with access to all of the information generated by the contractor under the contract.</p> <p>NASA will establish a reporting structure similar to those of other large programs. NASA will respond as requested/required by external stakeholders.</p>	<p>NASA's approach allows for flexibility in the types of systems being designed—thus allowing the specific content of contractors' performance milestones to vary.</p>
Maximum efficiency (schedule and requirements)	<p>NASA's approach relies on three primary mechanisms to better ensure efficiency—payments after accomplishing specific milestones, certification requirements for crew transportation services, and the insight/oversight model.</p> <p>NASA plans to provide high-level system integration requirements and allow contractors flexibility in determining the system, subsystem, and component requirements necessary to meet NASA's higher-level requirements.</p>	<p>NASA's schedule for completing its IDC and DTEC activities could be overly optimistic, as it appears to be based more on mission needs relating to servicing the space station rather than on verifiable contractor capabilities. Specifically, although NASA officials pointed out that the low-Earth orbit spaceflight capabilities being pursued do not involve revolutionary technologies, some potential contractors are pursuing development of systems or system elements that have little proven flight experience (those potential providers therefore lack human spaceflight system development and flight experience).</p> <p>Other than stating that contractors' progress will be evaluated at key junctures, NASA provided little information regarding when the agency will be in a position to and how it will adequately evaluate whether it will need to purchase additional flights on the Russian Soyuz vehicle as a contingency. Additionally, the lead time required for making Soyuz purchases is 3 years. Therefore, NASA could need to make a purchase decision before adequate information on contractors' progress and ability to meet their agreed-to schedules is available.</p> <p>An independent review of NASA's certification requirements highlighted concerns that requirements and other contract provisions could be too stringent to allow contractors to keep costs down and incentivize the competition for which NASA is hoping.<sup>b</sup></p>

Key element	NASA procurement approach	GAO observations
Proposed measures to address risk management	<p>NASA will have insight into commercial partners' risk management processes through its PITs, which can elevate concerns to the Technical Review Board and within the Commercial Crew Program office. This will occur on an as-needed basis, as well as at milestone reviews.</p> <p>Each contractor will be required to submit a risk management plan with its proposal, and NASA suggests following the agency's established risk management policies as a guide. Contractors will be required to describe their top technical risks in their proposals, and to submit their top program management risks and associated mitigation strategies as part of their risk management plans.</p> <p>NASA officials will evaluate each contractor's proposed scope of work for completeness, value, adequacy of schedule and cost, and whether the identified risks match NASA's assessment of the contractor's risks associated with its proposed solution.</p> <p>NASA will follow its own risk management process to track and manage additional programmatic risks; the agency plans to capture this information in a database to allow risks to be managed throughout the program life cycle.</p>	No concerns; this approach generally addresses the key internal controls associated with risk management.
Measures for safety oversight	<p>NASA's PIT members will assess contractors' hazards analyses as well as their safety and reliability plans against design processes and decisions. Specifically, during the Integrated System Safety Analysis Review milestone, NASA will review contractors' hazards analyses. As a design progresses, NASA PIT members will be able to assess the contractor's design decisions and implementation and to examine whether hazard controls are sufficient.</p>	<p>NASA officials stated that they are applying the same standards by which they assess government systems; this approach just embodies a different way of arriving at a level of confidence about the safety level obtained by the contractor's design. We have previously reported that partner-like situations, depending on the closeness of the working relationship, can pose risks for the government as officials can become vested in the results of decisions and less able to provide effective oversight.<sup>c</sup> Similarly, the Aerospace Safety Advisory Panel expressed concerns that without a formal rotation policy, there is a risk that PIT members could become too psychologically and culturally tied to commercial partners.</p>
Measures for quality control	<p>NASA's PIT members will assess contractors' quality control documentation and processes, and determine if they are adequate to ensure crew safety and mission success. The contractors' quality management systems must be compliant with industry standard AS9100.<sup>d</sup></p>	<p>AS9100 is an accepted industry quality standard, and NASA or third-party officials will provide verification of AS9100 compliance.</p>

Key element	NASA procurement approach	GAO observations
Application of federal oversight (regulations and licensing)	<p>NASA is working with the Federal Aviation Administration to determine whether current federal aviation regulations for public safety allow NASA sufficient latitude to protect crew safety through contractual means.</p> <p>NASA's aim is to ensure that there will be no unexpected risks to flight crew safety under the federal regulatory structure in the event that a NASA mission is executed under a Federal Aviation Administration license. According to NASA officials, NASA and the Federal Aviation Administration plan to share technical data and experiences related to commercial human spaceflight and to ensure commonality between NASA requirements and federal aviation regulations in order to minimize the burden placed on potential service providers.</p>	<p>Although an agreement on licensing crew transportation missions between NASA and the Federal Aviation Administration is not technically needed until NASA is ready to procure transportation services, agency officials stated that such an agreement is needed prior to issuing the IDC Request for Proposal to ensure maximum competition for that phase, given the potential effect of federal aviation licensing on contractors' respective business models (i.e. under a Federal Aviation Administration licensing regime contractors will have to meet Federal Aviation Administration standards for ensuring public safety as well as NASA standards for crew safety). The Program Director confirmed that a decision regarding Federal Aviation Administration licensing related to IDC phase activities will be communicated in the final Request for Proposals.</p>
Indemnification	<p>NASA's plan is to use provisions relating to liability for third-party claims in its crew transportation services contracts. NASA is planning to use provisions similar to those currently used in the NASA Launch Services contracts.</p>	<p>GAO has ongoing work on the topic of indemnification for commercial crew space activities. Results of this review are expected to be available in 2012.</p> <p>Industry concerns regarding third-party liability could limit potential contractors' acceptance of risk and willingness to compete for commercial crew design and development contracts if indemnification is not resolved before the agency's Request for Proposals is issued.</p>

Source: GAO analysis of NASA procurement approach for IDC phase.

<sup>a</sup>The independent government cost estimate will not be disclosed outside of the source evaluation board or the selection official, to ensure the integrity of the procurement competition.

<sup>b</sup>NASA's 1100-series documents encompass program-level requirements related to commercial crew transportation services, including those that pertain specifically to missions to the International Space Station. According to NASA officials, the IDC phase contract will include about 300 requirements related to crew safety and performance of the transportation system, and 148 compliance standards for vehicles that will interact with the space station.

<sup>c</sup>GAO, *Defense Acquisitions: Role of Lead Systems Integrator on Future Combat Systems Program Poses Oversight Challenges*, GAO-07-380 (Washington, D.C.: June 6, 2007).

<sup>d</sup>AS9100 standards are internationally recognized quality management standards specifically written for the aerospace industry.

## Conclusions

Given the daunting financial challenges the nation is facing, difficult decisions will continue to be needed regarding the amount of support NASA can provide for a commercial space transportation market and development of associated capabilities. With adequate funding, NASA's procurement review provides a reasonable plan, although it is under an aggressive schedule, for the IDC phase of its Commercial Crew Program. The plan and contracting approach, however good, do not ensure

---

success and, in fact, NASA is already facing challenges that could affect implementation of the plan and overall success of the Commercial Crew Program. These challenges include those related to the viability of the commercial market, an aggressive schedule, and transparency into costs. Most important, since NASA received less than half the funding it requested for this approach, the agency is likely to not be able to support multiple providers in development of crew transportation systems, thus weakening its ability to leverage competition and calling into question whether this fundamental element of its approach related to cost control is even feasible. If NASA finds it can ultimately support only one supplier or competition for the DTEC phase is limited, NASA may lack sufficient information on costs to adequately evaluate whether and when it needs to purchase additional seats on the Russian Soyuz vehicle. Even if NASA can maintain competition, the efforts of the commercial providers must succeed technically and in an appropriate time frame, which has proven elusive on NASA's past governmental and commercial development efforts. The risk of not meeting its schedule is also heightened given the inexperience of some of the potential commercial providers. Ultimately, NASA's plan for its commercial crew efforts must be implemented in such a way that it provides (1) early resolution of issues to facilitate success and (2) the wherewithal to change course while other contingency options, such as purchasing Soyuz seats, are still available. Timely resolution of the remaining challenges for the Commercial Crew Program is even more important given that NASA currently plans to commit to procuring initial transportation missions as part of the DTEC phase contract.

---

## Recommendations for Executive Action

In light of the level of funding NASA received in its fiscal year 2012 appropriations and the challenges the agency will continue to have as it moves forward with the Commercial Crew Program, we are making two recommendations to the Administrator of NASA.

- To continue to ensure that NASA's acquisition approach for commercial crew transportation services is reasonable in light of new appropriations, the Administrator of NASA should direct the Commercial Crew Program to reassess its approach for acquiring services before initiating its procurement process for the IDC and subsequent phases.
- To ensure that the United States has continued access to the space station if NASA's commercial crew efforts do not result in a capability within the intended time frame, the Administrator of NASA should

---

direct the Commercial Crew Program to establish criteria by which it will assess the progress of its commercial providers to determine whether the purchase of additional seats on the Russian Soyuz vehicle is required beyond 2016 and set time frames by which the initial and subsequent decisions will need to be made.

---

## Agency Comments

We provided a draft of this report to NASA for comment. In its written comments, which are reprinted in appendix I, NASA agreed with our findings, conclusions, and recommendations. Specifically, NASA stated that it would not initiate the procurement process for the IDC phase until it has reassessed its acquisition approach. As we stated in our report, doing so will allow NASA to better take into consideration its reduced funding level and the resultant challenges it, coupled with the aggressive program schedule, places on the program. These steps will help ensure that the ultimate acquisition approach NASA selects can be accomplished within the bounds of the schedule and resources constraints under which the program will have to operate. NASA also concurred with our recommendation to establish criteria and a time frame by which to assess the progress of its efforts to determine whether the purchase of additional seats on the Russian Soyuz vehicle is necessary to ensure continued access to the International Space Station. NASA also provided oral technical comments, which were incorporated into our report as appropriate.

---

We are sending copies of this report to the appropriate congressional committees, the Administrator of the National Aerospace and Space Administration, and other interested parties. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you have any questions about this report, please contact me at (202) 512-4841 or [chaplainc@gao.gov](mailto:chaplainc@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are provided in appendix II.



Cristina T. Chaplain  
Director, Acquisition and Sourcing Management

# Appendix I: Comments from the National Aeronautics and Space Administration

National Aeronautics and Space Administration  
Headquarters  
Washington, DC 20546-0001



DEC 13 2011

Reply to Attn of: Human Exploration and Operations Mission Directorate

Ms. Cristina Chaplain  
Director  
Acquisition and Sourcing Management  
United States Government Accountability Office  
Washington, DC 20548

Dear Ms. Chaplain:

The National Aeronautics and Space Administration (NASA) appreciates the opportunity to review and comment on the Government Accountability Office (GAO) draft report entitled, "Acquisition Approach for Commercial Crew Transportation Includes Good Practices But Faces Significant Challenges" (GAO-12-282).

In the draft report, GAO addresses two recommendations to the NASA Administrator, specifically:

**Recommendation 1:** To continue to ensure that NASA's acquisition approach for commercial crew transportation services is reasonable in light of new appropriations, the Administrator of NASA should direct the commercial crew program to reassess its approach for acquiring services before initiating its procurement process for the Integrated Design Contract and subsequent phases.

**Management's Response:** NASA concurs with this recommendation and a reassessment of the acquisition approach for Commercial Crew is already in process. NASA does not intend to initiate the procurement process for the Integrated Design Contract until the results of the reassessment are understood. Regardless of the acquisition approach, NASA plans to maintain its key priorities for the program of safe, reliable, and cost effective human space transportation.

**Recommendation 2:** To ensure that the United States has continued access to the space station if NASA's commercial crew efforts do not result in a capability within the intended timeframe, the Administrator of NASA should direct the commercial crew program to establish criteria by which it will assess the progress of its commercial providers to determine whether the purchase of additional seats on the Russian Soyuz vehicle is required beyond 2015 and set timeframes by which the initial and subsequent decisions will need to be made.

**Management's Response:** NASA concurs with the GAO recommendation to establish criteria by which NASA will assess commercial crew provider progress to determine whether the purchase of additional seats on the Russian Soyuz vehicle is required beyond 2015 and set timeframes by which the initial and subsequent decisions will need to be made. Additionally, NASA will gain more insight into subsequent needs and timing for Soyuz as the commercial crew development efforts mature and criteria will be established for subsequent Soyuz purchases.

Thank you for the opportunity to comment on this draft report. If you have any questions or require additional information, please contact Phil McAlister at (202) 358-0712.

Sincerely,



William H. Gerstenmaier  
Associate Administrator  
for Human Exploration and Operations

---

# Appendix II: GAO Contact and Staff Acknowledgments

---

## GAO Contact

Cristina T. Chaplain, (202) 512-4841 or chaplainc@gao.gov

---

## Staff Acknowledgments

In addition to the contact names above, Shelby S. Oakley, Assistant Director; R. Eli DeVan; Katheryn Hubbell; Kenneth Patton; Megan Porter; Andrew Redd; and Sylvia Schatz made key contributions to this report.



---

## GAO's Mission

The Government Accountability Office, the audit, evaluation, and investigative arm of Congress, exists to support Congress in meeting its constitutional responsibilities and to help improve the performance and accountability of the federal government for the American people. GAO examines the use of public funds; evaluates federal programs and policies; and provides analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions. GAO's commitment to good government is reflected in its core values of accountability, integrity, and reliability.

---

## Obtaining Copies of GAO Reports and Testimony

The fastest and easiest way to obtain copies of GAO documents at no cost is through GAO's website ([www.gao.gov](http://www.gao.gov)). Each weekday afternoon, GAO posts on its website newly released reports, testimony, and correspondence. To have GAO e-mail you a list of newly posted products, go to [www.gao.gov](http://www.gao.gov) and select "E-mail Updates."

---

## Order by Phone

The price of each GAO publication reflects GAO's actual cost of production and distribution and depends on the number of pages in the publication and whether the publication is printed in color or black and white. Pricing and ordering information is posted on GAO's website, <http://www.gao.gov/ordering.htm>.

Place orders by calling (202) 512-6000, toll free (866) 801-7077, or TDD (202) 512-2537.

Orders may be paid for using American Express, Discover Card, MasterCard, Visa, check, or money order. Call for additional information.

---

## Connect with GAO

Connect with GAO on [Facebook](#), [Flickr](#), [Twitter](#), and [YouTube](#). Subscribe to our [RSS Feeds](#) or [E-mail Updates](#). Listen to our [Podcasts](#). Visit GAO on the web at [www.gao.gov](http://www.gao.gov).

---

## To Report Fraud, Waste, and Abuse in Federal Programs

Contact:

Website: [www.gao.gov/fraudnet/fraudnet.htm](http://www.gao.gov/fraudnet/fraudnet.htm)

E-mail: [fraudnet@gao.gov](mailto:fraudnet@gao.gov)

Automated answering system: (800) 424-5454 or (202) 512-7470

---

## Congressional Relations

Ralph Dawn, Managing Director, [dawnr@gao.gov](mailto:dawnr@gao.gov), (202) 512-4400  
U.S. Government Accountability Office, 441 G Street NW, Room 7125  
Washington, DC 20548

---

## Public Affairs

Chuck Young, Managing Director, [youngc1@gao.gov](mailto:youngc1@gao.gov), (202) 512-4800  
U.S. Government Accountability Office, 441 G Street NW, Room 7149  
Washington, DC 20548

