Commercial Orbital Transportation Services (COTS) Program Status

and

GeoQuickRide (GQR) Overview

Briefing at DOC/NOAA Industry Day on
Seeking Commercial Capabilities to Address USG Requirements For Satellite-Based Observations
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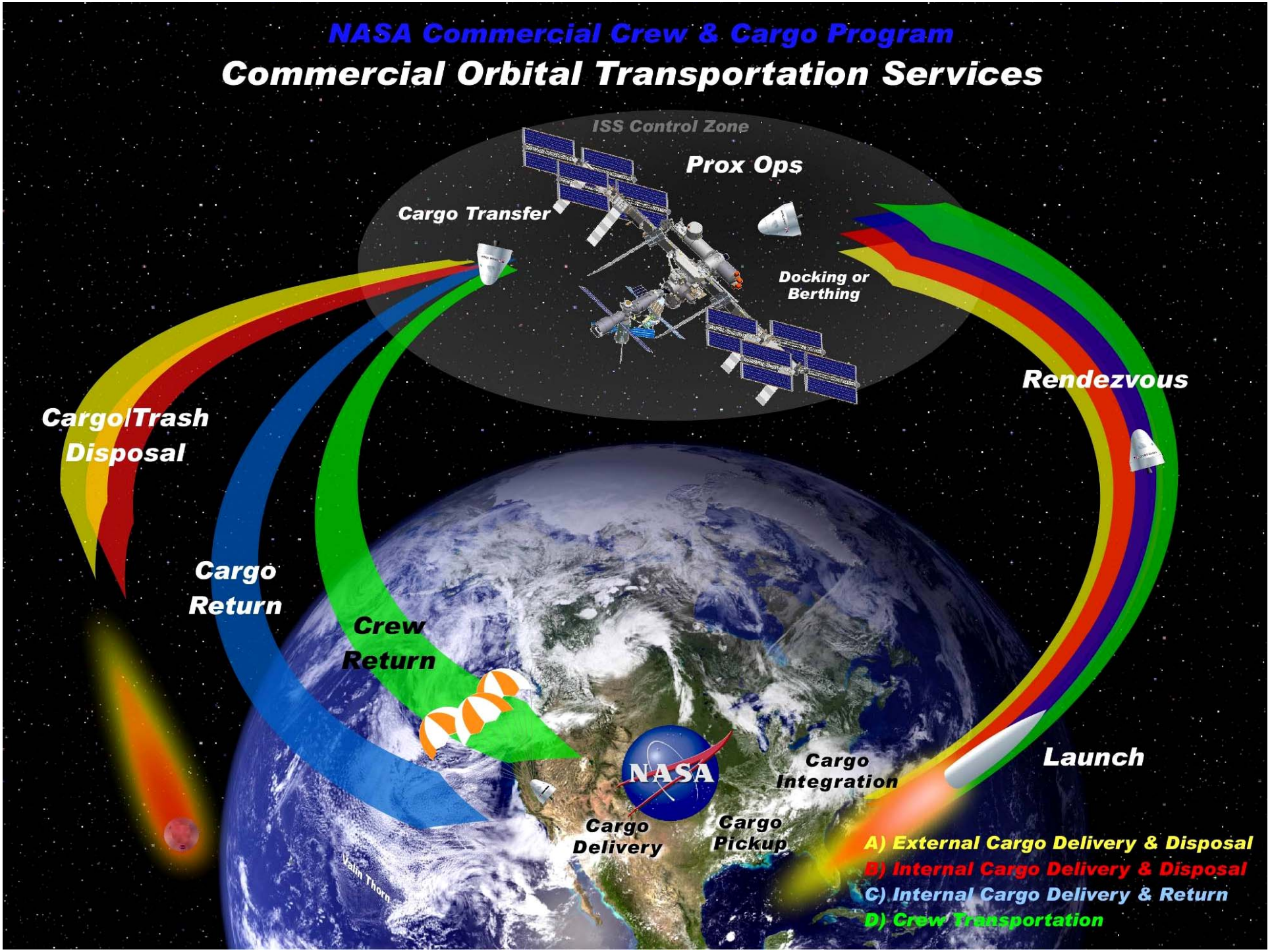
COMMERCIAL CREW & CARGO

International Space Station Role in COTS

- **Need**
  - NASA has an immediate need and long term obligation to service ISS
- **Status**
  - Policy is to retire Space Shuttle by 2010
  - Current agreements for International Partner space transportation capabilities are insufficient to meet projected ISS needs
  - Shortfall is about 80 metric tons of cargo to meet ISS resupply needs from 2010-2015
- **Strategy**
  - NASA is developing an ISS cargo resupply strategy using a mixed fleet of foreign vehicles and US commercial service providers
  - Strategy is to purchase US commercial orbital transportation services (COTS) as soon as available
  - Purchase of foreign services will bridge the gap until reliable, cost effective US commercial services are available


NASA Commercial Crew & Cargo Program
Commercial Orbital Transportation Services
ISS Control Zone
Prox Ops
Cargo Transfer
Docking or Berthing
Rendezvous
Cargo/Trash Disposal
Cargo Return
Crew Return
NASA
Cargo Integration
Launch
Cargo Delivery
Cargo Pickup
A) External Cargo Delivery & Disposal
B) Internal Cargo Delivery & Disposal
C) Internal Cargo Delivery & Return
D) Crew Transportation

COTS Overview

- **$500M budgeted in FY06-FY10**
- **NASA *investment* in the demonstration of commercial orbital transportation capabilities**
- **COTS Project executed in two phases:**
  - **Phase 1: Technical Development/Demonstration funded Space Act Agreements (SAA)**
  - **Phase 2: Competitive Procurement of Commercial Orbital Transportation Services**
- **Phase 1 competition executed Jan-Aug 2006**
- **Phase 1 SAAs include an *option* for crew transportation demonstrations**
  - **Pending successful cargo demonstrations *and* additional NASA funding**
- **Phase 2 planning has been initiated within NASA to support the procurement of ISS commercial cargo services by 2010**

COTS Phase 1 is NOT a procurement or contract for products and services – It is NASA's catalyst for commercial capability demonstrations where the potential high return on investment outweighs the associated financial risk

COTS Innovative Features

- **Phase 1 Competition**
  - **Utilized NASA's Space Act authority vs. FAR contract**
  - **Emphasized management team skills vs. company past performance**
  - **Business plan and financial criteria similar to private investment models**
  - **Broadly targeted technical goals for the general space transportation market**
    - Firm requirements/processes where necessary for ISS certification and human safety
  - **Encouraged private investment to share costs, enable multiple awards, and maximize capability coverage**
- **Space Act Agreement**
  - **Companies retain maximum rights to intellectual and personal property allowed by law**
  - **FAA licensing and cross-waiver liability provisions**
  - **Fixed-price performance milestone payments**
    - Series of incremental milestones based on objective criteria
  - **Restricted termination provisions**

COTS is a Government-Industry partnership paving a new way of doing business with the private sector

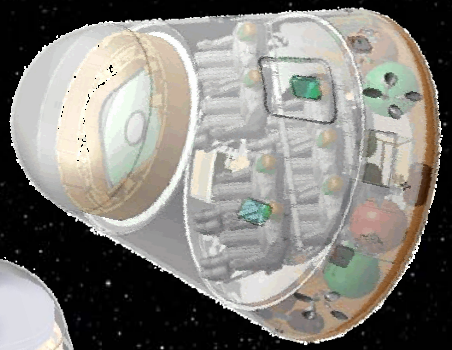
COTS Participants

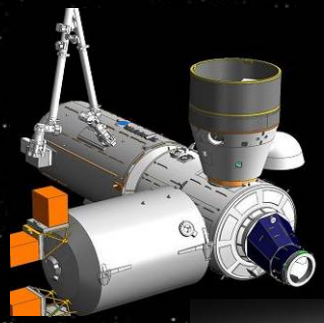
- Received 21 proposals from 20 companies across the full spectrum of industry in the 1st round competition
- Down selected to 6 companies for final evaluation and negotiations – 2 selected for portfolio of funded SAAs
  - Andrews Space
  - SpaceDev
  - SPACEHAB
  - Transformational Space Corp. (t/Space)
  - Space Exploration Technologies (SpaceX)
  - Rocketplane Kistler (RpK)

$ Funded Space Act Agreement $

Terminated Oct 18, 2007

Space Exploration Technologies (SpaceX) COTS Concept





Description:

- Falcon 9 Launch Vehicle
- Dragon Crew/Cargo Spacecraft

Proposed Features:

- Flexible crew and cargo configurations
- Recoverable launch vehicle and spacecraft
- ISS cargo delivery & return demonstration planned for completion by September 2009
- NASA Investment:
  - Cargo Demonstration – up to $278 M
  - Crew Option – up to $308 M additional

SPACEX
Space Exploration Technologies

http://www.spacex.com/

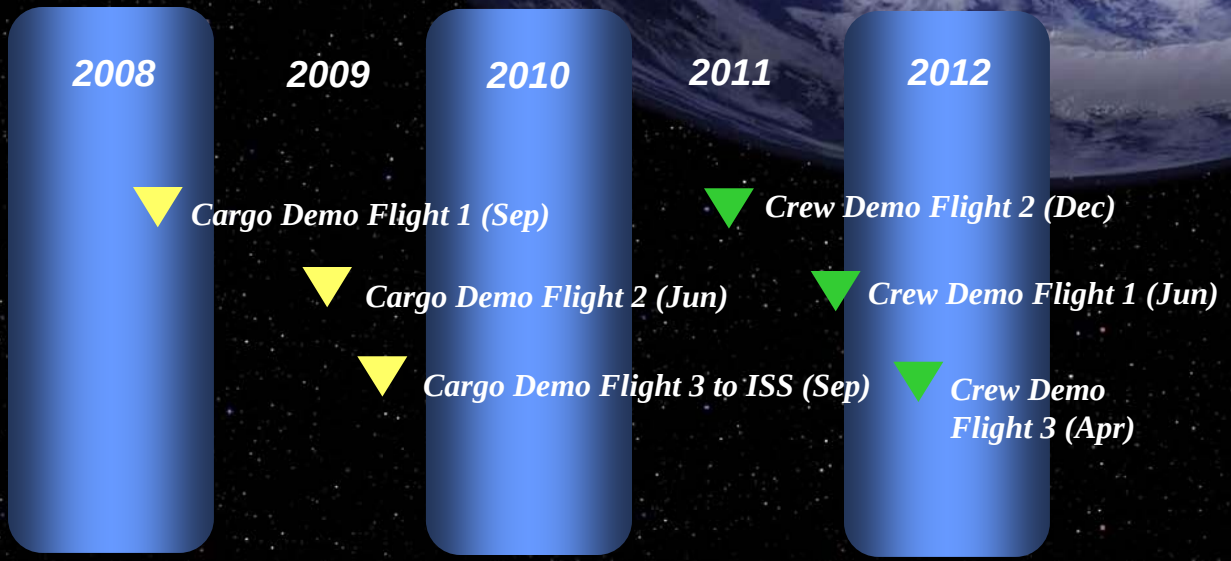
MDA ARES CORPORATION ODYSSEY SPACE RESEARCH PARAGON SPACE DEVELOPMENT CORPORATION

Phase 1 Re-competition Initiated

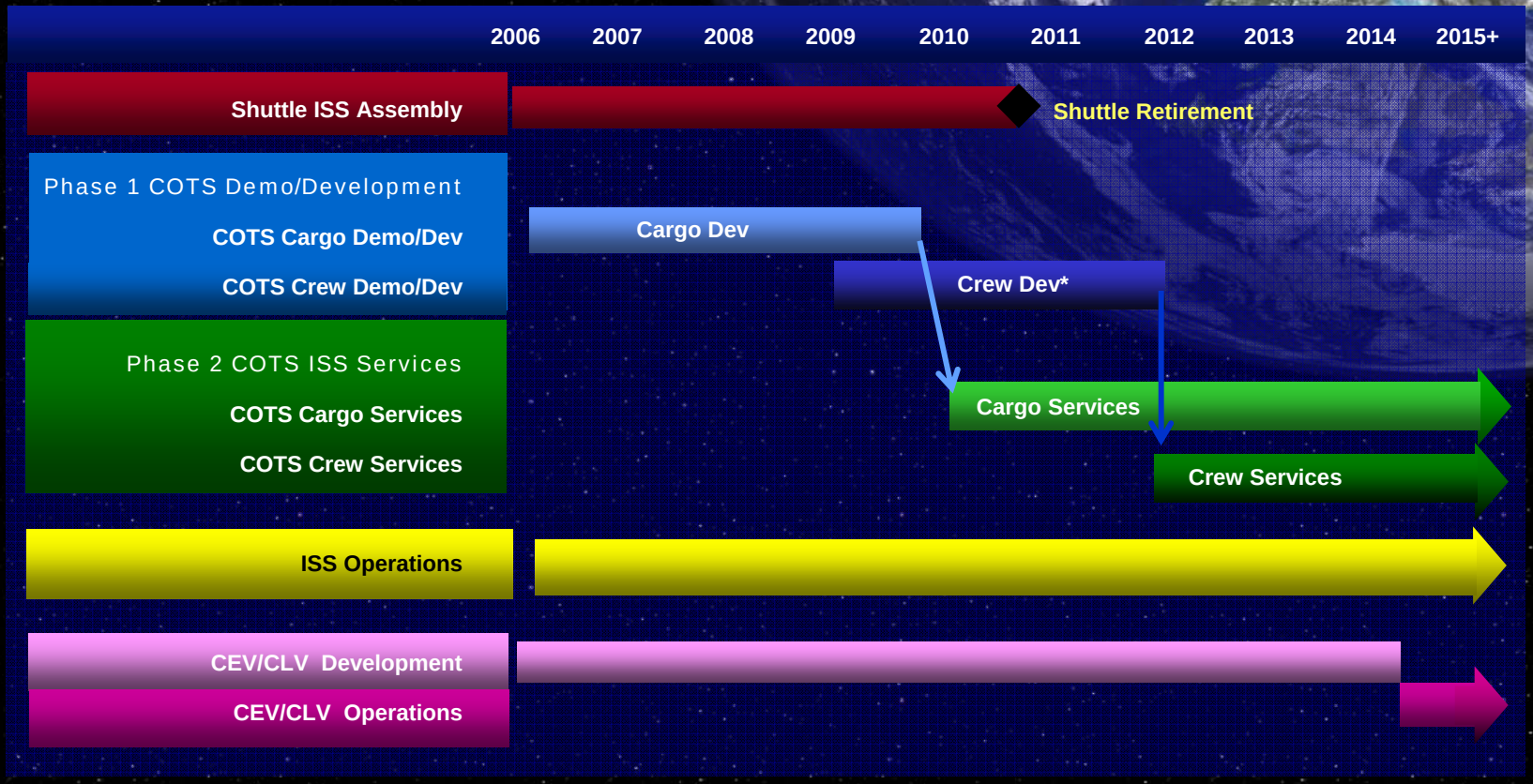
- **NASA terminated its SAA with RpK on October 18, 2007**
  - **Two milestones missed**
    - Financing Round 2
    - Pressurized Cargo Module CDR
  - **May submit a proposal in new competition**
- **COTS Phase 1 Round 2 Announcement released Monday, October 22nd**
  - **Full and open competition for remaining balance of $174M funding**
  - **Proposal's due November 21st**
  - **Award of new funded SAA(s) is targeted for February 2008**

COTS Flight Demonstrations

SPACEX
Space Exploration Technologies



COTS Timeline



*** COTS crew transportation capability is a Phase 1 option and is currently not funded or authorized**

Other COTS Partnerships

- Nonreimburseable (unfunded) SAAs enabling NASA technical assistance with space transportation capability development have been signed with five companies :
  - Constellation Services International (CSI)
  - PlanetSpace
  - SpaceDev
  - SPACEHAB
  - Transformational Space Corp. (t/Space)

Summary

- U.S. space policy directs pursuit of commercial opportunities for providing transportation and other services to low Earth orbit and beyond
- NASA's COTS Program established to implement policy with significant investments to stimulate the commercial space industry
- COTS significantly reduced barriers to entry to enable entrepreneurial approaches for the commercial space transportation market

Successful COTS providers
may open new space markets and provide
reliable, cost effective cargo and crew transportation services,
beginning a new era for commercial space

GeoQuickRide (GQR) Overview

- Fly science instruments and technology demos on the excess capacity of commercial GEO communication satellites
- 1998/99 GQR Studies on Commercial Spacecraft Opportunities:
  - Average excess capacity: mass: 89kg, power: 460W & volume
  - Commercial: 4 US manufactures & 4+ U.S. owner/operators
- Changes at NASA and the spacecraft industry are creating opportunities for piggybacking on commercial satellites
- Owner/Operators provide: spacecraft accommodations; integration support; & ground station/mission ops support
- Commercial Spacecraft Mission Life:
  - Mission life of 15 years and GQR payloads use BOL capacity
- FAA's 2004 Commercial Space Transportation Forecast: ~ 23.4 commercial launches/year, 2004-13

  (http://ast.faa.gov/rep_study/forcasts_and_reports.htm)

GQR (http://rsdo.nasa.gov) Bob Caffrey 301-286-0846


A New Era In Spaceflight Is Beginning...
NASA
COMMERCIAL
CREW & CARGO