

Space at a Crossroads: Commercial space sector influencing US Government space programs

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GAO

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- Our work is done at the request of congressional committees or subcommittees or is mandated by public laws or committee reports. We also undertake research under the authority of the Comptroller General.
- Range of issues GAO reviews include:
 - National security
 - Homeland security
 - Education
 - Environment
 - Financial markets
 - Major defense acquisitions



My Portfolio



Military Space

- Satellite program reviews
- Evolved Expendable Launch Vehicle (EELV)
- Ground systems
- Trends/Risks
- Acquisition strategies
- Best practices



Missile Defense

- Interceptor development
- Radar systems
- Space programs
- Testing
- Quality practices
- Cost estimating
- Integration



NASA

- James Webb Telescope
- Space Launch System
- Orion Capsule
- Commercial crew
- Science satellites
- Mars probes
- International Space Station

We study topics relating to commercial space



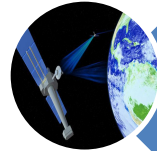
Evolved Expendable Launch Vehicle



Satellite disaggregation, hosted payloads,
way forward



Modernization of satellite control networks



Procurements of satellite bandwidth

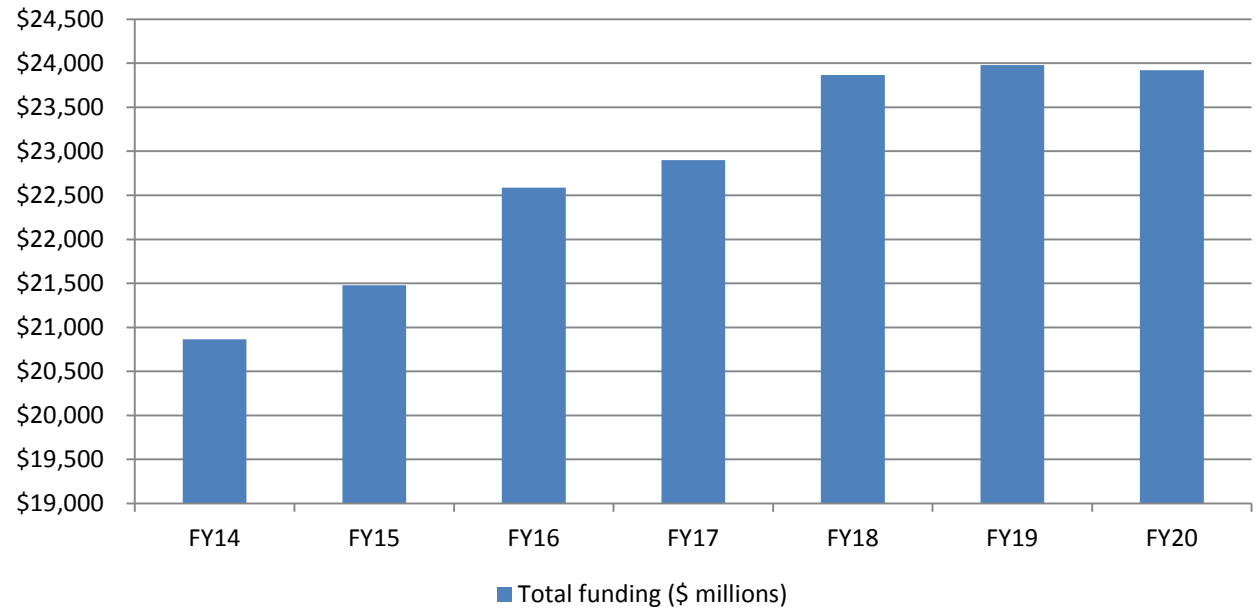


Commercial crew program

Government Trends in Space Acquisitions - DOD

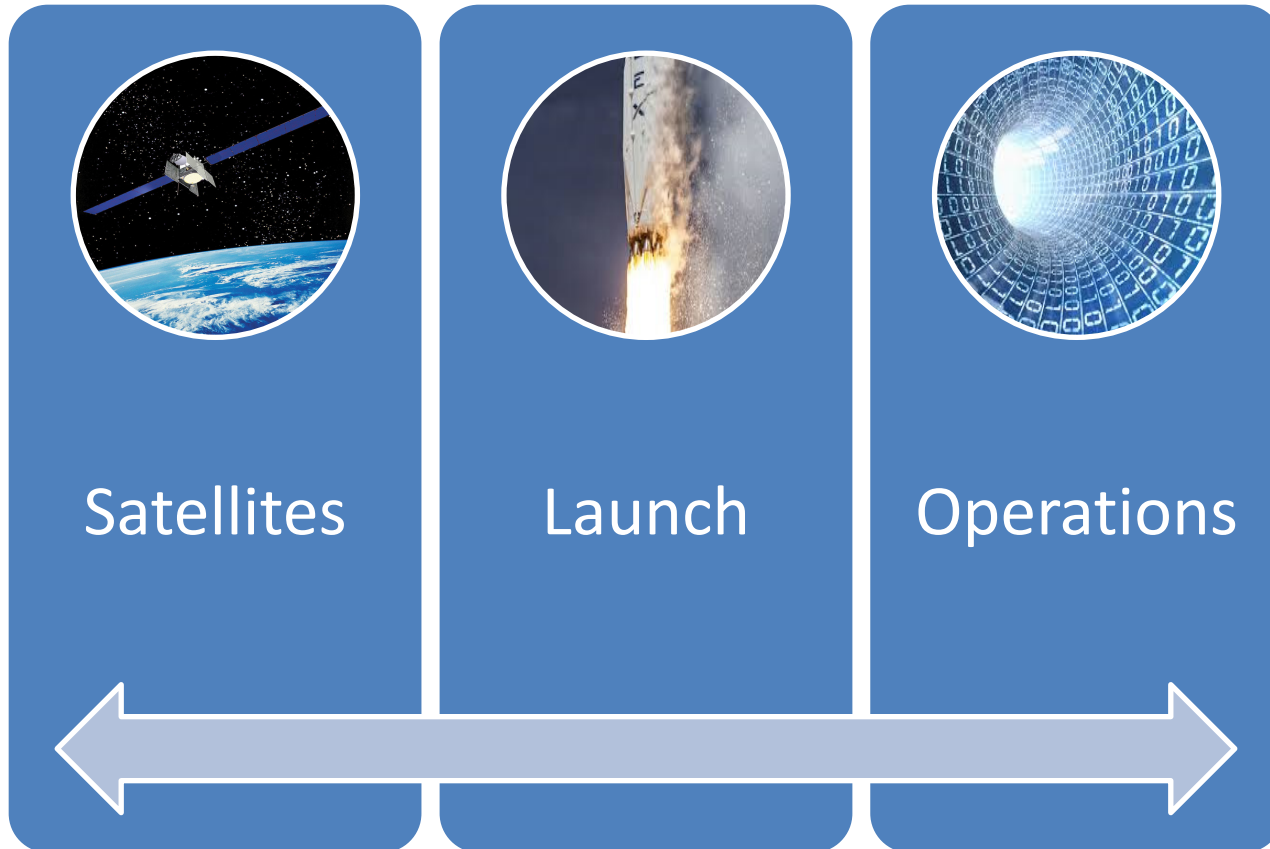


Funding for U.S. Military Space Programs



- New programs: Space Situational Awareness, space fence
- Continuing: Missile warning, various (AEHF, WGS, MUOS) satellite communications, GPS

DOD at a Crossroads



Satellites

Launch


Operations

Assessing
different paths
to increase
resiliency

Transitioning to
commercial and
competitive
acquisitions

Making
procurements
more strategic

Buzzwords

A large, complex satellite with multiple solar panels and antennas, floating in space against a starry background.

Transformational
Exquisite satellites
Revolutionary advances
Cost-plus contracts
Preeminence
Systems of systems
Hands-off oversight

Yesterday

A small, cube-shaped satellite with a few solar panels and antennas, floating in space against a starry background.

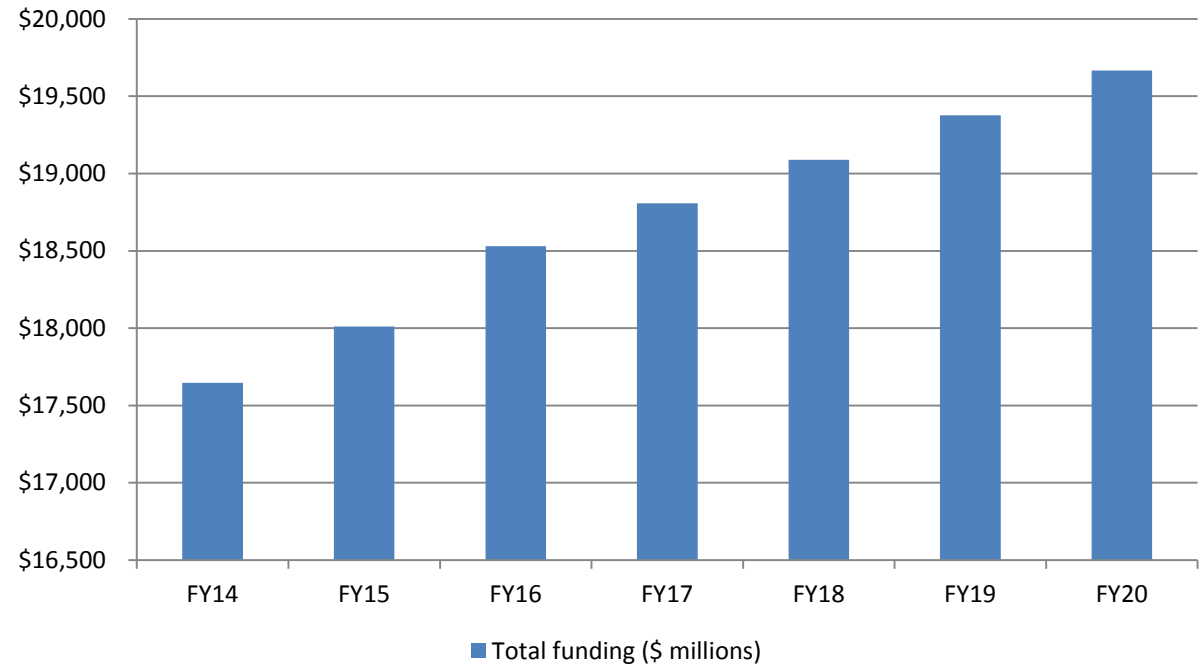
Evolutionary
Small/cube/nano satellites
Incremental advances
Commercial/fixed-price contracts
Resilience
Data fusion/networks
Streamlined oversight

Today

Government Trends in Space Acquisitions - NASA



Total NASA Operating Budget



- New: Asteroid Redirect, Europa, Mars 2020
- Continuing: Commercial Crew, James Webb Telescope, Orion Crew Capsule, Space Launch System

NASA Challenge: Balancing Priorities

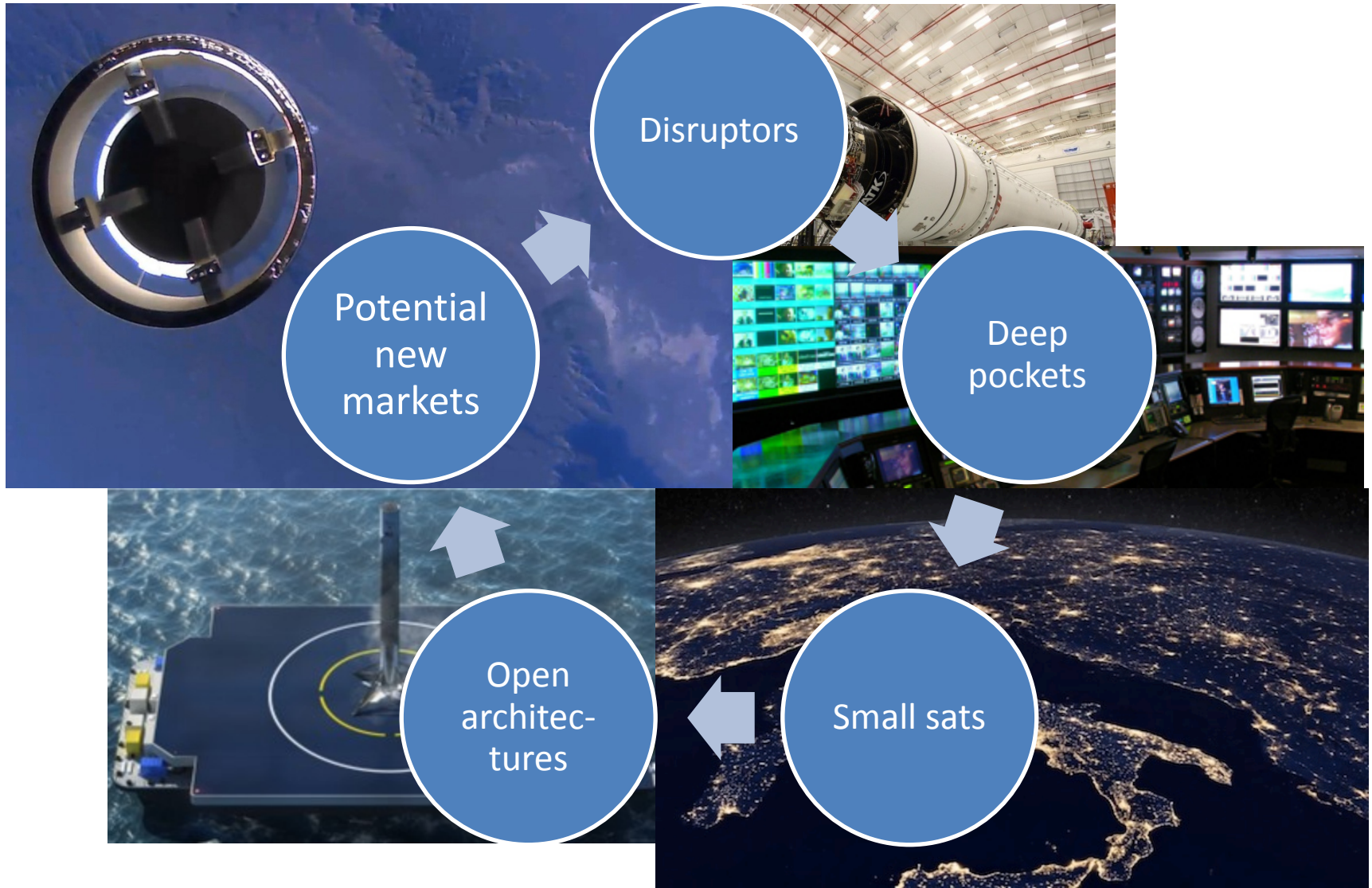


SLS, Orion,
James Webb,
entering critical
phases

Appropriations
for commercial
crew less than
planned

Cost overruns
can overwhelm
portfolio

Trends in Commercial Sector



Opportunities

Cost reduction

- Competition
- Fixed price contracts
- New acquisition tactics, e.g., long term leasing
- Hosted payloads
- Money-saving concepts such as reusable launch vehicles

Resiliency

- More pathways to provide capability
- Use of commercial satellites to augment government satellites
- Reduce potential for systemic failure

Innovation

- Examples: methane engines, ride sharing services, satellite control software
- Common architectures and data fusion

Savings?

- GAO and others have identified examples of savings related to hosted payloads, satellite control networks, bandwidth procurements
- Not enough experience and hard data to confirm commercial approaches/practices are better



Numerous Barriers to Commercial Space Industry



Difficult to change status quo



Daunting national security requirements



Diffuse leadership



Acquisition problems



Legal and policy barriers

Keys to overcoming barriers



Best Practices Government Should Adopt—New Systems

- Defined and understood requirements
- Use of mature technologies
- Incremental development
- Realistic estimates of costs, schedule, risk
- Base decisions to move programs forward on demonstrated knowledge

Don't bite of more than you can chew

Fly before you buy

Best Practices Government Should Adopt--Launch

- Single supplier: increase knowledge about supplier base, cost and pricing, launch rates, etc.
- Competitive environment: gain experience with new suppliers and competitive approaches before adopting long-term strategy
- Develop government-wide investment strategy to optimize spending and advance technology (now mandated)

Best Practices Government Should Adopt—Satellite control

- Adopt interoperable/open architectures
- Leverage COTS products
- Automate
- Business case for stand alone approach



Best Practices Government Should Adopt—Services (SATCOM, Launch)

- Spend analysis
- Centralized procurement
- Category strategies
- Cost of total ownership
- Buying in bulk for some services but for complex services with few suppliers:
 - understand cost drivers
 - streamline requirements
 - recruit skilled procurement talent
 - develop new suppliers
 - benchmark