www.nasa.gov/leo-economy

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NASA's Plan for Commercial
LEO Development

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Goals for Human Spaceflight in LEO

• It is the sense of Congress that “an orderly transition for United States human space flight activities in low-Earth orbit from the current regime, that relies heavily on NASA sponsorship, to a regime where NASA is one of many customers of a low-Earth orbit commercial human space flight enterprise may be necessary.” P.L. 115-10, NASA Transition Authorization Act of 2017

• The President’s 2020 Budget: Drives toward a Vibrant, U.S.-Led Economy in Earth Orbit. The Budget provides funding for the International Space Station as well as for new commercial space capabilities that will facilitate a transition to a more robust and cost-effective approach to human space activities near the Earth. By 2025, the Budget envisions commercial capabilities on the International Space Station as well as new commercial facilities and platforms to continue the American presence in Earth orbit.

• Four goals from Oct 2018 NASA/Commerce/State report to the National Space Council: Strategy for Human Spaceflight in LEO and Economic Growth in Space
  1. To achieve a continuous U.S. presence in LEO – both with government astronauts and with private citizens – in order to support the utilization of space by U.S. citizens, companies, academia, and international partners and to maintain a permanent American foothold on the nearest part of the space frontier.
  2. To create a regulatory environment in LEO that enables American commercial activities to thrive.
  3. To conduct human spaceflight research in LEO that will advance the technology and systems required for long-duration spaceflight systems, including systems for interplanetary travel and permanent space habitation.
  4. To expand and extend commercial opportunity through international partnerships and engagement.
Commercial LEO Development

Cargo
- COTS Competitions
- COTS Funded SAAs
- CRS Competitions
- CRS Contracts

Crew
- Commercial Crew Dev 1 & 2
- Commercial Crew CCiCap
- Commercial Crew CCtCap

ISS Utilization
- ISS National Lab
- ISS NL AO (unfunded)
- ISS Commercial Facilities
- ISS NL BAA (funded)
- ISS NRA for ISS Utilization

Commercial LEO Development
1) ISS Commercial Use & Pricing Policy
2) Private Astronaut Missions
3) Commercial Destination Development
4) Stimulate Demand
5) Define NASA’s Long-Term LEO Needs
NASA Plan for Commercial LEO Development

NASA developed a five-point plan building on the work of the last two decades. This plan includes new policies, multiple solicitations, and new information that can be found on the Leo Economy website.

1. NASA established a commercial use and pricing policy for the International Space Station (ISS)
2. Enable flight of private astronauts to the ISS with the first mission as early as 2020
3. Initiate a process for developing commercial low-Earth orbit destinations
4. Seek out opportunities to stimulate scalable and sustainable demand for LEO destinations
5. Quantify the agency's long term needs in LEO

https://go.usa.gov/xym78
Overview of NASA's Commercial LEO Plans

<table>
<thead>
<tr>
<th>Current/Near-Term</th>
<th>Mid-Term</th>
<th>Long-Term</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td><strong>Objectives</strong></td>
<td><strong>Objectives</strong></td>
</tr>
<tr>
<td>• Support NASA’s R&amp;D needs and ISS National Laboratory needs</td>
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<td>• Turn over LEO operations to the private sector</td>
</tr>
<tr>
<td>• Leverage ISS capabilities to stimulate demand and catalyze new markets</td>
<td>• Incorporate IP commercial needs</td>
<td>• Purchase NASA’s needed R&amp;D Services from commercial provider at lower cost than ISS</td>
</tr>
<tr>
<td>• Meet International Partner (IP) Intergovernmental Commitments</td>
<td>• Initiate phased transition from ISS to Commercial with attached (initially) and/or free flyers</td>
<td>• Shift NASA/IP focus and resources towards exploration</td>
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<tr>
<td>• Collaborate with IPs on new market development</td>
<td>• Stimulate global demand and catalyze new markets</td>
<td><strong>Activities</strong></td>
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<tr>
<td>• Document and share with industry NASA’s comprehensive approach for global Commercial LEO Development:</td>
<td>• Partner with industry to develop and demonstrate new LEO destinations</td>
<td>• Complete transition of ISS assets at end of life</td>
</tr>
<tr>
<td>1) Establish ISS commercial use and pricing policy</td>
<td>• Initiate phased transition to acquire needed services from commercial destinations rather than ISS</td>
<td>• Conduct NASA’s needed R&amp;D on commercial destinations in LEO</td>
</tr>
<tr>
<td>2) Enable private astronaut missions to ISS</td>
<td>• Avoid competition from ISS</td>
<td>• Purchase ‘LEO National Lab’ services from commercial provider?</td>
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<td>3) Initiate process for commercial development of LEO destinations</td>
<td>• Seek out and pursue opportunities to stimulate demand both domestic and international</td>
<td><strong>Activities</strong></td>
</tr>
<tr>
<td>4) Seek out and pursue opportunities to stimulate demand</td>
<td>• Initiate transition of ISS assets while still satisfying IP agreements</td>
<td><strong>Activities</strong></td>
</tr>
<tr>
<td>5) Quantify NASA’s long-term needs for activities in LEO</td>
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<td><strong>Activities</strong></td>
</tr>
</tbody>
</table>
(1) ISS Commercial Use and Pricing Policy

NASA released a NASA Interim Directive (NID) for Use of ISS for Commercial and Promotional Activities

**Purpose**: to clarify NASA’s policy for expanded commercial use of ISS (within the agency’s existing authorities) consistent with congressional and administration policy direction

**Goal**: enable commercial activities in low Earth orbit leading to sustainable LEO economy with NASA as one of many customers

New policy enables:

- Manufacturing, production, transportation, or marketing of commercial resources and goods, including products intended for commercial sale on Earth
- Inclusion of private astronauts on USG or commercial missions to the International Space Station and associated on-orbit activities, including commercial and marketing activities
- U.S. government astronauts conducting coordinated and scheduled activities in support of commercial and marketing activities
- Purchase resources available for use on the International Space Station for commercial and marketing activities

[https://go.usa.gov/xym7f](https://go.usa.gov/xym7f)
Commercial Resource Allocation

Current

- Private Firms (Commercial, Non-Profit)
- Academic Institutions
- Other USG Agencies
- CSA
- ESA
- JAXA

Physical and Life Sciences
Human Research Program
Exploration Research & Technology
Science Missions

Expanded Commercial Use

- Private Firms (Commercial, Non-Profit)
- Academic Institutions
- Other USG Agencies
- CSA
- ESA
- JAXA

Physical and Life Sciences
Human Research Program
Exploration Research & Technology
Science Missions

NASA Utilization
ISS National Lab
International Partners
Commercial Non-R&D
Benefits of Private Astronaut Missions

- Allow commercial industry to purchase commercial services and gain insight into the costs associated with owning and operating a platform in the future
- Reduce market risk to commercial LEO destination developers by demonstrating the market
- Expands range of commercial activities that can be performed on ISS
- Potential to increase flight rate and strengthen the market for commercial crew launch service providers
- Potential to increase available crew time on orbit for NASA, commercial, and other R&D activities
NASA’s LEO Destinations Roadmap

**Current/Near-Term**
- ISS Port Path
  - Pre-Phase A
  - Phases A-B
  - Concept Dev & Prelim. Design
- Free Flyer Path
  - Pre-Phase A
  - Phases A-B
  - Selection
  - Concept Dev & Prelim. Design

**Mid-Term**
- Phase C-D
  - Final Design, Fabrication, Assembly, Integration, Test
  - Launch
- Phase E
  - On-Orbit Demo(s)

**Long-Term**
- Phase E cont.
  - Commercial Operations
  - Transition Planning

**NASA Services Acquisition**
- ISS Research Acquisition
- Incremental Research Element
- ISS Transition
- Ongoing use of Current ISS NRA for Utilization
- Commercial Destination Services Acquisition
- Commercial Destination Services Purchase

**Appendix I**
- Selection of Axiom Space announced January 27, 2020

**Appendix K**
- Request for Proposals in work

**NextStep 2 BAA**
- Appendix I
- Appendix K
Axiom Space Selected for Appendix I (port solicitation)
(4) Stimulate Sustainable Demand

- Development of a scalable, sustainable demand for LEO platforms is a critical element of NASA’s plan for development of the LEO economy
- ISS National Lab accommodating many industry R&D projects
  - Promising projects will transition from ISS NL post-R&D to enter production
- In Space Manufacturing Projects underway:
  - Exotic Optical Fibers #1 - Demo #1 on NG-11 (April 2019), Demo #2 on NG-13 (February 2020)
  - Exotic Optical Fibers #2 - Demo #1 on NG-11 (April 2019), Demo #2 on SpX-21 (August 2020)
  - Bio-Printing Cardiac Tissue - Demo #1 on SpX-18 (July 2019), #2 SpX-20, #3 NG-13, #4 NG-14
  - Ceramic Turbine Blisk Manufacturing - Demo #1 NET SpX-21 (August 2020)
  - Industrial Crystals Facility - Demo #1 NET NG-14 (October 2020)
  - Super Alloy Turbine Blisk Manufacturing - Demo #1 NET SpX-22 (January 2021)
- Continuing the development pipeline for these and other promising areas of potential future demand for LEO platforms is a high priority
- Intent is to continue building a pipeline of projects through ISS life, migrate successful projects to commercial lab(s) in LEO
Commercial Hardware on ISS

• NanoRacks: Internal & External platforms; sat deployers; airlock
• Teledyne Brown Engineering: MUSES External precision pointing platform
• Bigelow Aerospace: Expandable module
• Alpha Space: MISSE-FF External materials exposure platform
• BioServe: Space Biology platforms and services
• Space Tango: TangoLab space biology platforms
• Techshot: Bone densitometer, MVP centrifuge facility
• Made In Space: Additive Manufacturing Facility
• STaARS: Space biology platform
• Sierra Nevada Corp: Small mass measurement device
Commercial Research on ISS

Lilly
Muliken
MERCK
P&G

BROAD INSTITUTE
Ras Labs
iXpressGenes

COBRA PUMA GOLF

VISIDYNE

NOVARTIS

YOSEMITE SPACE

CamMED

VECOY NANOMEDICINES

beth

Quad Technologies

NEURAL ANALYTICS

gumstix

dream, design, deliver

HySpeed COMPUTING
NovaWurks

Honeywell

n3D Biosciences, Inc.

BERYLLIUM
NASA’s Future LEO Demand

- Human Research
- Technology Demonstrations
- Crew Accommodations & Training
- Science
- Physical & Biological Research
- National Lab Services
Resources Available
www.nasa.gov/leo-economy/resources

Low-Earth Orbit Economy Resources

Request for Information (RFI)
- Plan for Commercial Low-Earth Orbit Development (June 7, 2019)

Document Releases
- NASA Plan for Commercial LEO Development: Summary and Near Term Implementation Plans (June 7, 2019)
- NASA Interim Directive: Use of International Space Station (ISS) for Commercial and Marketing Activities (memo signed by Bill Gerstenmaier, June 6, 2019)
- How to Get Your Commercial Activity on ISS (June 7, 2019)
- Forecasting Future NASA Demand in Low-Earth Orbit: Revision Two – Quantifying Demand (June 7, 2019)
- Low Earth Orbit Commercialization Study Results - Executive Summaries (June 7, 2019)

Related Previously Released Documents
- Low Earth Orbit Commercialization Study Results - One Page Summaries (May 20, 2019)
- Forecasting Future NASA Demand in Low-Earth Orbit (October 26, 2018)
- Strategy for Human Spaceflight in LEO and Economic Growth in Space (October 19, 2018)
- International Space Station Transition Planning (March 30, 2018)
- Economic Development of Low Earth Orbit (July 11, 2016)

Press Releases
- NASA Opens International Space Station to New Commercial Opportunities, Private Astronauts (press release 19-044, June 7, 2019)

Related Previous Press Releases

Opportunity Releases
- NextSTEP
  - Synopsis: FedBizOpps NextSTEP-2 Appendix I: Commercial Destination Development in LEO Using the ISS (Solicitation Number: NNH16ZC001K-CDISS; June 7, 2019)
  - Solicitation: FedBizOpps NextSTEP-2 Appendix I: Commercial Destination Development in LEO Using the ISS (Solicitation Number: NNH16ZC001K-CDISS; June 21, 2019)
Learn more at www.nasa.gov/leo-economy