



Models for Facilitating Government-Funded Activities in the Post-ISS LEO Ecosystem

NASA Office of Technology, Policy, and Strategy

AIAA ASCEND

July 30, 2024

Erica Rodgers, Christie Cox, Pat Craven, Jason Hay, Amanda Hernandez,
Nik Joseph, Rachael Lussos, Maia Robakidze, Ken Wright, Grace Ray



Office of Technology, Policy, Strategy

OTPS provides analytic, strategic, and decisional support to NASA senior leadership on core agency issues. We are the NASA Administrator's principal advisor on agencywide technology policy matters.*

Proactive Focus Areas for CY24



Space Environment Sustainability



Sustained Lunar Presence



Technology Disruption



Economic Strategy

Activities and Contributions



Reports



Analyses



Workshops



Policy Demos

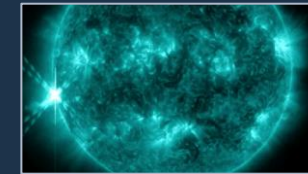


Strategy Support

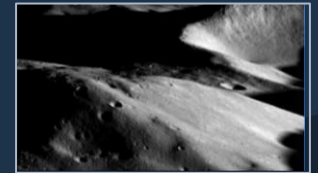


Education and Thought Leadership

Recent OTPS Reports



Space-Based Solar Power



Artemis, Ethics and Society: Synthesis from a Workshop

Visit the OTPS Website



* OTPS mandate as defined by NPD 1000.3E

Next Generation μ g Laboratory in LEO



Align to strategic policy objectives in the *White House Office of Science and Technology Policy National LEO Research and Development Strategy* (March 2023)

1. Advance groundbreaking science & technologies
2. Strengthen U.S. govt collaboration and partnerships
3. Promote market opportunities, innovation, & sustainability
4. Expand International Cooperation
5. Stimulate STEM education & workforce development

AND

- Represent all U.S. govt needs for space-based research
- Encourage collaboration
- Be scalable to demand
- Be platform agnostic
- Leverage existing and new ground and space capabilities
- Provide equitable access for all & act as an honest broker
- Foster workforce development



Pictured: NASA astronaut and Expedition 71 Flight Engineer Jeanette Epps extracts DNA samples from bacteria colonies for genomic analysis aboard the International Space Station's Harmony module. The research work may help researchers understand how bacteria adapts to weightlessness and develop ways to protect space crews and humans on Earth. April 2024 (Credit NASA ID ss071e041625)

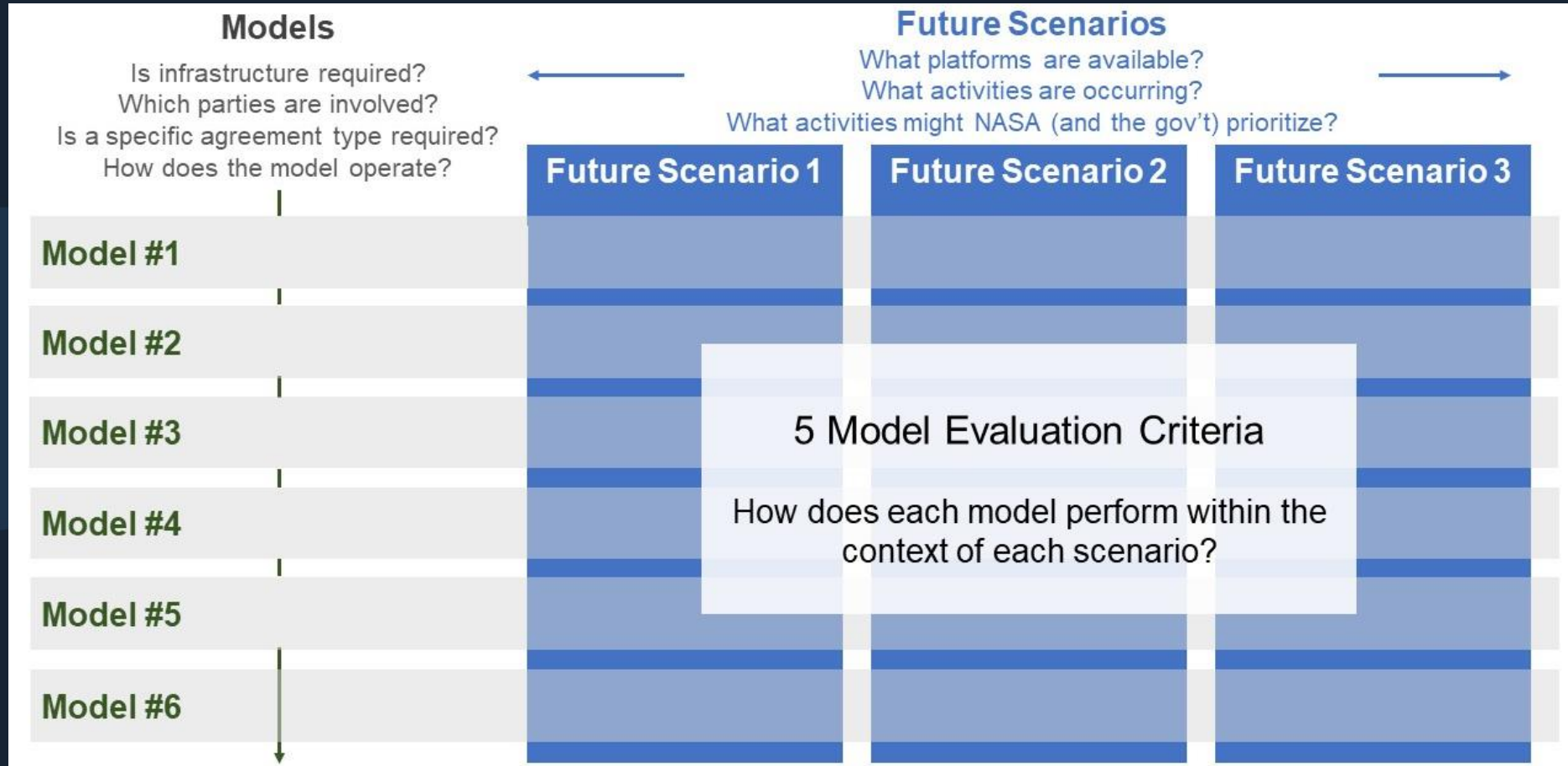
Study Motivation

- Retirement of International Space Station (ISS) and transition of low-Earth orbit (LEO) activities to Commercial LEO Destinations (CLDs) by 2030
- New models for connecting NASA and LEO users to platforms
- Current model for non-exploration activities is ISS National Lab (ISSNL) managed by Center for the Advancement of Science in Space (CASIS)
- ISSNL model needs to evolve as LEO ecosystem evolves



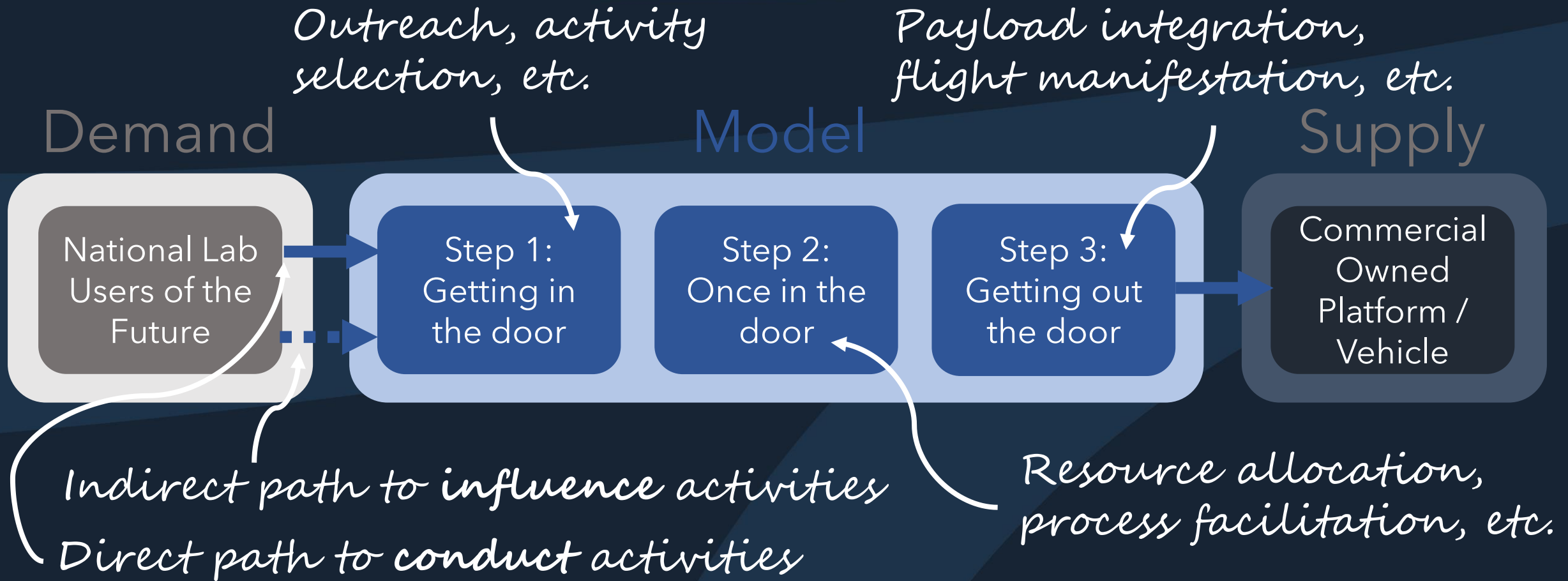
Pictured: NASA astronaut and Expedition 68 Flight Engineer Frank Rubio replaces experiment samples and research hardware inside the International Space Station's Combustion Integrated Rack for a study exploring how fires burn in weightlessness to improve fire safety techniques in space. Jan 2023. (Credit NASA ID iss068e043130)

Study Methodology





Model: Connect Supply to Demand



Models are illustrative and no one model on its own represent a complete strategy for next generation μ g laboratory in LEO.



Models for Facilitating Government-Funded Activities in the Post-ISS LEO Ecosystem

Goal: Identify potential models to facilitate government-funded or subsidized activities in a National Lab on a commercial LEO platform

Method: Scenario-driven & Stakeholder-driven analysis to rate distinct models based on how they may perform in the 2030 timeframe

Findings: Six illustrative models identified with more to less government oversight that can be further adjusted to meet leadership priorities



Model 1: Anchor Tenant

Long-term agreement for leasing space on a commercial platform



Model 2: Government Research Broker

Customizable research missions using both transport vehicles and CLDs



Model 3: Innovation Campus

Modern terrestrial campus with workforce focus



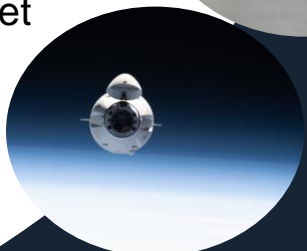
Model 4: Matchmaker

Neutral third party connecting users to platforms



Model 5: Institute Network

Network of separate but related efforts to enable commercial scaling and U.S. leadership



Model 6: Fee for Service

Free market approach with coordinated grants and data/service buys

Model Attributes



Infrastructure



Stakeholder roles



Process for access



Agreements between users & providers

Community Values



Ability to meet NASA's needs



Adaptability



Opportunity for collaboration



Market sustainability



Equity & accessibility

Continued Stakeholder Engagement

NASA actively engaging stakeholders to define strategy for next generation μ g laboratory in LEO

Strategy Development



Management structure



Roles and relationships



International cooperation



Legislation changes



Transition from ISSNL



Name of future construct



Holly Smith-Dalenberg of NASA's Human Health and Performance Directorate shows participants of the human systems integration meeting an International Space Station mock-up as part of the Acoustics Lab tour (from left, Liz Warren of Blue Origin, Curtis Lee of Vast, Jamie Barrett of the Federal Aviation Administration, and Vast's Caroline Kim and Leilani Bautista.) A spacecraft like the International Space Station contains a large number of complex systems – all with their associated fans, pumps, valves, and other mechanical noises. To mitigate the risk of excessive noise, all flight hardware is required to pass acoustic emissions testing. April 2024. Credit: NASA/James Blair.



Questions?



Visit NASA OTS