

LEIDEN, NETHERLANDS - DECEMBER 2015

THE FUTURE OF ISS UTILIZATION: AN INDUSTRY PERSPECTIVE



**BLUE
ORIGIN**



#FUTUREISS

MR. RICHARD POURNELLE, SENIOR VP OF BUSINESS DEVELOPMENT, NANORACKS

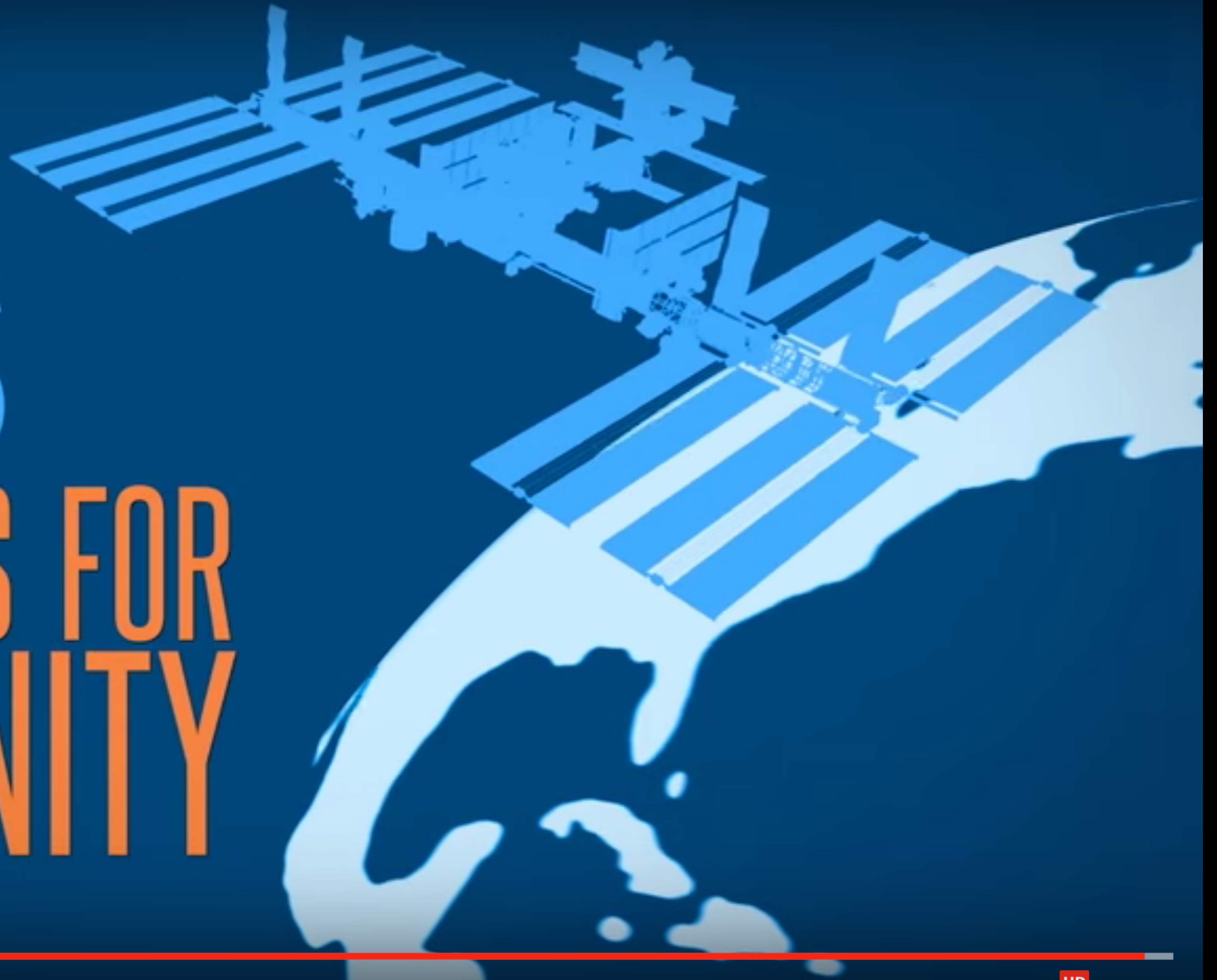


HOW NANORACKS INTERFACES WITH NASA & SPACE STATION PARTNERS



ISS

BENEFITS FOR HUMANITY



4:07 / 4:11



NANORACKS SPACE ACT AGREEMENT

- SAA-OZ-14-16763
- International concerns
- NanoRacks advantages
- NASA Advantages

NONREIMBURSABLE SPACE ACT AGREEMENT
BETWEEN
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER
AND NANORACKS, LLC
FOR OPERATION OF THE NANORACKS SYSTEM ABOARD THE
INTERNATIONAL SPACE STATION

ARTICLE 1. AUTHORITY AND PARTIES

In accordance with the National Aeronautics and Space Act (51 U.S.C. § 20113), this Agreement is entered into by the National Aeronautics and Space Administration Lyndon B. Johnson Space Center, located at 2101 NASA Parkway, Houston, Texas 77058 (hereinafter referred to as "NASA" or "NASA JSC") and NANORACKS, LLC located at 18100 Upper Bay Road, Suite 150, Houston, TX 77058 (hereinafter referred to as "Partner" or "NANORACKS"). NASA and Partner may be individually referred to as a "Party" and collectively referred to as the "Parties."

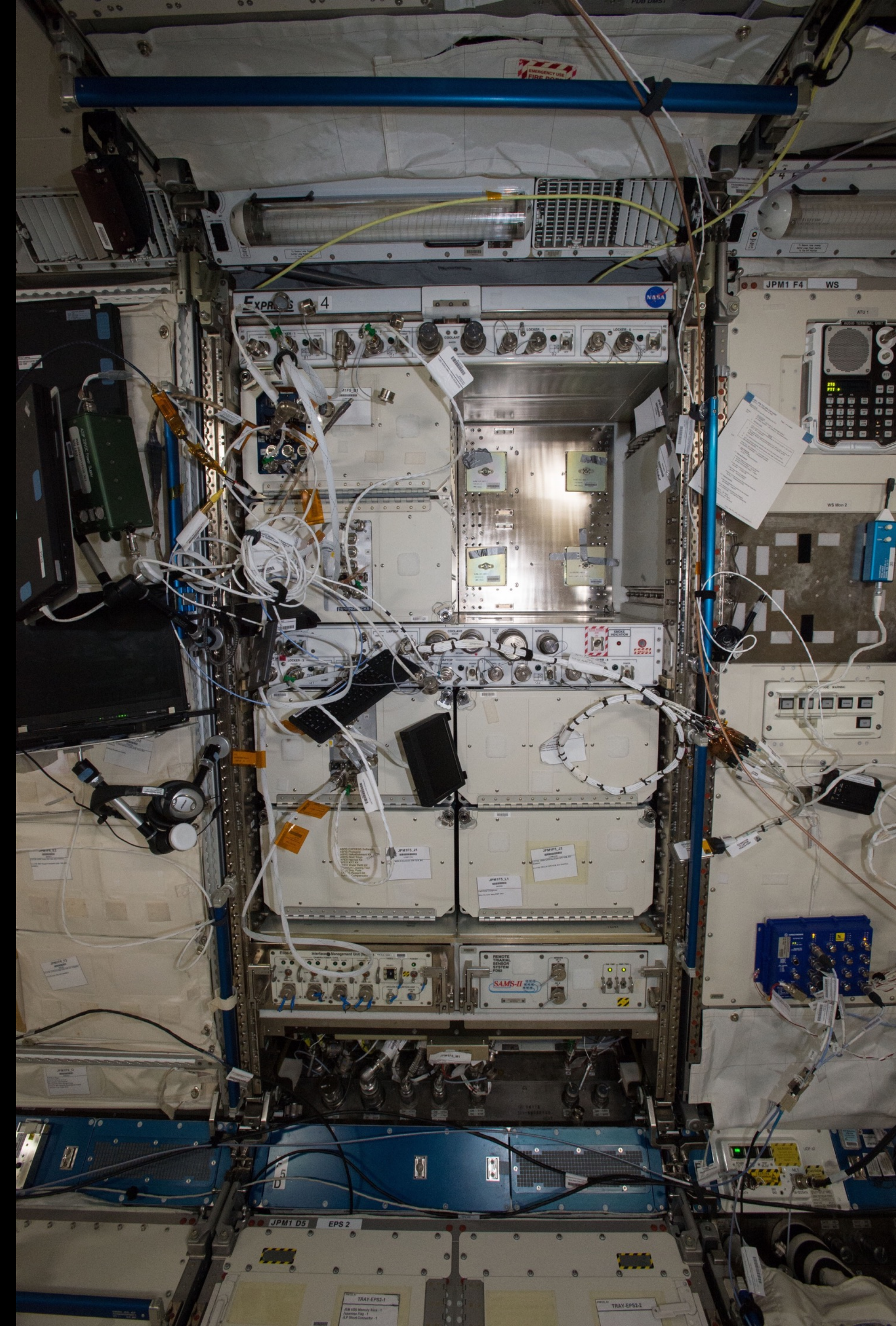
ARTICLE 2. PURPOSE

NASA planned and now operates a share of the United States accommodations of the International Space Station (ISS) as a national laboratory in accordance with the NASA Authorization Acts of 2005 and 2010. To fulfill this mandate, NASA released an announcement entitled the "OPPORTUNITY FOR THE USE OF THE INTERNATIONAL SPACE STATION BY DOMESTIC ENTITIES OTHER THAN U.S. FEDERAL GOVERNMENT AGENCIES." NANORACKS responded to that announcement with a proposal to further utilize the ISS by launching hardware that enables multiple small payloads to be operated within an Expedite the Processing of Experiments to the Space Station (EXPRESS) Rack (ER) locker. NASA's acceptance of NANORACKS' proposal lead to the issuing of SAA SOMD 6355. NANORACKS has demonstrated under that Space Act Agreement (SAA) it can solicit and service a wide variety of customers including educational and commercial organizations from a variety of sectors, U.S. government agencies, and non-domestic businesses and governments in ways that benefit the U.S. government, U.S. education, and the nation as a whole.

In light of this proven business model, NASA is entering into a Space Act Agreement with NANORACKS in which NASA and its designated organizations will provide on-orbit resources and provide selected launch opportunities. This Agreement will not only enable early proof--of-concept opportunities for any future space-based products or services, but will also provide for on-going services demanded by the commercial, educational and governmental clients that utilize the International Space Station via NANORACKS.

RELATIONSHIP WITH CASIS

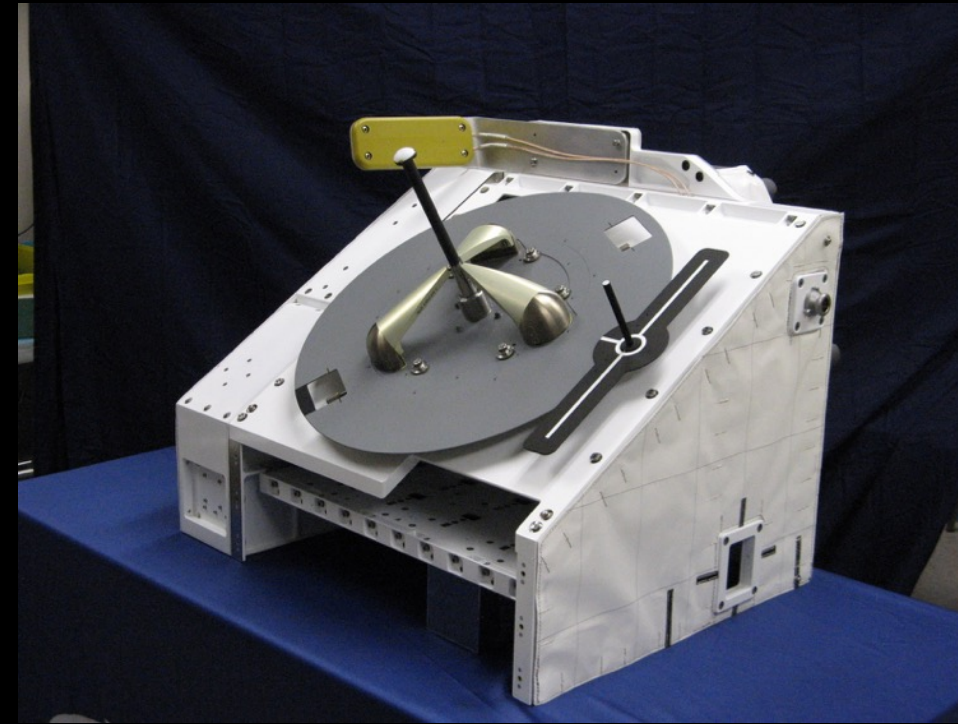
- NanoRacks uses CASIS allocated up-mass (for US National Lab only)
- CASIS advocate for Station utilization
- CASIS is a customer for use of NanoRacks hardware



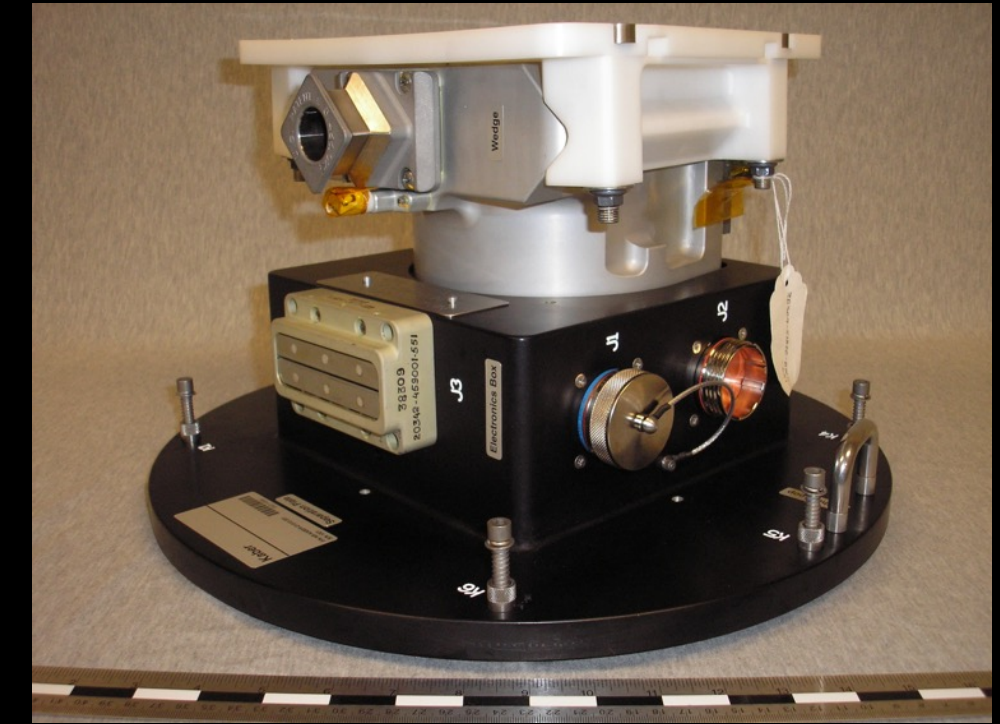
NANORACKS SERVICE LINES



NanoLabs



NREP



Kaber



CubeSats



Blue Origin

- Now looking at how to move beyond ISS: first steps, use of visiting vehicles

HOW WE DELIVER OUR PRODUCTS

- We don't wait for the contract
- We invest our own capital
- Turnkey pricing
- High level of customer support
- Dedicated technical account managers
- We manage NASA and Space Station interface



MANIFESTING PAYLOADS

- NanoRacks Account Managers take care of the paperwork!
- Payloads subject to ISS Prioritization
- Very specific safety processes

Generic CubeSat Developers Timeline	
Milestone	Time from Launch (L+/-X Months)
Contract Signing	L-11
Detailed Payload Info. Required	L-9
Phase 1 PSRP	L-8
Phase 2 PSRP	L-6
Flight Safety Verification Testing	L-3 to L-4
Phase 3 PSRP	L-2 to L-3
H/W Delivery to NanoRacks	L-1 to L-3
H/W Delivery to NASA	L-2
Launch	L-0
Deployment from ISS	L+1 to L+3

Milestone	Time from Launch
Contract signing, experiment name and general payload information	L-8 months to NLT L-6.5 months
Submit initial manifest request	NLT L-6 months
Detailed information for Safety and Ops	NLT L-6 months
Phase 0/I/II SDP	L-5.5 months
Complete hardware testing	L-5.5 to L-4 months
Submit procedures inputs and payload requirements	L-5.5 to NLT 3.5 months
Phase III SDP submit	NLT L-3.5 months
Phase III Safety Review Close Out and Final Approval	L-2 months to L-2.5 weeks
Order labels	NLT L-3 months
Turn over to NR for final testing and prep	L-45 days to NLT L-32 hours
Turn over to NASA	L-30 days to NLT L-24 hours

CUSTOMER PORTAL



Kirk Woellert
External Payloads Manager



Conor Brown
External Payloads Account Manager



Mary Murphy
Internal Payloads Manager

nanoracks customer portal

PROJECTFORK

Create Select Project Filter

Projectfork	Title	Type	Created By	Created On
Dashboard	12U NRCSD QuadM +1	Directory	Super User	Jan 06
Projects	A-76 NanoRacks +1	Directory	Super User	Oct 10
Milestones	AAUSat-5 NanoRacks +1	Directory	Super User	Nov 20
Tasks	Accounting Forms for General Use NanoRacks	Directory	Super User	Jul 23
Time Tracking				
Repository				
Forum				
Users	Backyard Brains Backyard Brains +1	Directory	Super User	May 07
Designs	C2BD C2BD	Directory	Super User	May 02
User Menu				
Your Profile	CASIS - Houston CASIS- Denver +1	Directory	Super User	May 22
Submit an Article	Centennial-1 Centennial-1 +1	Directory	Super User	May 04
Submit a Web Link	Chicks In Space NanoRacks	Directory	Patricia Mayes	Dec 12
Site Administrator	CID CID +1	Directory	Super User	Aug 28
Template Settings	Clear Spring HS Clear Spring HS +1	Directory	Super User	May 07
Site Settings	Closeout Photos NanoRacks +1	Directory	Super User	Oct 15
Login Form	Closeout Photos (1) NanoRacks	Directory	James Miller	Oct 10
Hi Abby Dickes,	Contracts (2) Executive	Directory	Super User	Aug 20
Log out	CubeSats NanoRacks	Directory	Super User	Jan 16

Projectfork

AAUSat-5

Dashboard	17 Apr	<input type="checkbox"/> Flight Safety Approval	In 70 days
Projects	20%	Approval from the Payload Safety Review Panel (PSRP)	
Milestones		<input type="checkbox"/> Edit 0 Comments 0 Lists 5 Tasks 0 Attachments	
Tasks			
Time Tracking			
Repository			
Forum			
Users			
Designs			
User Menu			
Your Profile			
Submit an Article			
Submit a Web Link			
Site Administrator			
Template Settings			
Site Settings			
Login Form			
Hi Abby Dickes,			

10 Apr	<input type="checkbox"/> NanoRacks Flight Hardware Delivery to NASA	In 63 days
0%	On-Dock date to Lockheed-CMC in Webster, TX	
	<input type="checkbox"/> Edit 0 Comments 0 Lists 2 Tasks 0 Attachments	
13 Jun	<input type="checkbox"/> SpaceX-7 Launch	In 127 days
0%		
	<input type="checkbox"/> Edit 0 Comments 0 Lists 0 Tasks 0 Attachments	
10 Apr	<input type="checkbox"/> Spectrum Coordination Complete	In 63 days
	All regulatory licenses in place.	

INTERNATIONAL BUSINESS DEVELOPMENT

- The best way to do business internationally is in person
- Alliances across Europe, Asia, and within the United States
- Working with the government is hard! But we have a lot of experience managing bureaucracies and paperwork



2016 ISS LAUNCH SCHEDULE



January 14, 2016



March 10, 2016



March 18, 2016



March 21, 2016



March 31, 2016



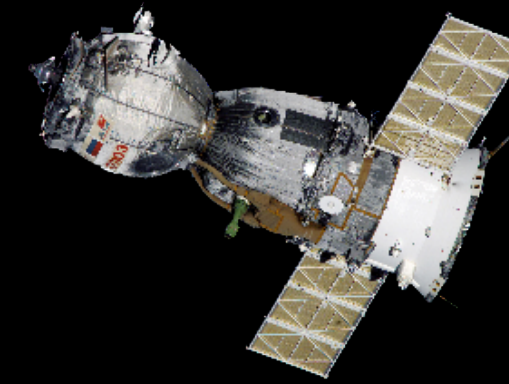
May 31, 2016



June 10, 2016



June 21, 2016



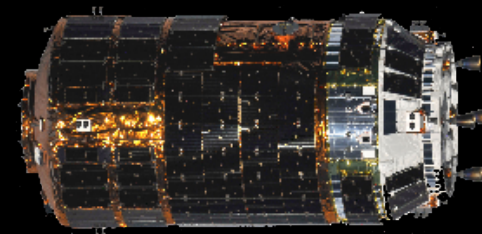
July 4, 2016



August 15, 2016



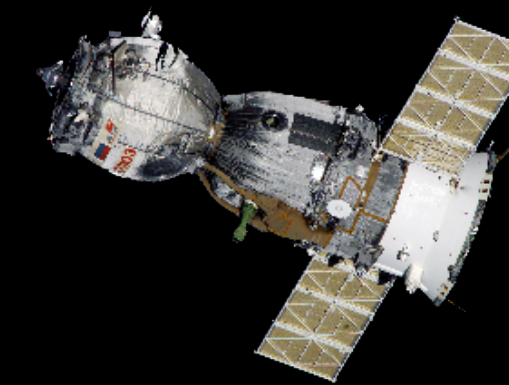
September 23, 2016



October 1, 2016



October 4, 2016



October 20, 2016



November 16, 2016

FUTURE PATHWAYS

- In the United States, Congress and NASA are on a pathway of yielding operations to the private sector for LEO
- Each space agency will find the pathway that works best
- We look forward to working with all of you to maximize LEO utilization and beyond

