Preparation and Launch of the JEM ISS Elements – A NASA Mission Manager's Perspective

Scott Higginbotham
Mission Manager
Launch Services Program
NASA – John F. Kennedy Space Center

Rev Basic Date: 14 January 2016

Agenda

- My Background
- National Aeronautics and Space Administration (NASA)
- Kennedy Space Center (KSC)
- International Space Station (ISS)
- Japanese Experiment Module (JEM) Processing
- Advice

My Background

- 50 years old
- Born and raised in rural Missouri
- Education
  - Lamar High School
  - BS Aerospace Eng. – University of Missouri
  - MS Eng. Management – University of Central Florida
- 28+ years with NASA
- Project Manager for 20+ years
- Married for 26+ years
- Father of twin teenage girls

NASA

NASA'S VISION

To reach for new heights and reveal the unknown for the benefit of humankind.

NASA'S MISSION

Drive advances in science, technology, and exploration to advance knowledge, education, innovation, economic vitality, and stewardship of Earth.

NASA'S VALUES

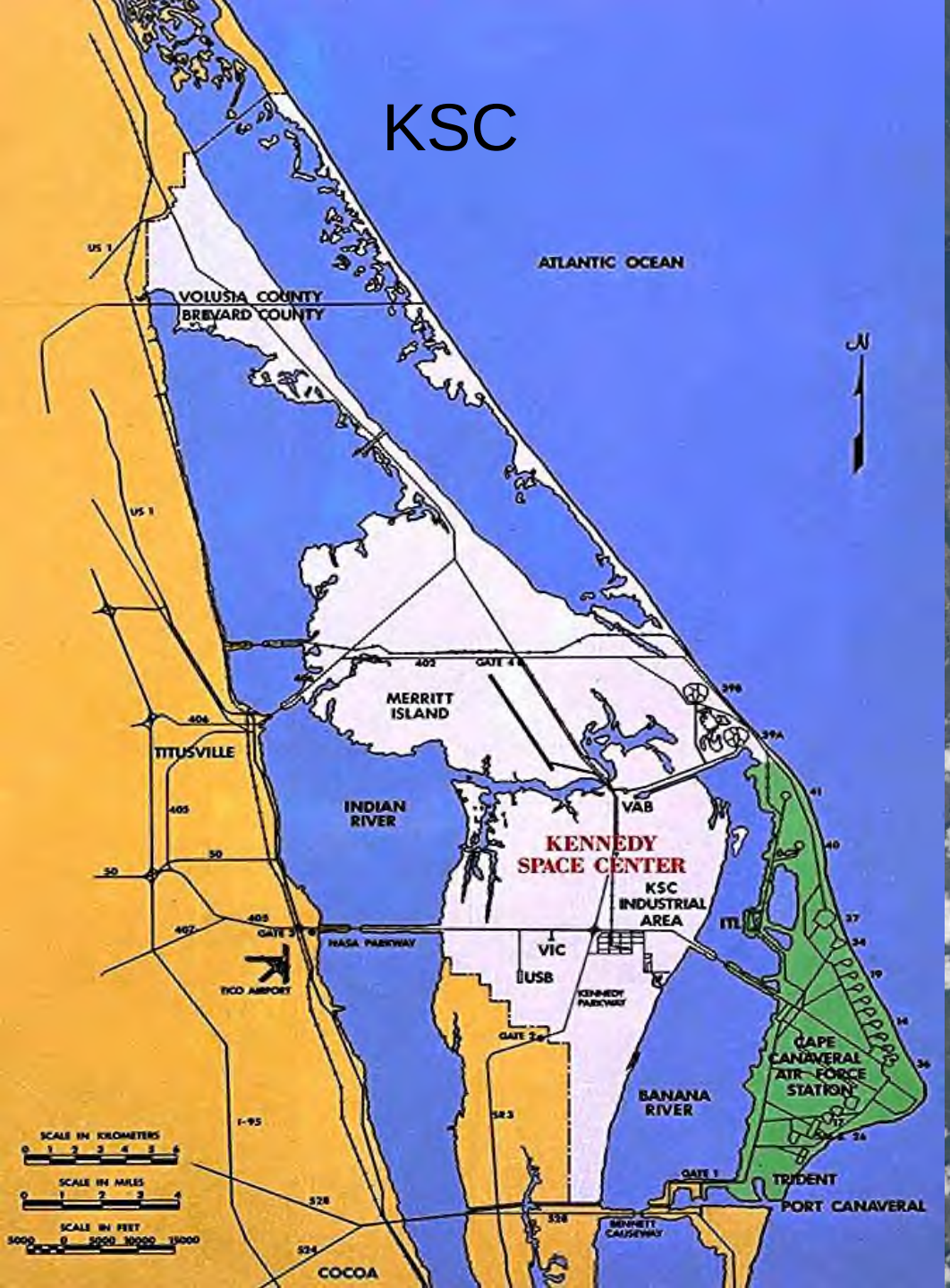
The Agency's four shared core values support NASA's commitment to technical excellence and express the ethics that guide our behavior. These values are the underpinnings of NASA's spirit and resolve.

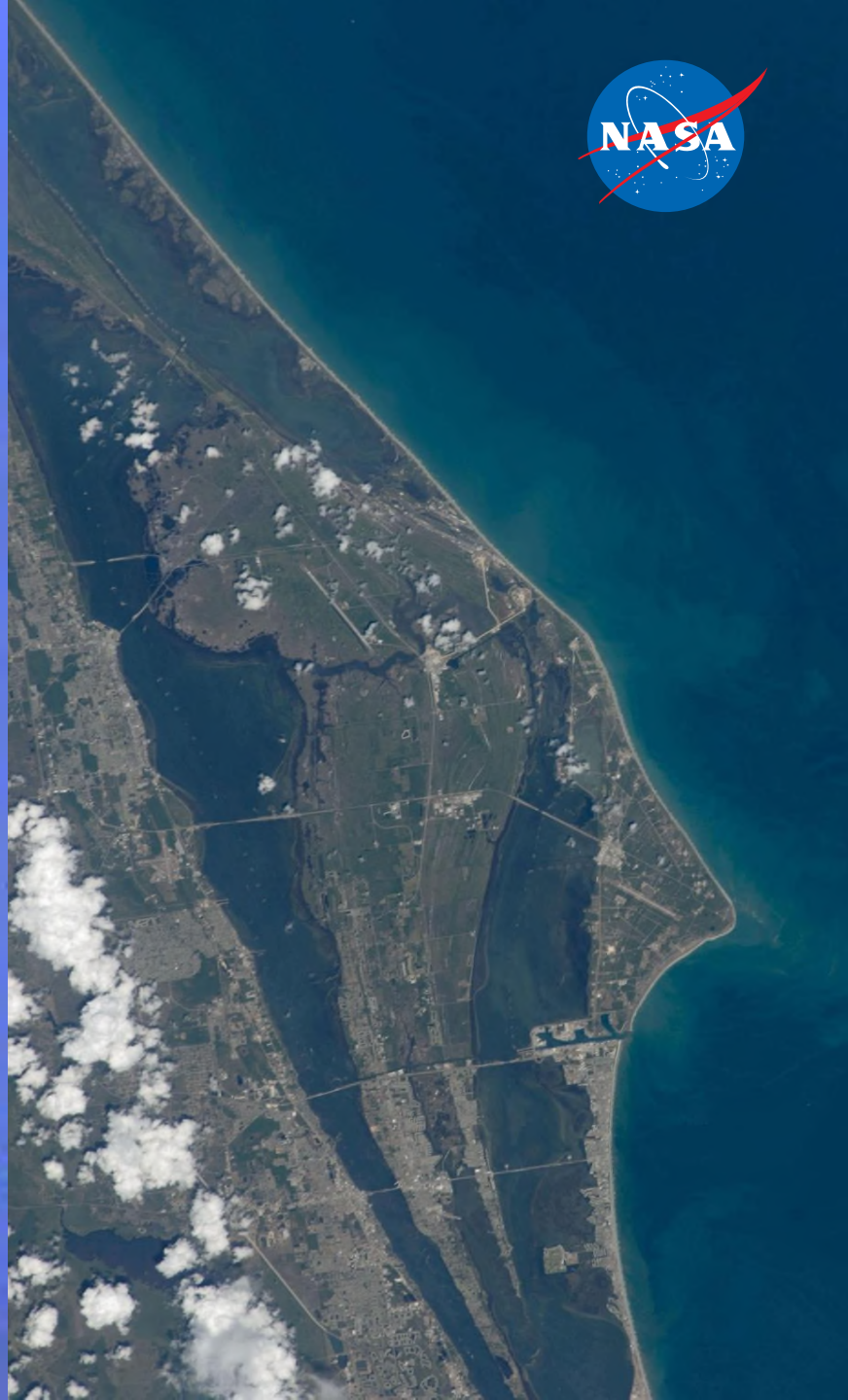
Safety ***Teamwork***

Integrity ***Excellence***

NASA's Spaceflight Accomplishments

KSC

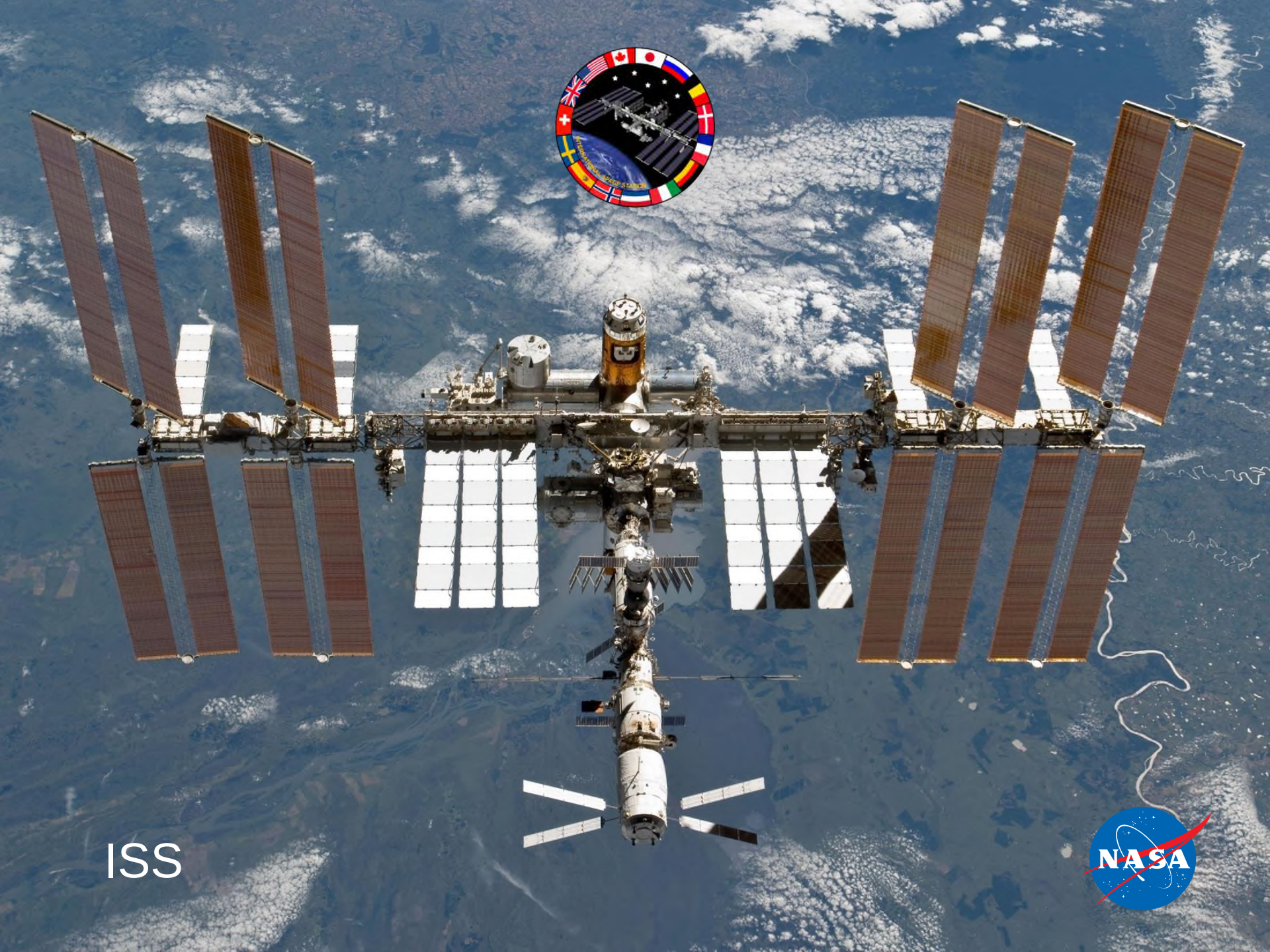

ATLANTIC OCEAN
VOLUSIA COUNTY
BREVARD COUNTY
US 1
MERRITT ISLAND
TITUSVILLE
INDIAN RIVER
VAB
KENNEDY SPACE CENTER
KSC INDUSTRIAL AREA
VIC
USB
ITL
NASA PARKWAY
KENNEDY PARKWAY
TICO AIRPORT
CAPE CANAVERAL AIR FORCE STATION
BANANA RIVER
TRIDENT
PORT CANAVERAL
BENNETT CAUSEWAY
COCOA
I-95
SR3
SCALE IN KILOMETERS
SCALE IN MILES
SCALE IN FEET




NASA
KSC

KSC Wildlife

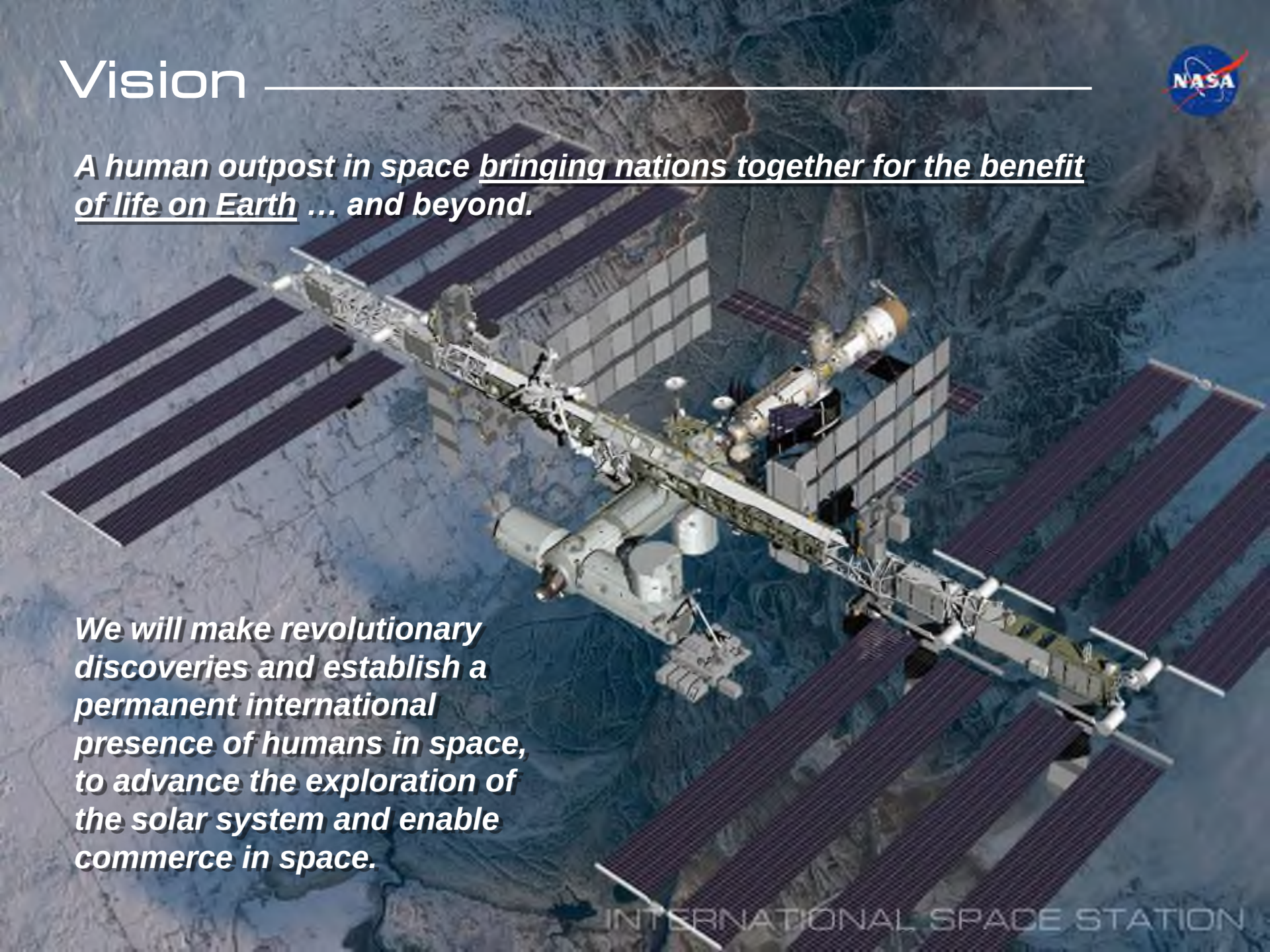

KSC
Security!


ISS
NASA

Vision

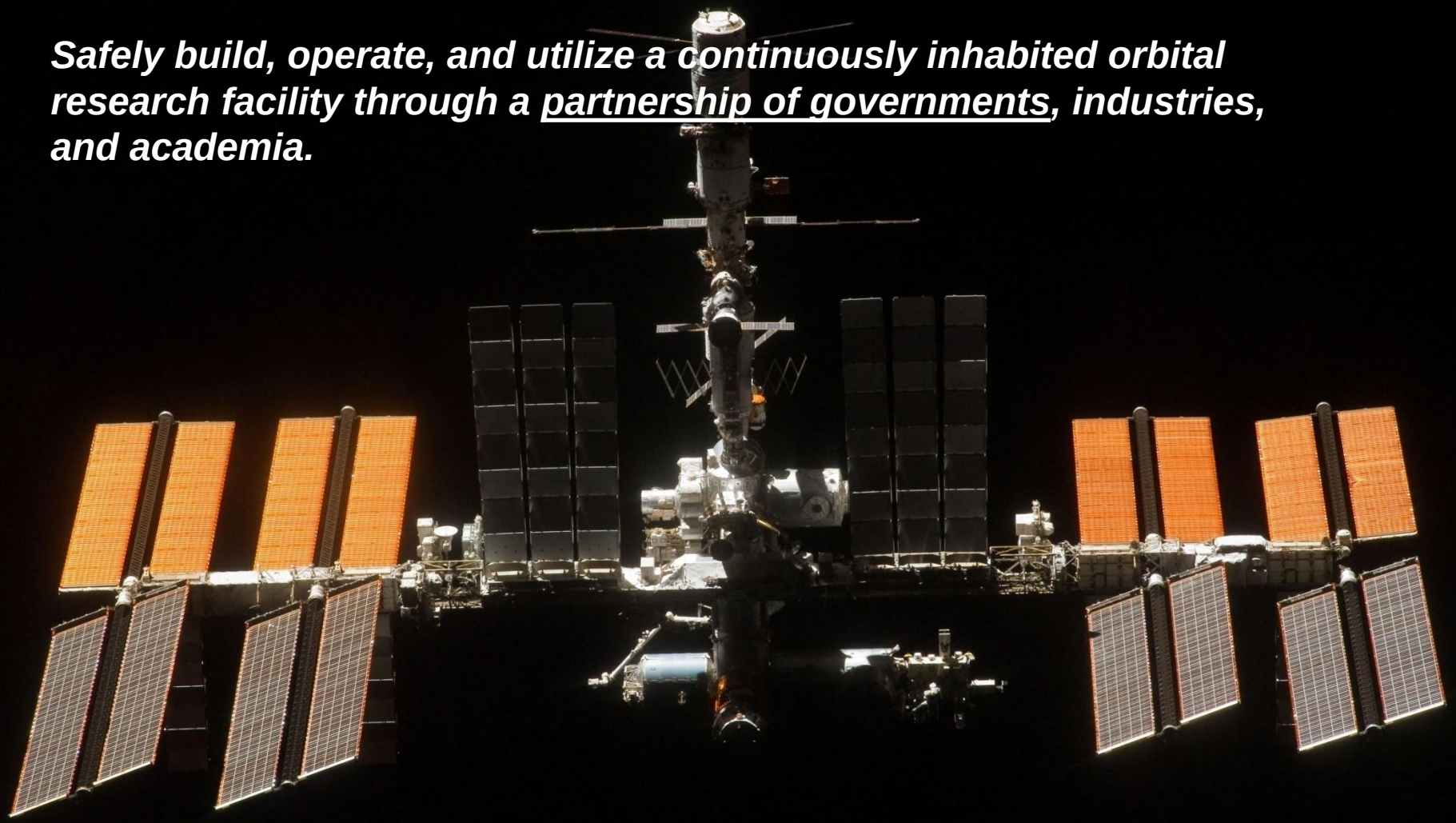
A human outpost in space bringing nations together for the benefit of life on Earth … and beyond.

We will make revolutionary discoveries and establish a permanent international presence of humans in space, to advance the exploration of the solar system and enable commerce in space.



Mission

Safely build, operate, and utilize a continuously inhabited orbital research facility through a partnership of governments, industries, and academia.



Five international partners

ISS Today

dimensions:
240 ft. long, 357 ft. wide, 45 ft. high, 32,333 cubic feet of living space

weight:
approximately 1,000,000 lbs.

science capabilities:
laboratories from four international space agencies – U.S., Russia, Europe, and Japan

orbital inclination/path:
51.6 degrees, covering 90% of the world's population

altitude:
approximately 220 miles above the Earth

speed:
17,500 miles per hour, orbiting the Earth 16 times a day

The International Space Station is more powerful, and 4 times larger than any human space craft ever built.

Fifteen years

of continued human presence…

Elements were constructed around the world

and came together in space with hairline tolerance.

41 launches to complete ISS assembly

37 US Shuttle flights

*** crew member exchange**

STS-88 - U.S. Node
STS-96 - Logistics
STS-101 - Logistics
STS-106 - Logistics
STS-92 - Z-1 Truss
STS-97 - Solar Array
STS-98 - Destiny Lab
STS-102 - MPLM
STS-100 - Canadarm2
STS-104 - U.S. Airlock
STS-105* - MPLM
STS-108* - Expedition 4
STS-110 - S0 Truss
STS-111* - Science, Expedition 5
STS-112 - S1 Starboard Truss
STS-113* - P1 Port Truss, Expedition 6
STS-114 - Logistics
STS-121 - Logistics
STS-115 - P3/P4 Truss
STS-116* - P5 Integrated Truss, Expedition 14
STS-117* - S3/S4 Truss, Expedition 15
STS-118 - S5 Truss
STS-120* - Harmony module
STS-122* - Columbus module
STS-123* - "Kibo" module, "Dextre" robotic arm
STS-124* - second "Kibo" module
STS-126 - Logistics
STS-119* - S6 Truss Solar Array
STS-127* - "Kibo" platforms
STS-128* - MPLM
STS-129* - spare hardware on 2 logistics pallets
STS-130 - Node 3/Cupola
STS-131 - MPLM
STS-132 - MRM1, spare antenna
STS-133 - PMM "Leonardo", 1 logistics pallet
STS-134 - AMS experiment, 1 logistics pallet
STS-135 - MPLM

4 Russian flights

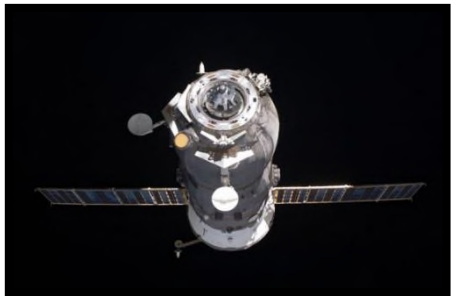
2 Proton, (FGB, Service Module)
2 Unmanned Soyuz (Pirs and Poisk docking compartments)

INTERNATIONAL SPACE STATION

OFF THE EARTH FOR THE EARTH

National Aeronautics and Space Administration

CARGO FLEET



Progress (Roscosmos)

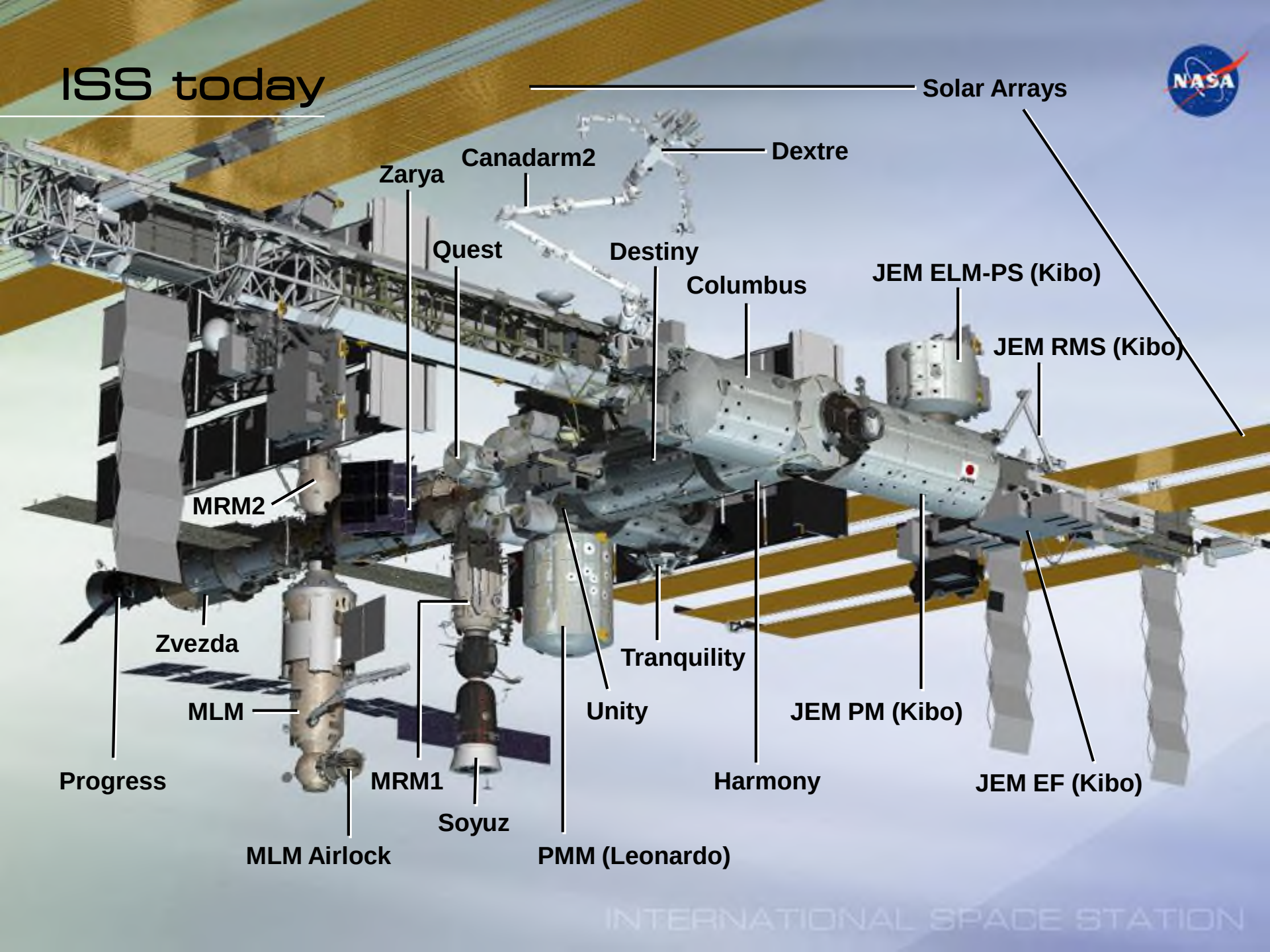
H-II Transfer Vehicle (JAXA)

Automated Transfer Vehicle (ESA)

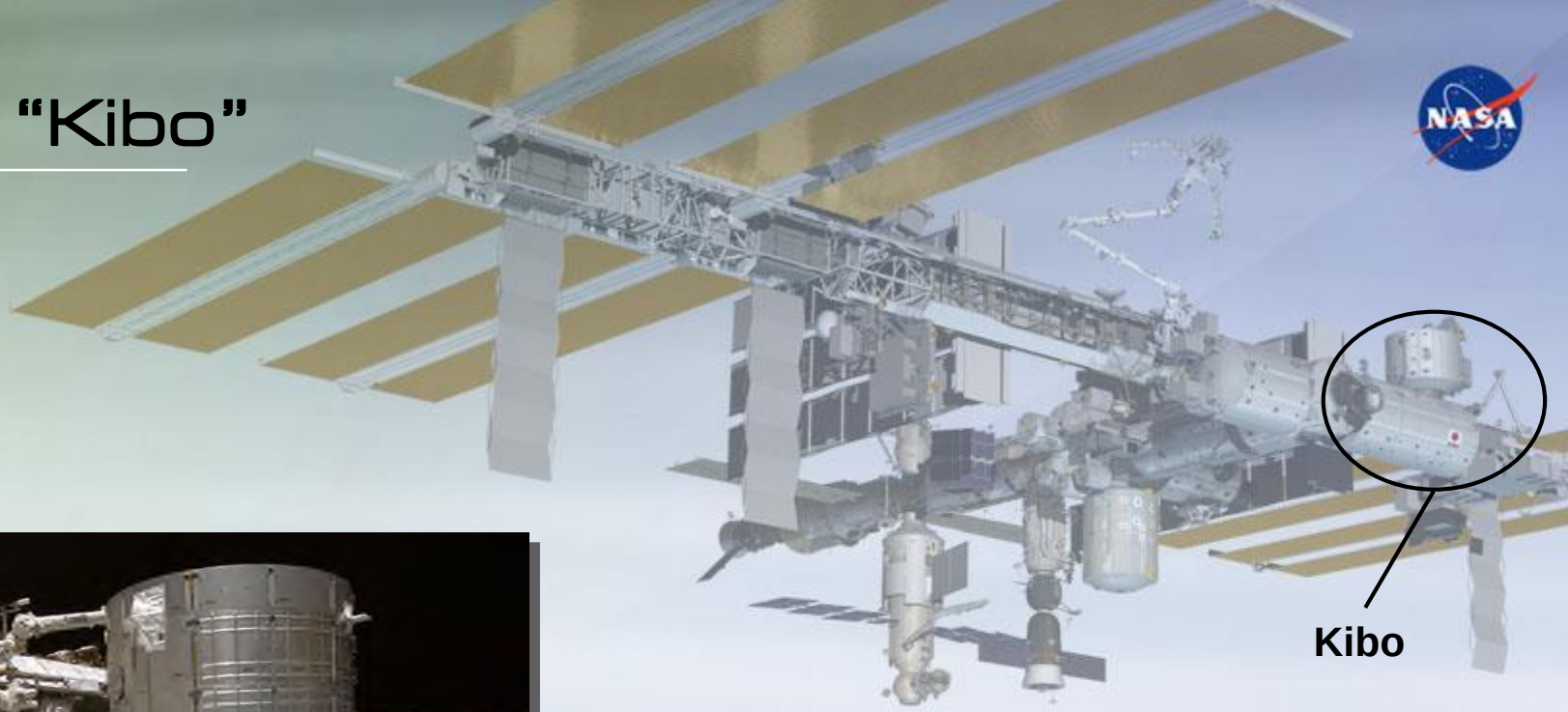
Cygnus (Orbital)

Dragon (SpaceX)

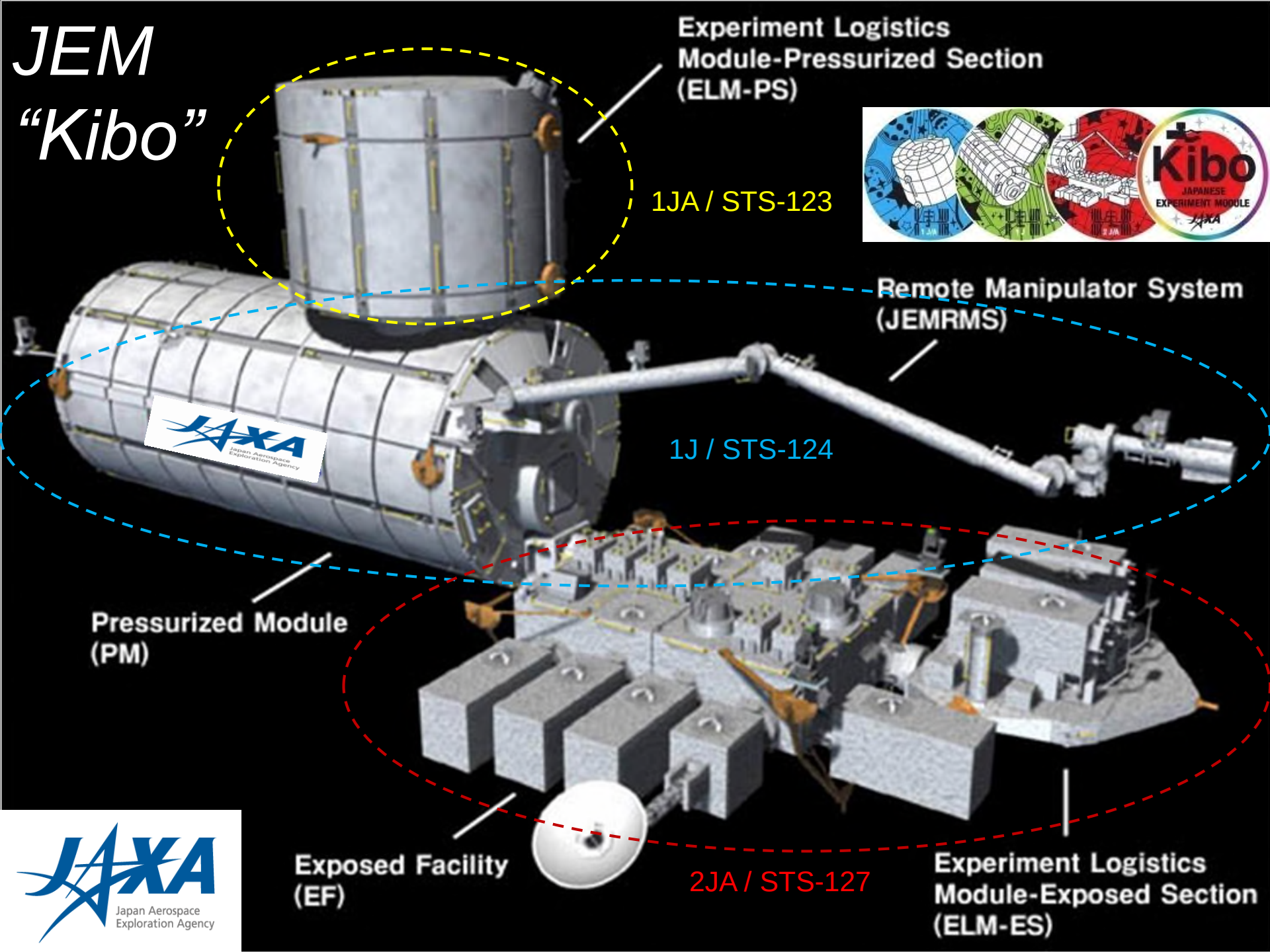
ISS today



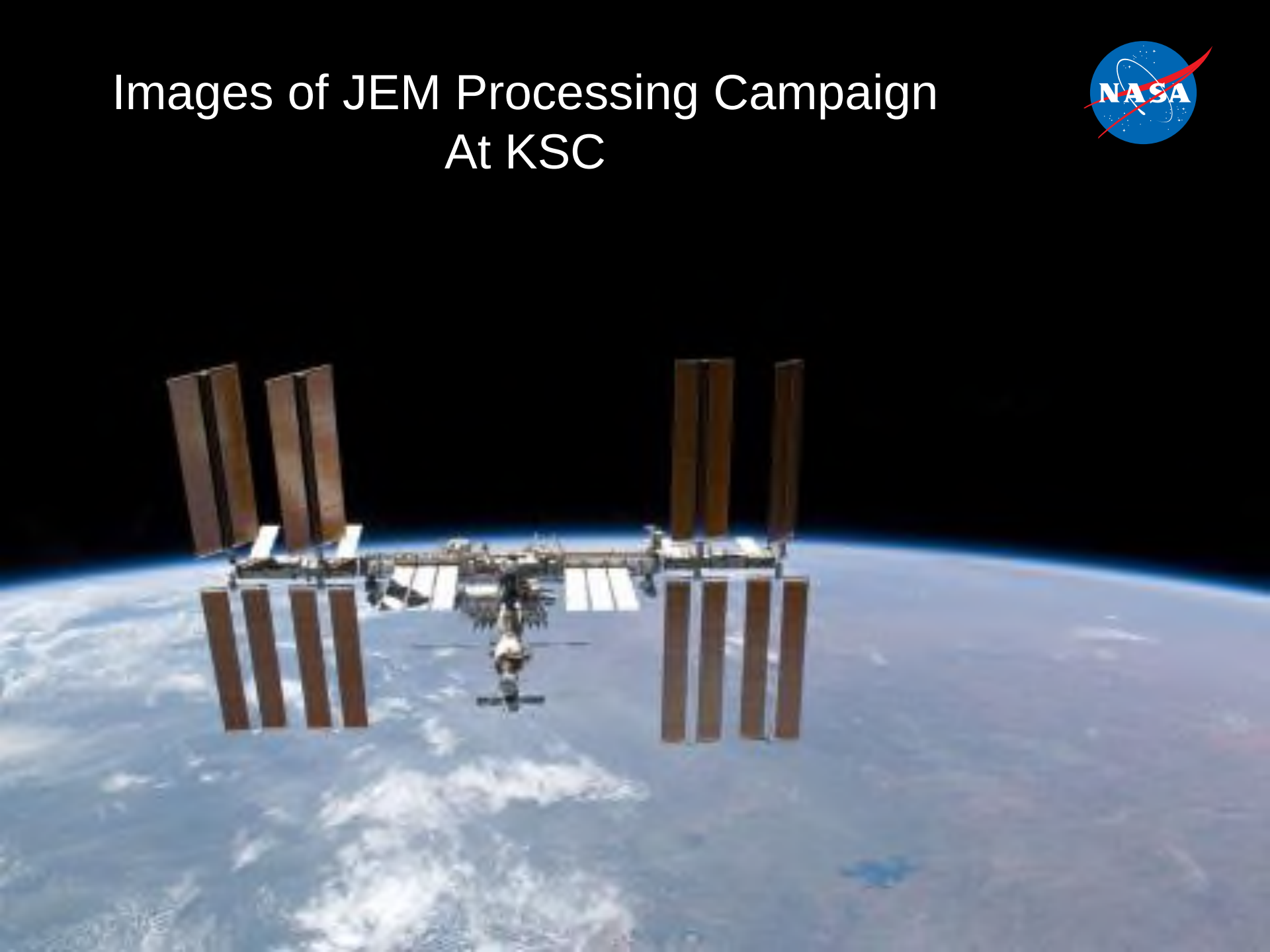
JEM "Kibo"



"Kibo" ("Hope"), is Japan's state of the art science lab consisting of two modules providing room to house ten racks - it also has it's own robotic arm (JRMS) outside the station.


JEM
"Kibo"
Experiment Logistics
Module-Pressurized Section
(ELM-PS)
1JA / STS-123
Kibo
JAPANESE
EXPERIMENT MODULE
Remote Manipulator System
(JEMRMS)
1J / STS-124
Pressurized Module
(PM)
Exposed Facility
(EF)
2JA / STS-127
Experiment Logistics
Module-Exposed Section
(ELM-ES)
JAXA
Japan Aerospace
Exploration Agency

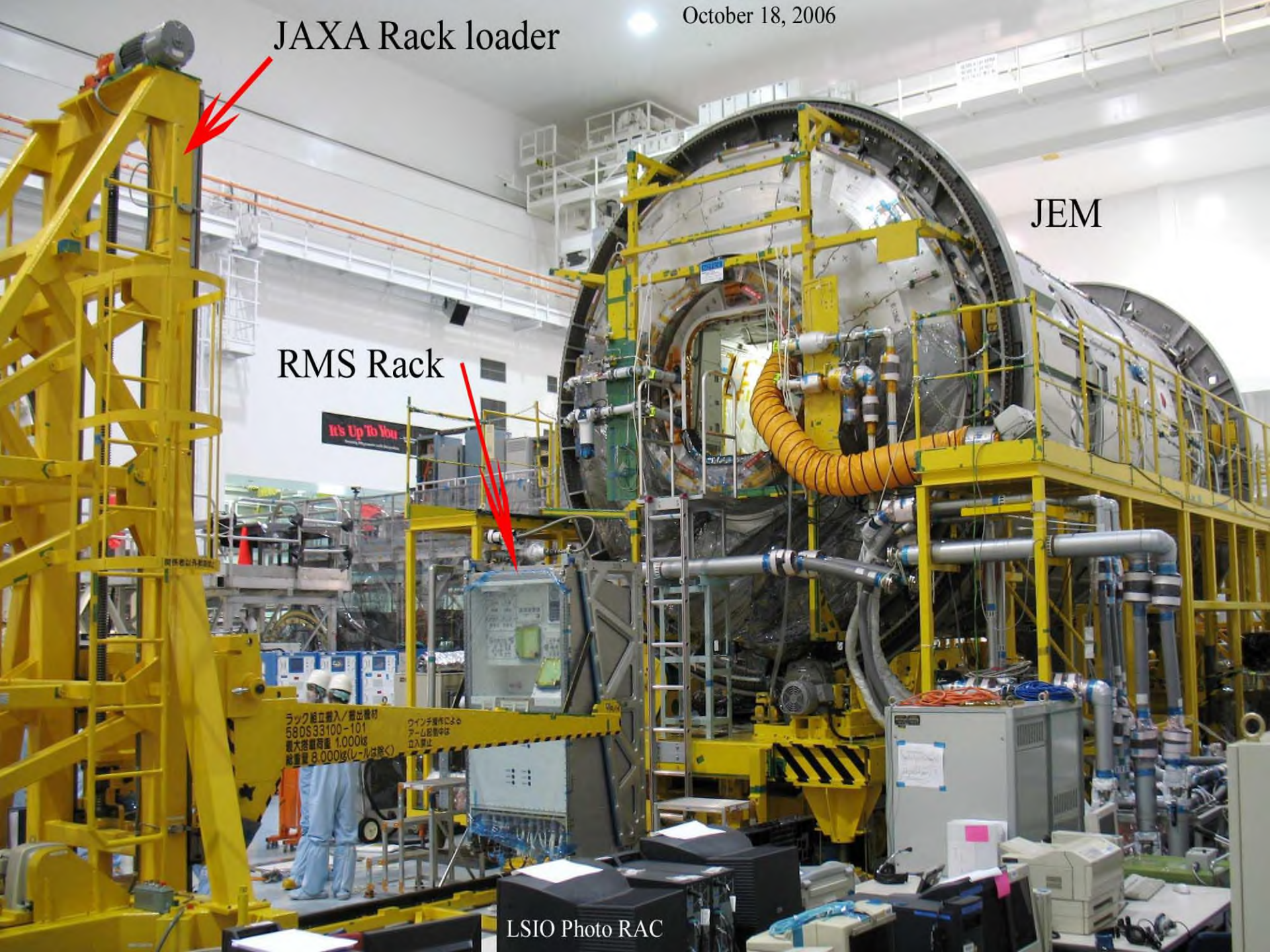
Images of JEM Processing Campaign At KSC

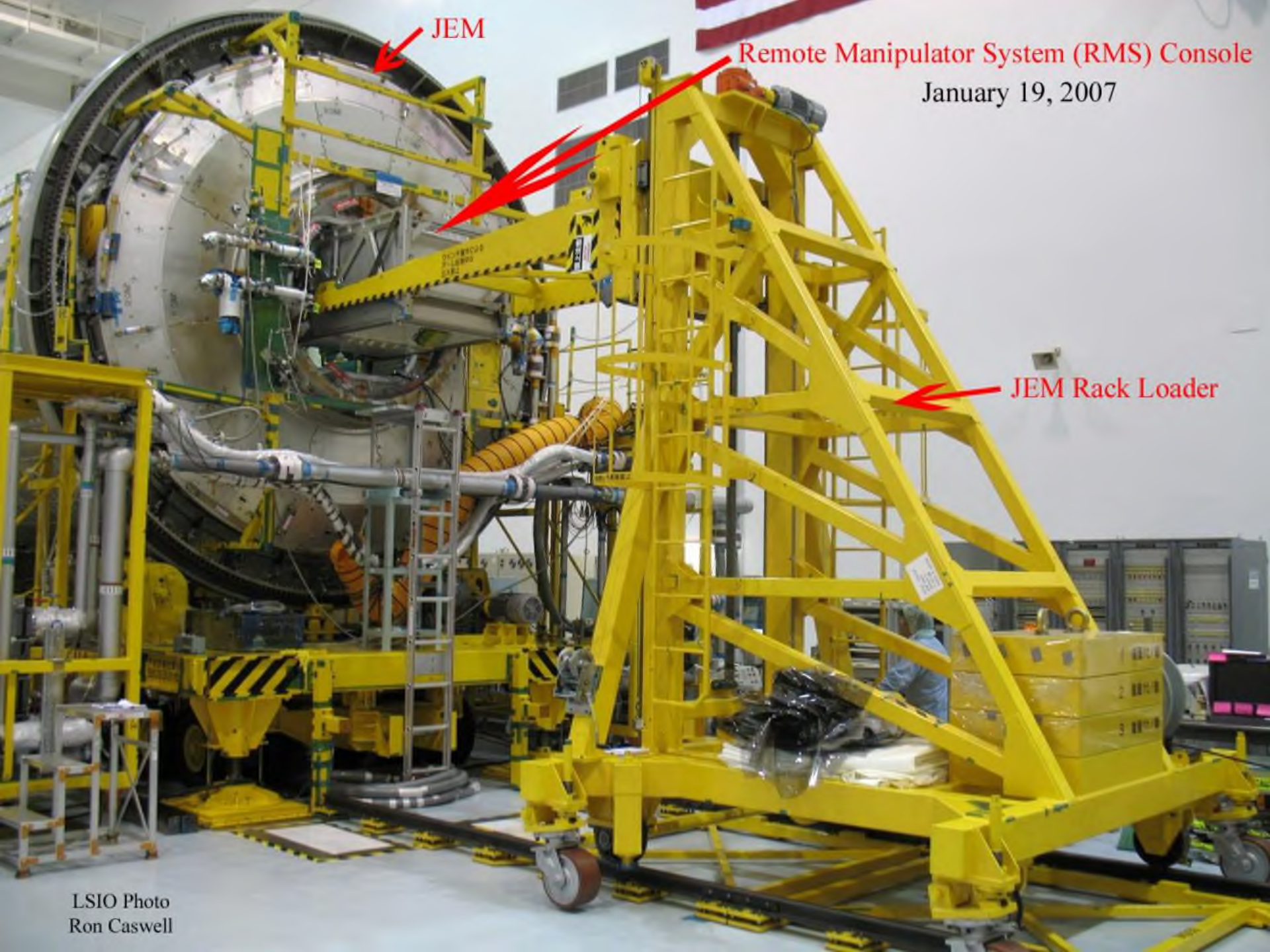


1J Mission Processing Team


NASDA
NASDA
NASDA
NASDA
NASDA
NASDA
NASDA
NASDA


5
1


October 18, 2006
JAXA Rack loader
JEM
RMS Rack
It's Up To You
LSIO Photo RAC


JEM
Remote Manipulator System (RMS) Console
January 19, 2007
JEM Rack Loader
LSIO Photo
Ron Caswell


WIDE LOAD


Genie GS-2032

1JA, Launch Site Processing Team


3S/2
WT21.5MT

METRIC
1
2


NASA


JAXA


NASA
JAXA

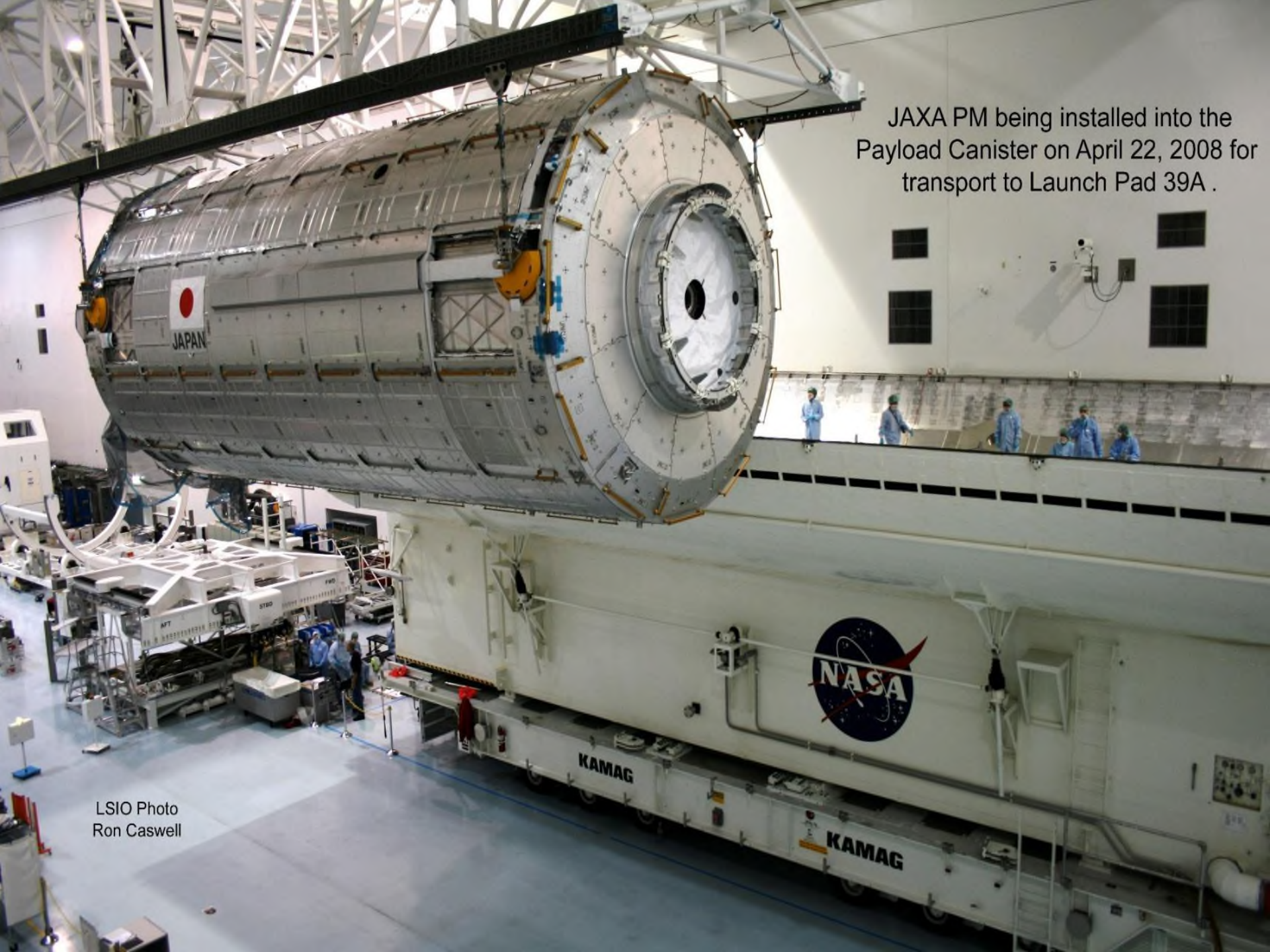

NASA
KAMAG


CAUTION


Kibo
JAXA
日本の夢 きぼうを宇宙へ!!
Launching our Dreams into Space !!
Dextre
Canada
Endeavour

ISS016E032567


JAPAN



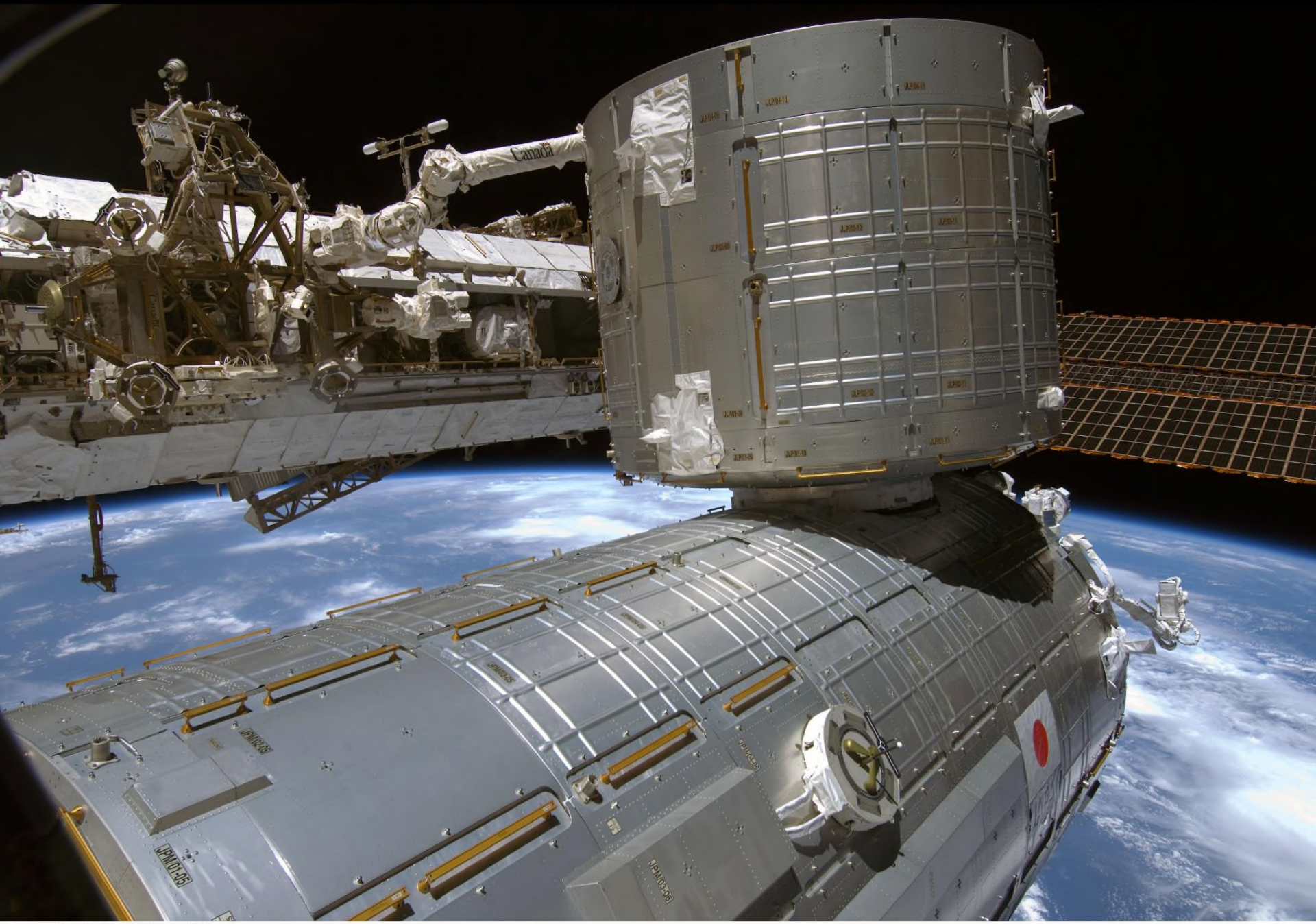
JAXA PM being installed into the Payload Canister on April 22, 2008 for transport to Launch Pad 39A .

LSIO Photo
Ron Caswell


Kibo


JPM/02-05

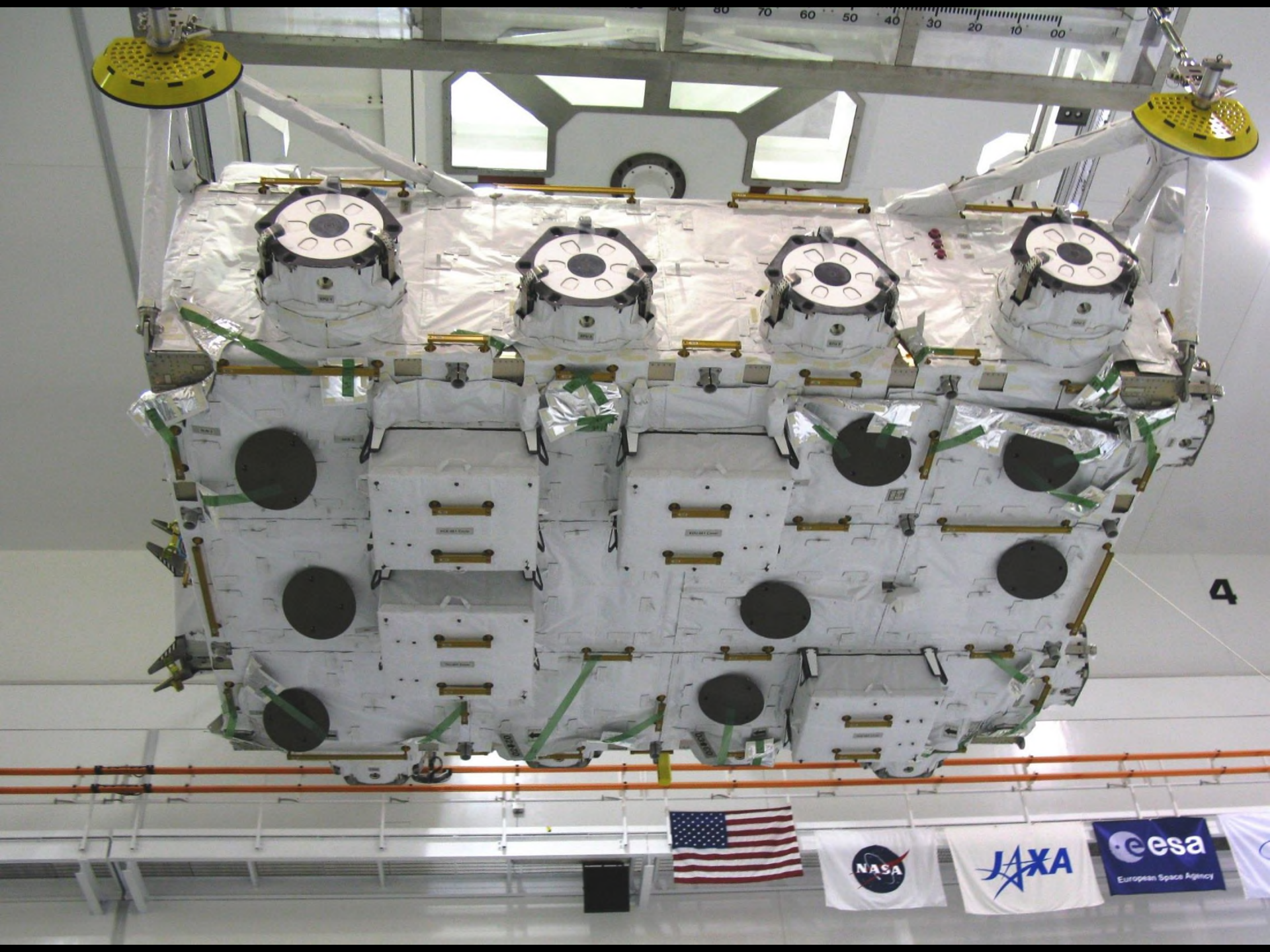

JAXA

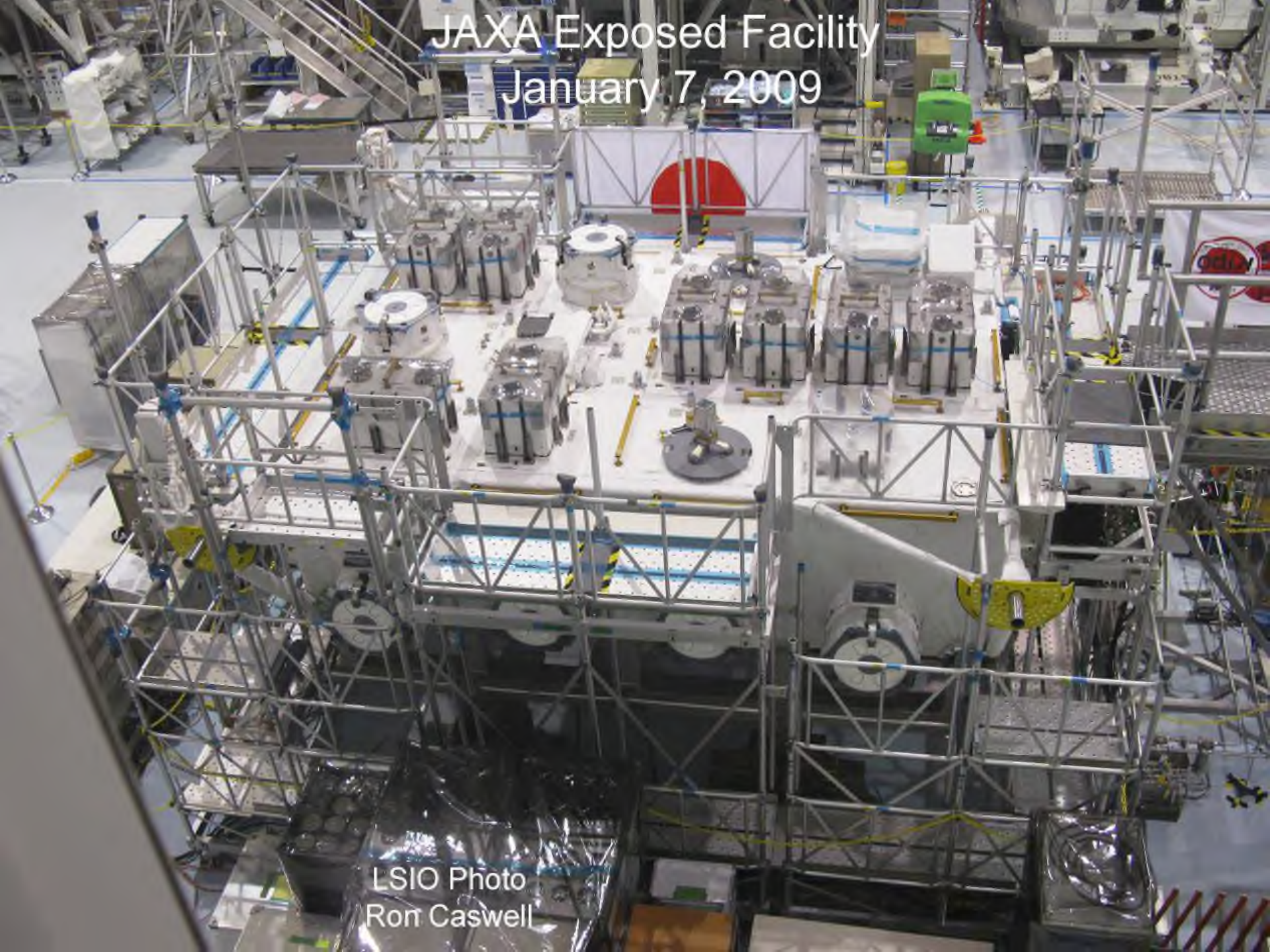


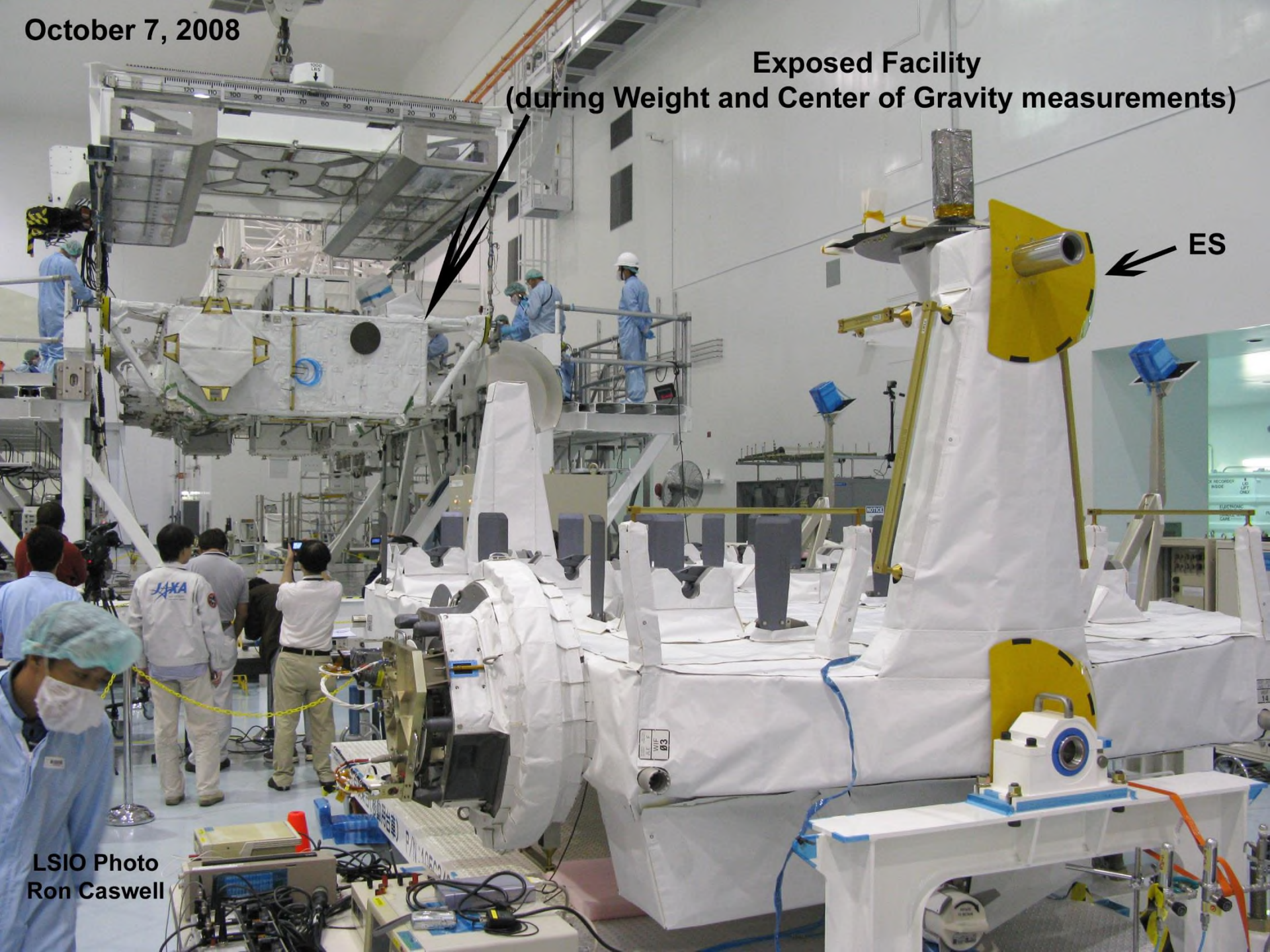
S124E007092

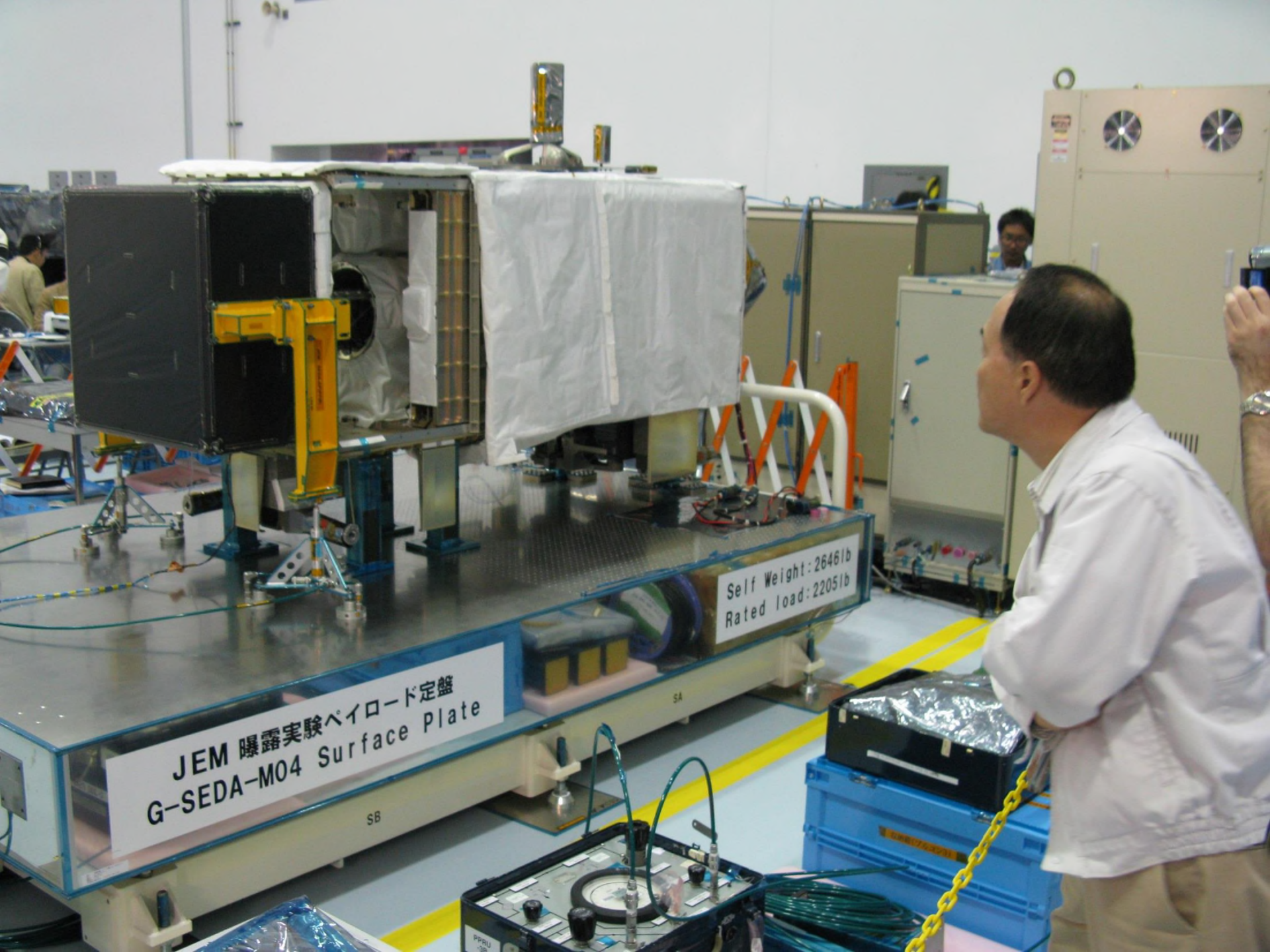
S124E006923

2JA Mission Processing Team


NASA
JAXA
esa
European Space Agency


JAXA Exposed Facility
January 7, 2009
LSIO Photo
Ron Caswell


October 7, 2008
Exposed Facility
(during Weight and Center of Gravity measurements)
ES
LSIO Photo
Ron Caswell


JEM 曝露実験ペイロード定盤
G-SEDA-M04 Surface Plate
Self Weight:2646lb
Rated load:2205lb
SA
SB


ELM-ES PIS 105C341103-1 WEIGHT:1550kg (3420lb
SPF TECHS

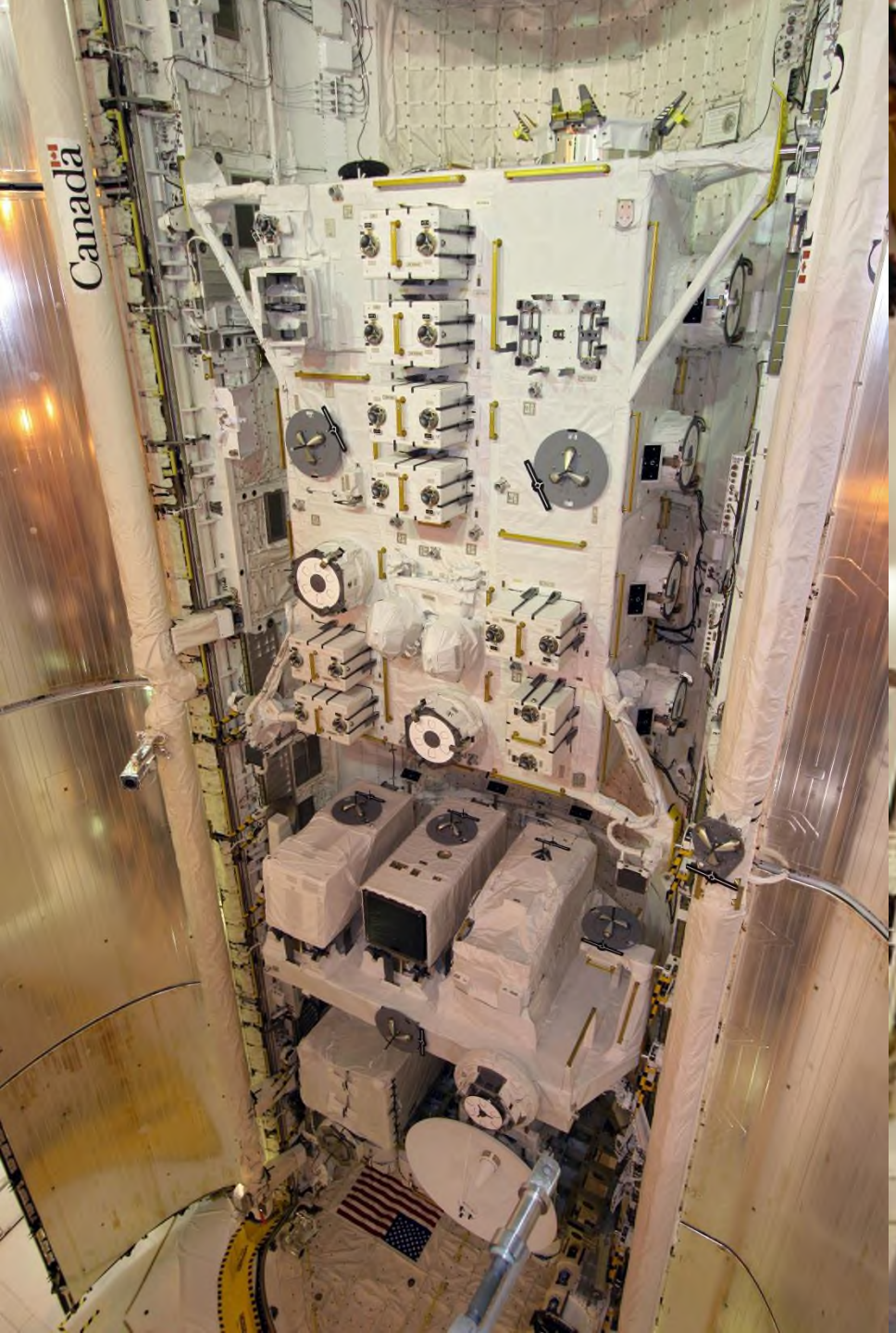

EXIT


NASA
KAMAI

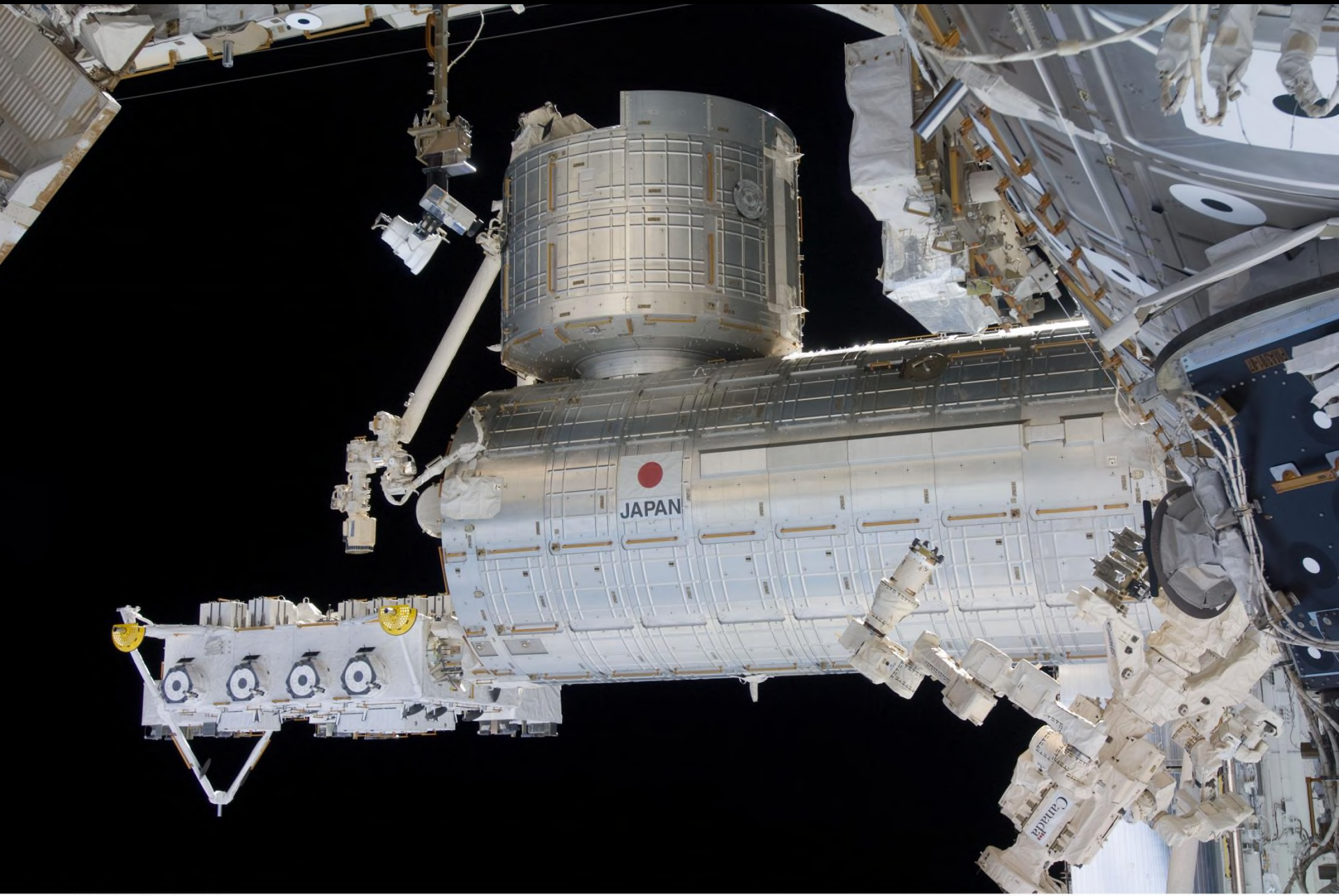

AFT


NASA
KAMAG


KAMAG


Canada

ISS020E022362



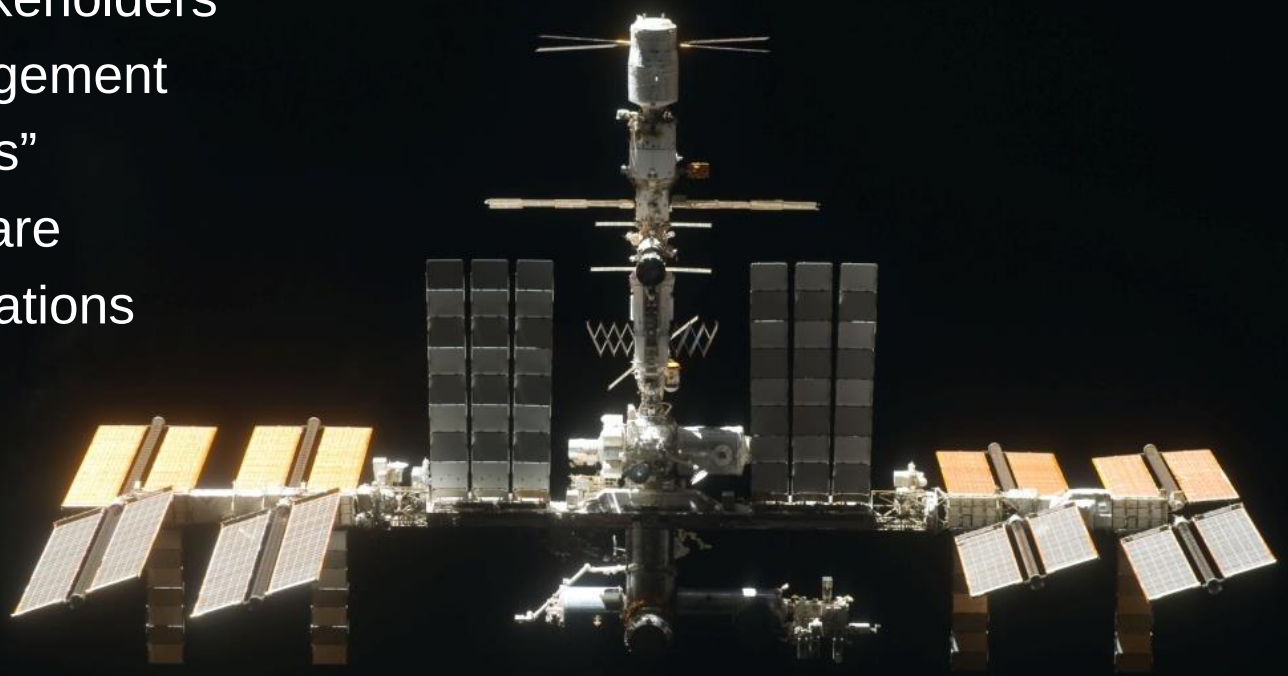
ISS020E025622


NASA


JAXA farewell dinner after 3 successful missions!
Thai Paradise restaurant in Cocoa Beach
September 2, 2009

JEM Processing Challenges and Opportunities

- Time zones / distance
- Language
- Cultures
- Logistics
- Media / government attention
- Customers / stakeholders
- Resource management
- “Unique Services”
- Complex hardware
- Hazardous operations
- Export control
- Badging
- IT support
- Hurricanes



Keys to JEM Processing Success

- Communication
- Respect
- Reliability
- Predictability
- Honesty
- Friendliness
- Humor
- Teamwork
- Flexibility
- Patience

Advice to Project Managers

- Always be polite and respectful
- Listen more, talk less
- Surround yourself with people smarter than you
- Take care of your people
- Share success and failure…learn from both
- Always have a plan, but be prepared for the unexpected
- Adapt, improvise, and overcome
- Know your customers – cultivate relationships
- Tailor communications
- Trust, but verify
- Be helpful to all
- Be a mentor

Advice to Project Managers

- Take care of yourself
  - Mind
  - Body
  - Spirit
- Take care of your family
- Have a vision for your future
- Make a financial plan
- Never stop learning
- Stay positive
- Have fun!


Questions?