3RD SPACE EXPLORATION CONFERENCE & EXHIBIT

Transition: A Look Ahead

Dr. John Olson (NASA HQ - ESMD) - Moderator

Exploration Systems Mission Directorate

February 27, 2008

Transition Panel: A Look Ahead

Panel Member	Representing	Perspective
Joel Kearns	OFFICE OF SPACE OPERATIONS	NASA HQ, SOMD Shuttle & ISS
Richard Wickman	OFFICE OF INFRASTRUCTURE AND ADMINISTRATION iTransition	NASA Property & Facilities
Jeff Hanley	CONSTELLATION	Constellation Program
Bill Parsons	Kennedy Space Center VISITOR COMPLEX	Centers, KSC
Anne Martt	USA United Space Alliance	Shuttle & Transition, Corporate
Cleon Lacefield	LOCKHEED MARTIN	Orion, MAF, Corporate
Jim Chilton	BOEING	Ares, Corporate

What is NASA Transition?

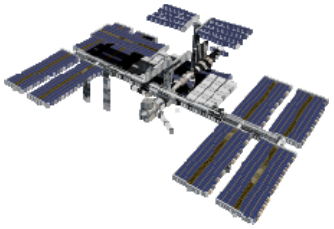
NASA Transition Definition:

- **The careful planning, optimized utilization, and responsive disposition of personnel, processes, resources, and real and personal property, focused upon leveraging existing Shuttle and ISS assets for Exploration programs' safety and mission success**

A Continuum of Transition and Recurring Development to Operations Iterations:

- **Space Shuttle Program Transition & Retirement (T&R)**
- **ISS Program Shuttle Transition and Retirement (STaR)**
- **Constellation Transition(s) from Development to Operations**
- **Commercial Orbital Transportation Services (COTS) Transition**

Shuttle

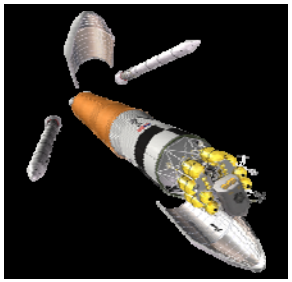


ISS

COTS

Ares I

Orion



Ares V

Focus on Big 3: Workforce, Infrastructure/Property, Budget/Schedule

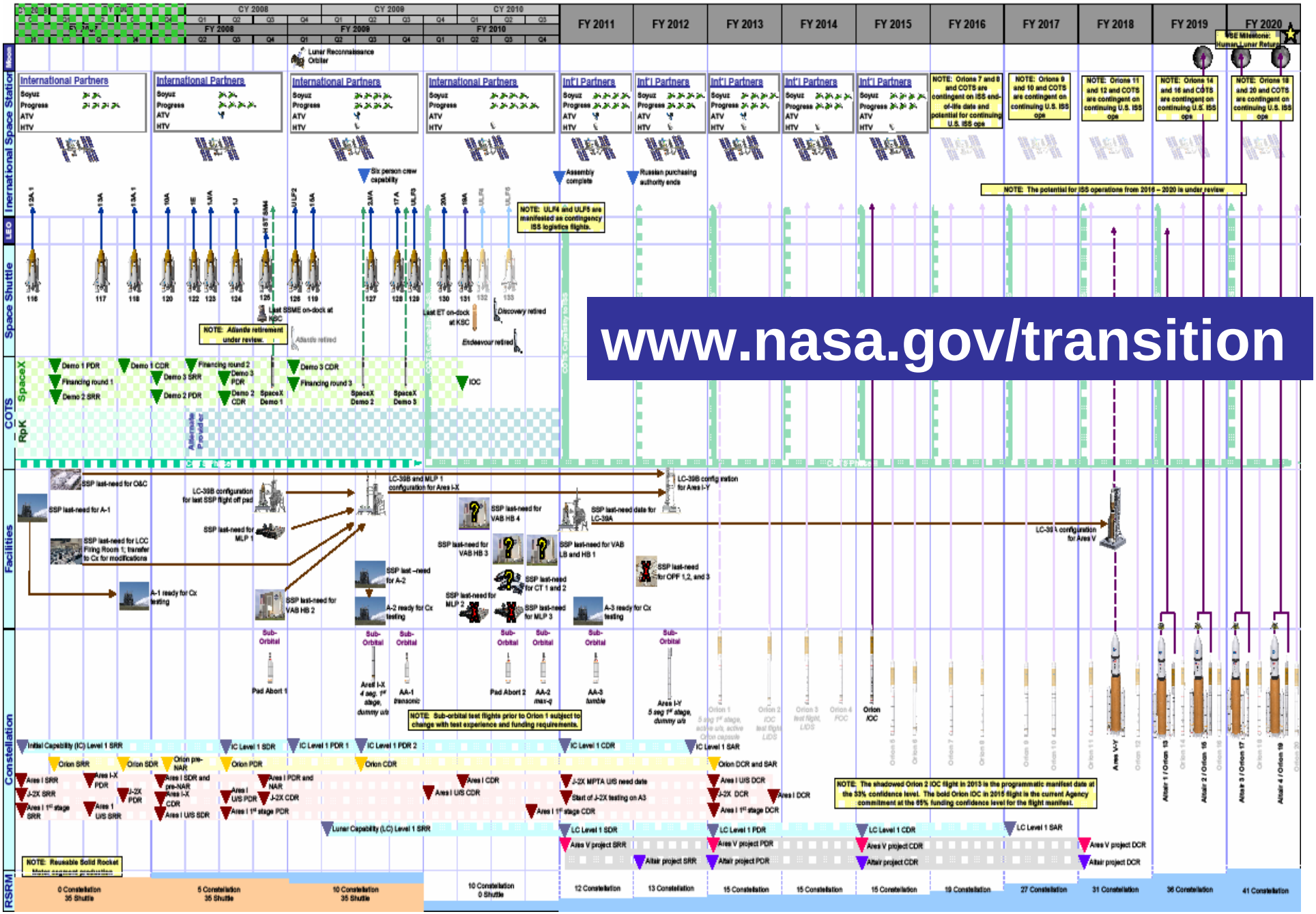
CONFIGURATION CONTROLLED DOCUMENT

Document # MPIM-rev-2008-01-25-04

revised January 25, 2008

Controlling Officials: Joel Kearns (HQ/SOMD), John Olson (HQ/ESMD)

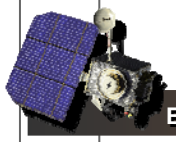
Multi-Program Integrated Milestones



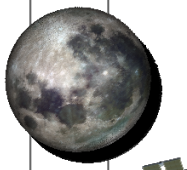
www.nasa.gov/transition

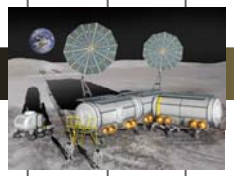
Exploration Roadmap

05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25



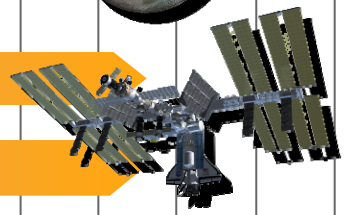
Exploration and Science Lunar Robotics Missions





Lunar Outpost Buildup

Research and Technology Development on ISS



Commercial Crew/Cargo for ISS

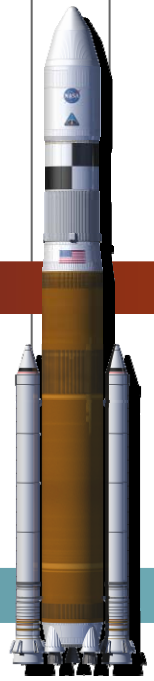
Space Shuttle Operations

SSP Transition

Ares I and Orion Development

Operations Capability Development
(EVA Systems, Ground Operations, Mission Operations)

Orion and Ares I Production and Operation



Altair Lunar Lander Development

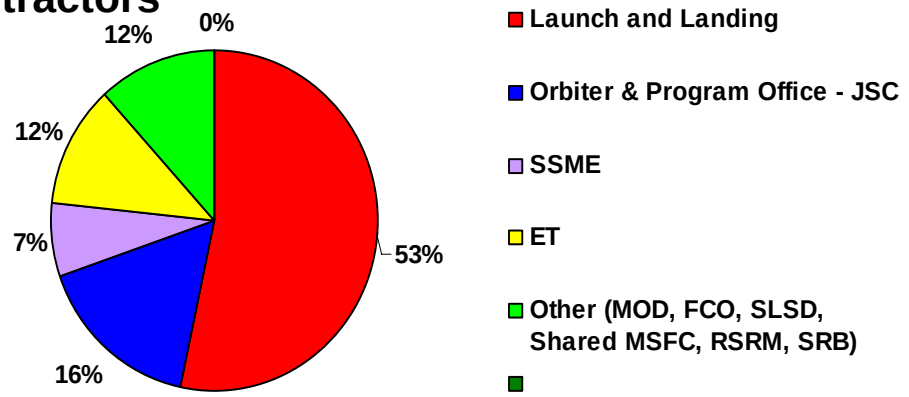
Ares V & Earth Departure Stage

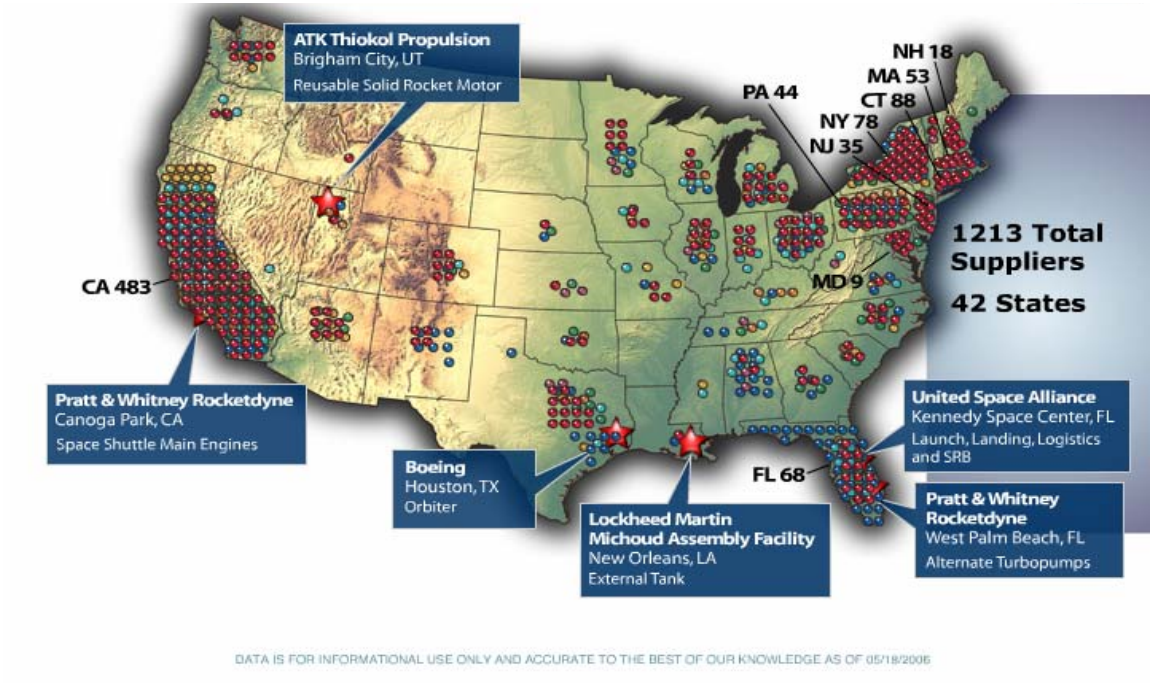
Surface Systems Development

Scope of the Transition Challenge:
Shuttle and ISS Flight Safety is #1 Priority

- Approximately 17,000 civil servants and contractors*
- Shuttle occupies 654 facilities
- Over 980,000 equipment items
- Total equipment acquisition value is ~$12B
- Total facilities replacement value is ~$5.7B
- 1,500+ Suppliers: 2007 Key for ET, SSME, Element Suppliers

Equipment Items Composition





* FY07 workforce data from SOMD RMO, 2/15/07

Color Code of Suppliers to Shuttle Prime Contractors:
Yellow - Boeing
Dark Blue - USA
Purple - Lockheed-Martin
Green - Hamilton Sunstrand
Blue - PWR
Orange - ATK
Red - Orbiter Project (JSC)

Major Space Shuttle Program Facilities

Reusable Solid Rocket Motor
ATK Thiokol Propulsion
Brigham City, Utah

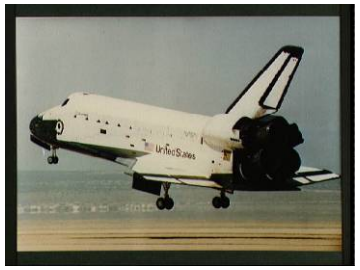
NASA MSFC
Huntsville, AL
-Shuttle Projects Office
-SSME - ET
-SRB - RSRM

Space Shuttle
Main Engines
Pratt & Whitney/Rocketdyne
Canoga Park, CA

EVA Suits
Hamilton Sundstrand
Winsor Locks, CT

NASA Headquarters
Washington, D.C.

NASA KSC
Kennedy Space Center, FL
-Launch & Landing
-NASA Shuttle Log. Depot
-Solid Rocket Booster
- United Space Alliance (USA)

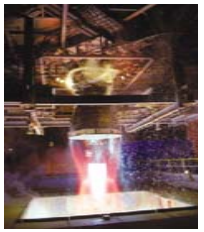


Alternate Landing Site
Edwards AFB, CA

NASA JSC
Houston, Texas
-Shuttle Program Office
-Program Integration
-Space Shuttle Veh. Eng. Office
(FSW, FCE, ORB, RMS)
-United Space Alliance - SFOC

External Tank
LMCO
Michoud Assembly Fac.
New Orleans, LA

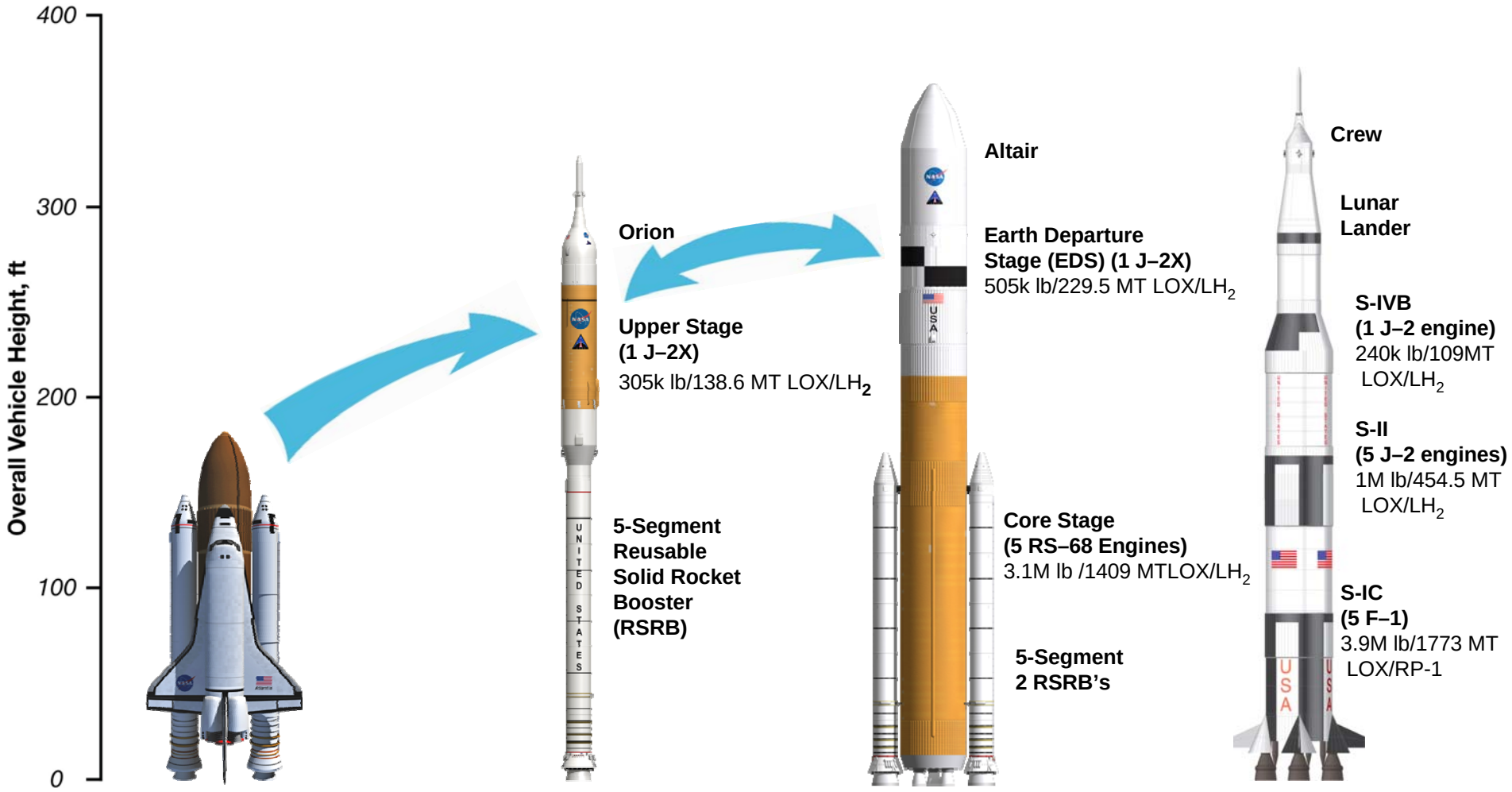
NASA SSC
Bay St. Louis, MS
- SSME Test



Alternate Turbo Pumps
Pratt & Whitney
West Palm Beach, FL

Building on a Foundation of Proven Technologies

- Launch Vehicle Comparisons -



Space Shuttle

Height: 184.2 ft/ 55.8 m
Gross Liftoff Mass:
4.5M lb/ 2045 MT

55k lbm/ 25 MT to
Low Earth Orbit (LEO)

Ares I

Height: 325 ft/ 98.5 m
Gross Liftoff Mass:
2.0M lb/ 909.1 MT

51.3k lbm/23.3 MT to LEO

Ares V

Height: 360 ft/ 109.1 m
Gross Liftoff Mass: 7.4M lb/ 3364 MT

138k lbm/ 62.7MT to TLI in
Dual-Launch Mode with Ares I
314k lbm / 142.7 MT to LEO

Saturn V

Height: 364 ft/ 110.3m
Gross Liftoff Mass:
6.5M lb/ 2954.5 MT

99k lbm/45 MT to TLI
262k lbm/119.1 MT to LEO

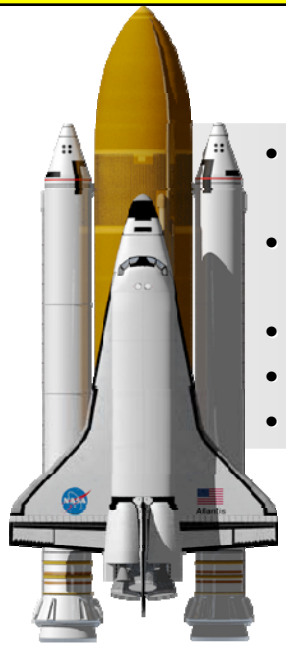
Leveraging the Ares I and Ares V Heritage: Strategic and Tactical Implications

- J-2 engine (Ares I and Ares V)
- Operational experience

Emphasize Life Cycle Cost and Risk Control

- RSRM / SRB production (Ares I and Ares V)
- External Tank fabrication facilities (Ares I, and Ares V)
- Ground processing facilities
- Mission operations facilities
- Operational experience

Saturn V


Space Shuttle

Ares I

Ares V

NASA Transition Driving Paradigm Changes

- **Focus Change:** NASA is moving our HSF workforce from Shuttle and ISS operations work to CxP design and development; Will spend the same amount on skilled labor, but with an emphasis on design of new vehicles to explore beyond low earth orbit. **Leaner Across the Board, More Development**

- **Reduce Fixed & Ops Costs:** New vehicles must cost less to operate, or we cannot afford to develop the vehicles to explore beyond earth orbit. Must drop production, processing and operations costs.

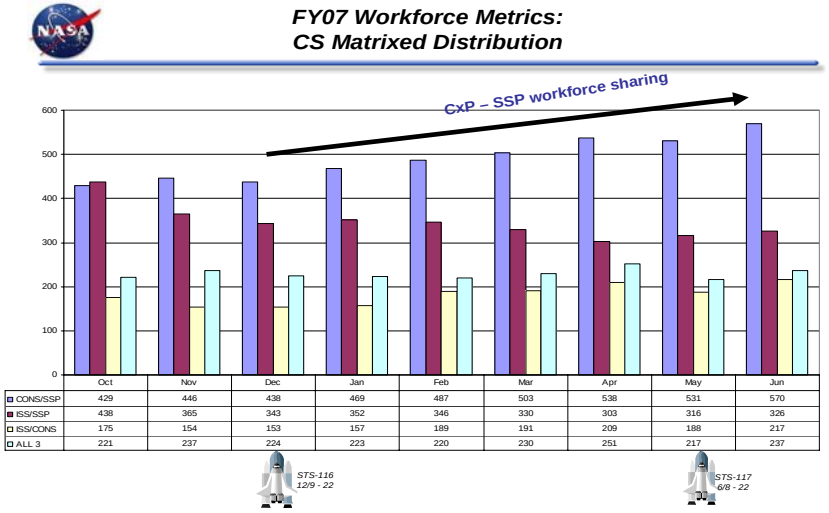
- **Geographical & Skill Shifts:** Regional workforce impacts of shifting from "vehicle processing" and "operations" to DDTE are becoming clearer. Reducing the impacts to specific regions will require assignment of specific Constellation development, test & manufacturing as Shuttle is completed.

- **Budget Threat:** Still defining post Shuttle Fly-Out asset disposition work -- Funds spent on Shuttle T&R come from Exploration DDTE. Asset Disposition costs to be minimized.

Transition Is About Re-Invention and Re-Invigoration of NASA

Transition and the Workforce

- **Unique Challenges:**
  - ***Retaining Skills for Shuttle Operations*** to Safely Execute Remaining Shuttle Missions; ***and***
  - ***Managing Transition*** of Appropriate Shuttle Workforce into Constellation Development; ***and***
  - ***Retaining Skills during Gap*** to Safely Execute Constellation IOC Flight Operations (2010-15)
  - **Balancing "10 Healthy Centers" with Program Requirements drive Workforce and Skill Needs**
- **NASA is Committed to Transitioning as Much of the Shuttle Civil Service Workforce to Other Agency Programs as is Practical, Using Strategies such as:**
  - **Workforce Sharing, Matrixing, Detailing. Retraining, Skills Assessment and Org Matching**
- **NASA is Committed to Working with Shuttle Contractor Partners on Workforce Issues.**
  - **Industry has a Range of Transition, Retention, and Staffing Tools Available to Maintain Critical Skills to Meet their Contractual Obligations Required for Shuttle Mission Execution.**
  - **Unique to Each Contractor Situation and their Known Role in Future Constellation Work**



Constellation Leverages Unique Skills and Capabilities Throughout NASA Centers

Facilities Transition Already Occurring

- KSC / Operations & Checkout Building
  - Highbay for all Orion final assembly
  - Highbay cleanout Complete
  - Highbay design in work

- KSC / Pad 39B
  - Launch Pad and Support Facilities
  - Lightning Protection System

- Michoud Assembly Facility (MAF)
  - Primary structure manufacturing
  - Composite and metal fabrication
  - Planned Users: Orion, Ares I Upper Stage, Ares V Earth Departure Stage, Ares V Core Stage, COTS

Emphasize Efficient Utilization and Life Cycle Cost Control

NASA Transition Summary

- Transition is Challenging, Complex, and Dynamic – Integration is Key!
- Plans & Estimates Continue to Mature – Coordination is Key!
  - NASA Transition Plan
  - Workforce Transfer & Allocation
  - Facility Transfer/Disposal on Target
  - Personal Property Disposition (Transfer and Excess)
- FY11+ Workforce, Shuttle Property Excess, Facility Gap budgets remain Threat
  - FY 2010 President's Budget is target for incorporation of revised T&R Budget
  - Post-Shuttle Workforce skill needs will shift -- We are preparing
  - Major facilities are transitioning today – Substantial progress already
  - Longer "Gap" = Greater difficulty in mitigating workforce impacts
- NASA will Generally Spend Same Amount on Labor Nation-wide, but Change of Emphasis Toward Development of New Exploration Systems
- Transition Workforce Mapping Data: Good – Communication is Key!

NASA is not going out of Business, rather, Transition Enables a New Line of NASA Business for the Next 30-50 Years.
Here are Perspectives from the People Leading the Way…