A Direct Way to Close all Gaps within Budget

DIRECT • Space Transportation System Derivative

JUPITER 120

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The Best Solution will Close ALL Gaps within Budget

The Workforce Gap

The Flight Gap

The Exploration Gap

The Budget Gap

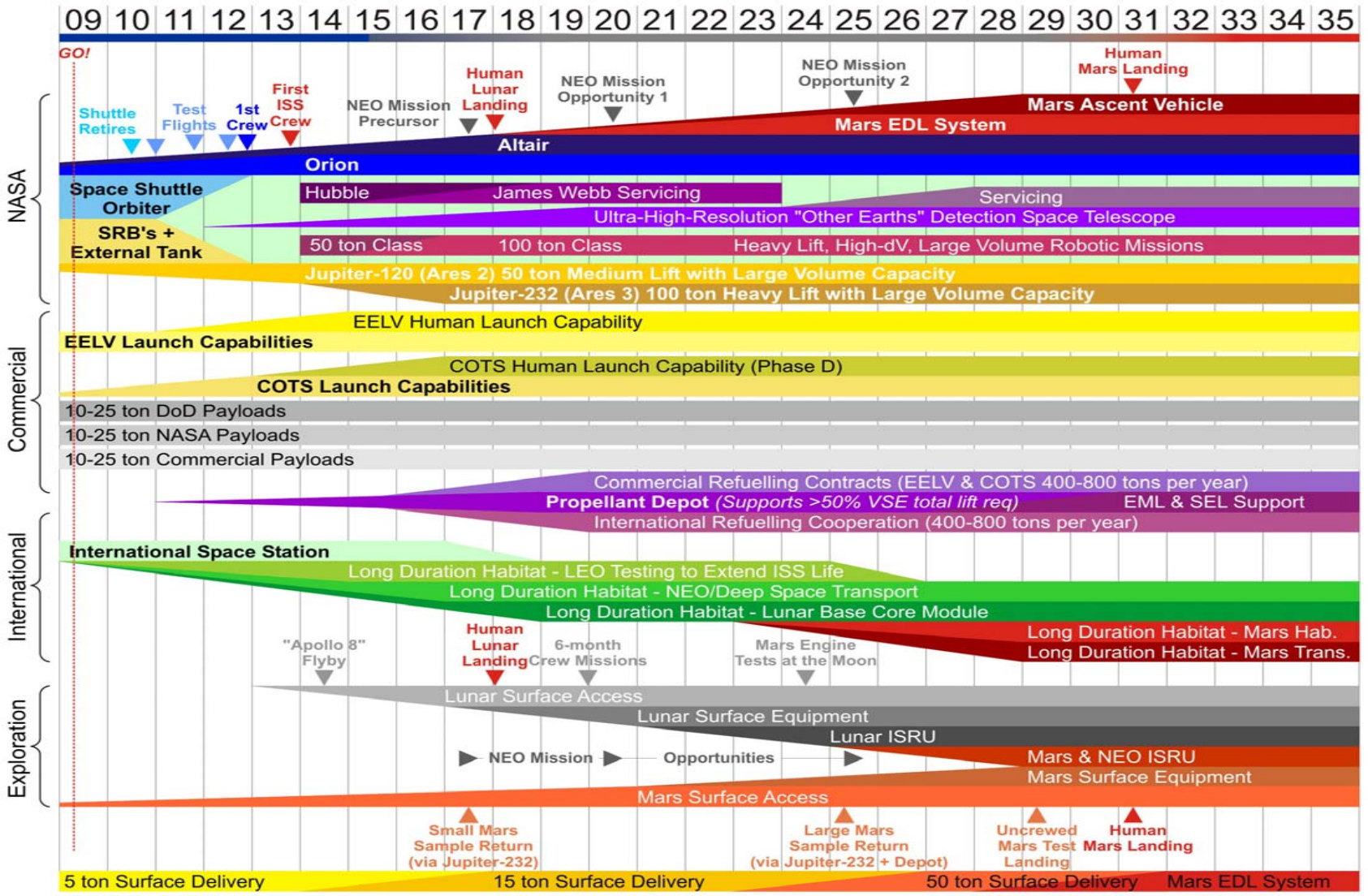
The Contracts Gap

The COTS Gap

The International Gap

The Performance Gap

DIRECT Roadmap



DIRECT Delivers what United States Congress Authorized

-NASA Authorization Act of 2005

"The Administrator shall, to the fullest extent possible consistent with a successful development program use the personnel, capabilities, assets, and infrastructure of the Space Shuttle program in developing the Crew Exploration Vehicle, Crew Launch Vehicle, and a heavy-lift launch vehicle."

The best civil space policy to have been enunciated by a president in four decades or more, and the best authorization act to be approved by the Congress since the 1960s.*

NASA Administrator Dr. Griffin, Space Transportation Association, 22 January 2008

A DIRECT Derivative of the Space Transportation System

DIRECT 'is' the Historic NASA STS Derived Approach

Step 1: Go to http://ntrs.nasa.gov/search.jsp

Step 2: Type in "National Launch System" or "Shuttle Derived" into the search box

Result: Over 190 detailed studies from 1978 to 2005 that use the DIRECT approach.

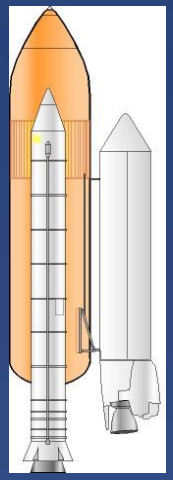
True STS derived systems have three things in common

1) **They Retain the STS Stack configuration**
2) **They Reuse the 4-Segment SRB**
3) **They Keep the STS External Tank at a 8.4m dia.**

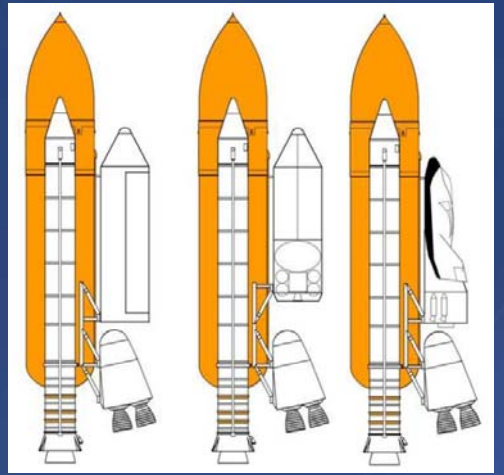
Ares-I and Ares-V do none of these three things

Morton-Thiokol 1979 Proposal

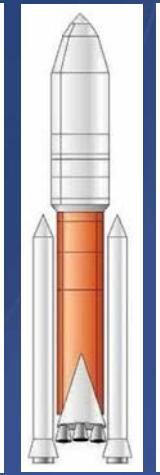
National Launch System (NLS)



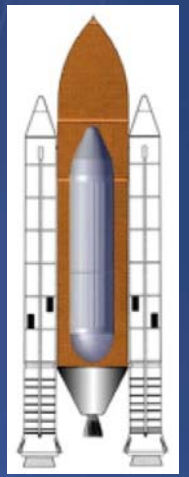
Shuttle-C



Shuttle-B



Mars Direct's Ares



Buzz Aldrin's Aquila

DIRECT Maximizes the Space Transportation System

Ares-I

New 5-Seg. SRB
New J-2X Engine
New Configuration
New Infrastructure
New Upper Stage

Jupiter-120

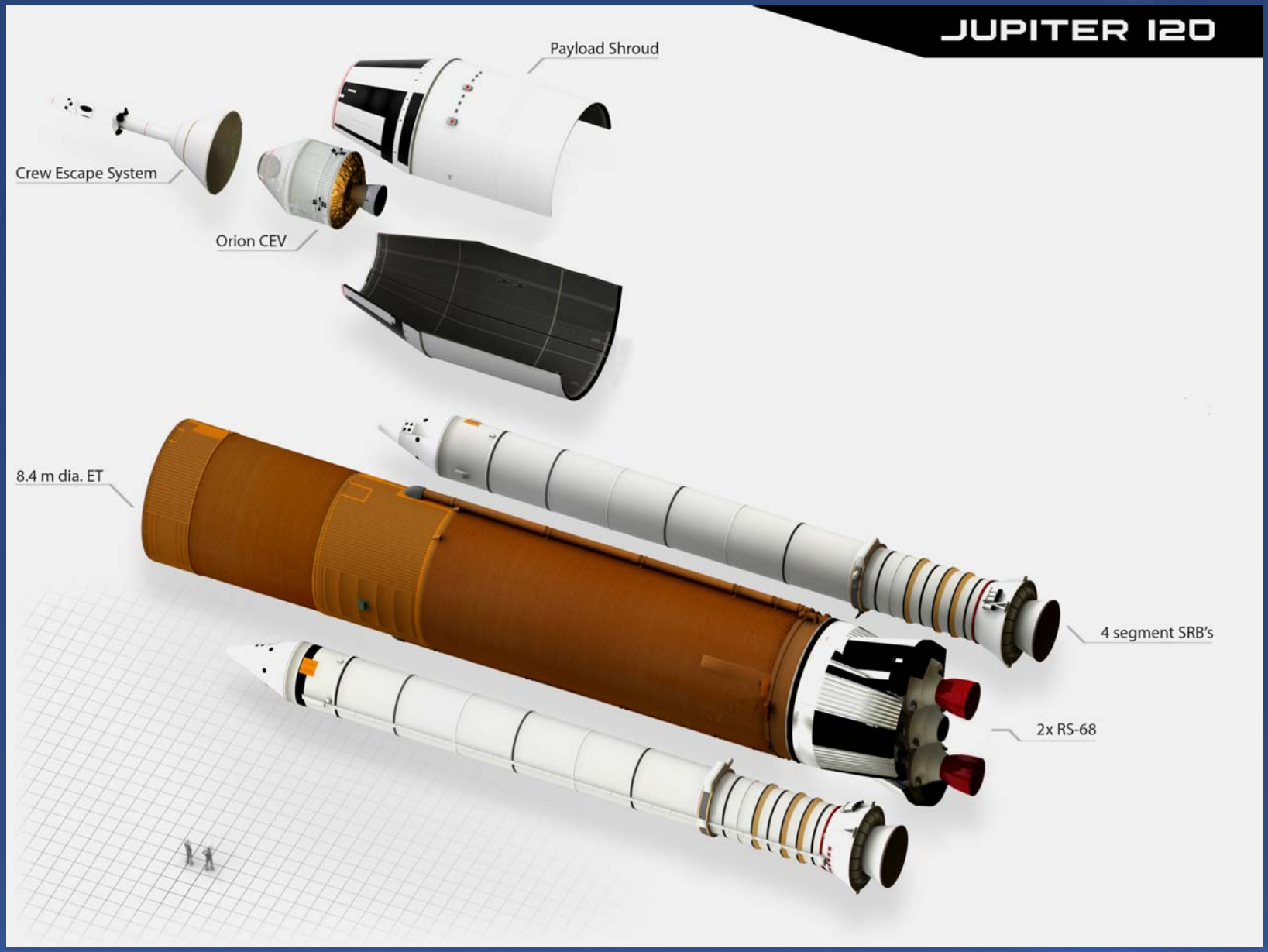
Existing 4-Seg. SRB
Existing RS-68 Engine
Existing Configuration
Existing Infrastructure
No Upper Stage

$14.4 Billion* ←	Total Development Cost	→ $9.5 Billion
March 2016** ←	Operational Date	→ September 2012

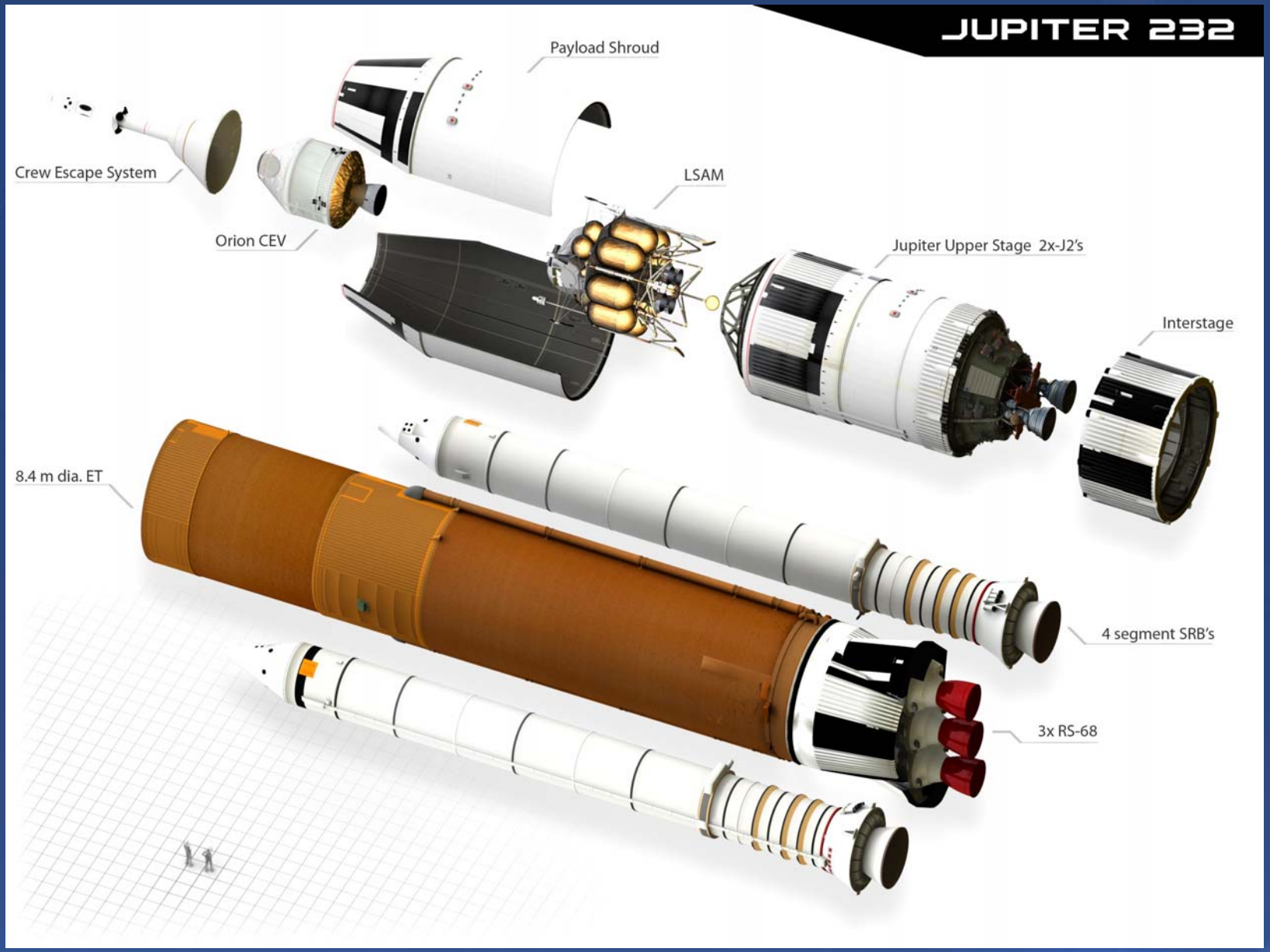
Bottom-line: DIRECT <u>Closes the Gap</u> within the <u>Current Budget</u>

**GAO Figure*
*** March 2016 recently revealed*

The Jupiter-120 Protects the Heavy Lift Infrastructure



Add a 2nd Stage and LSAM and we can Return to the Moon



We Agree, It is Too Late to Switch Horses Now

Ares Retains < 5% of the STS Hardware or Infrastructure

The Jupiter is a Direct Derivative of STS

Breaking News

New 10m Tank

Al-Li Disposable 5.5-Segment SRB

Even Longer Tank

Six RS-68 Engines

Different Upper Stages

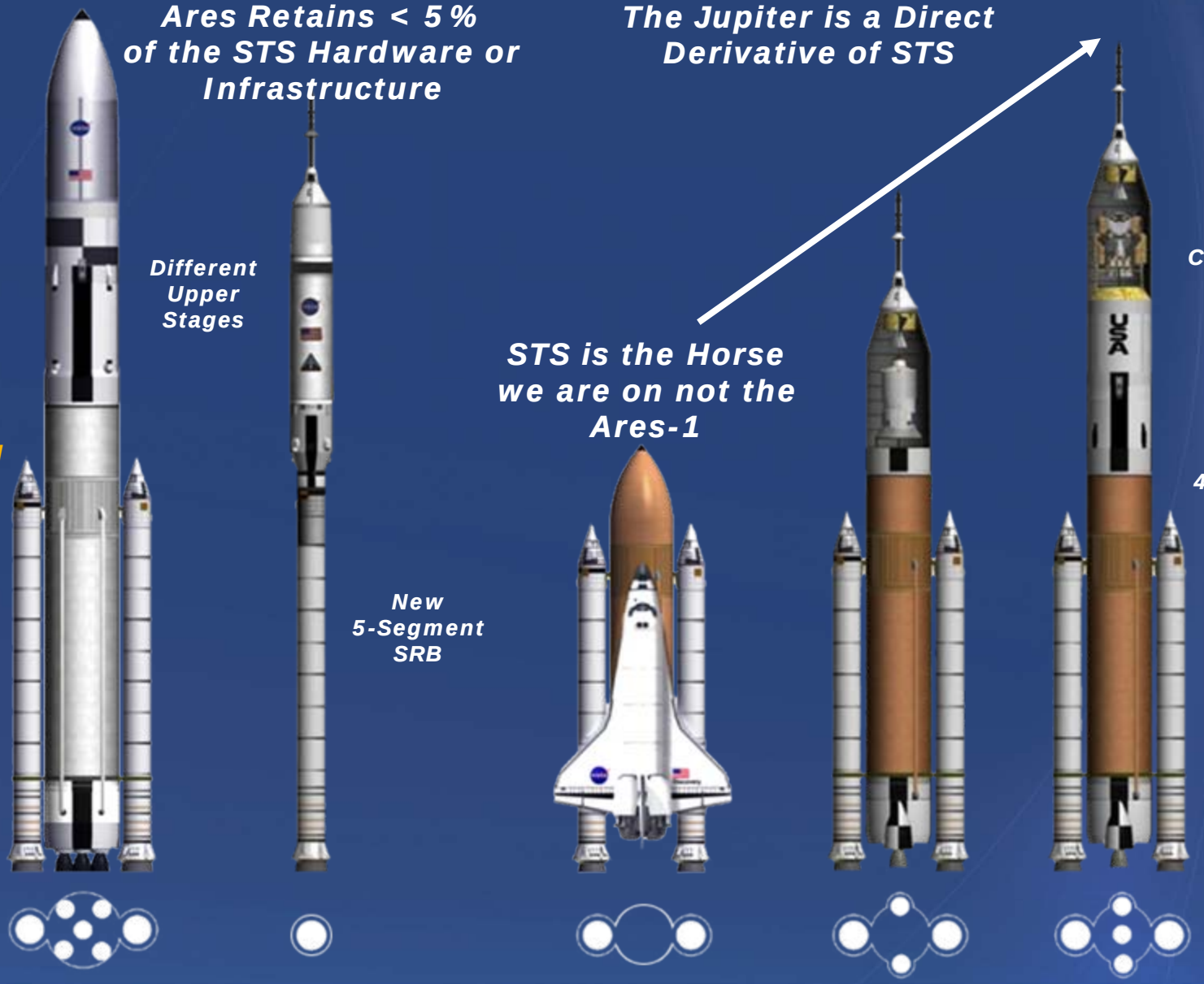
New 5-Segment SRB

STS is the Horse we are on not the Ares-1

Common Upper Stage

Existing Reusable 4-Segment SRB

Same 8.4m Tank



Different Foot Print

Same Foot Print

DIRECT Provides a Smooth Transition from the Ares-1

Current Ares-I Contractors

Lockheed Martin
Orion

Boeing
Upper Stage
Pratt & Whitney
J-2X Engine

Boeing
Instrument Unit

ATK
Solid Rocket
Booster

Possible Jupiter Contractors

Lockheed Martin
Orion

LSAM?

Lockheed Martin
Orion

PLF?

Boeing
Upper Stage
Pratt & Whitney
J-2X Engine

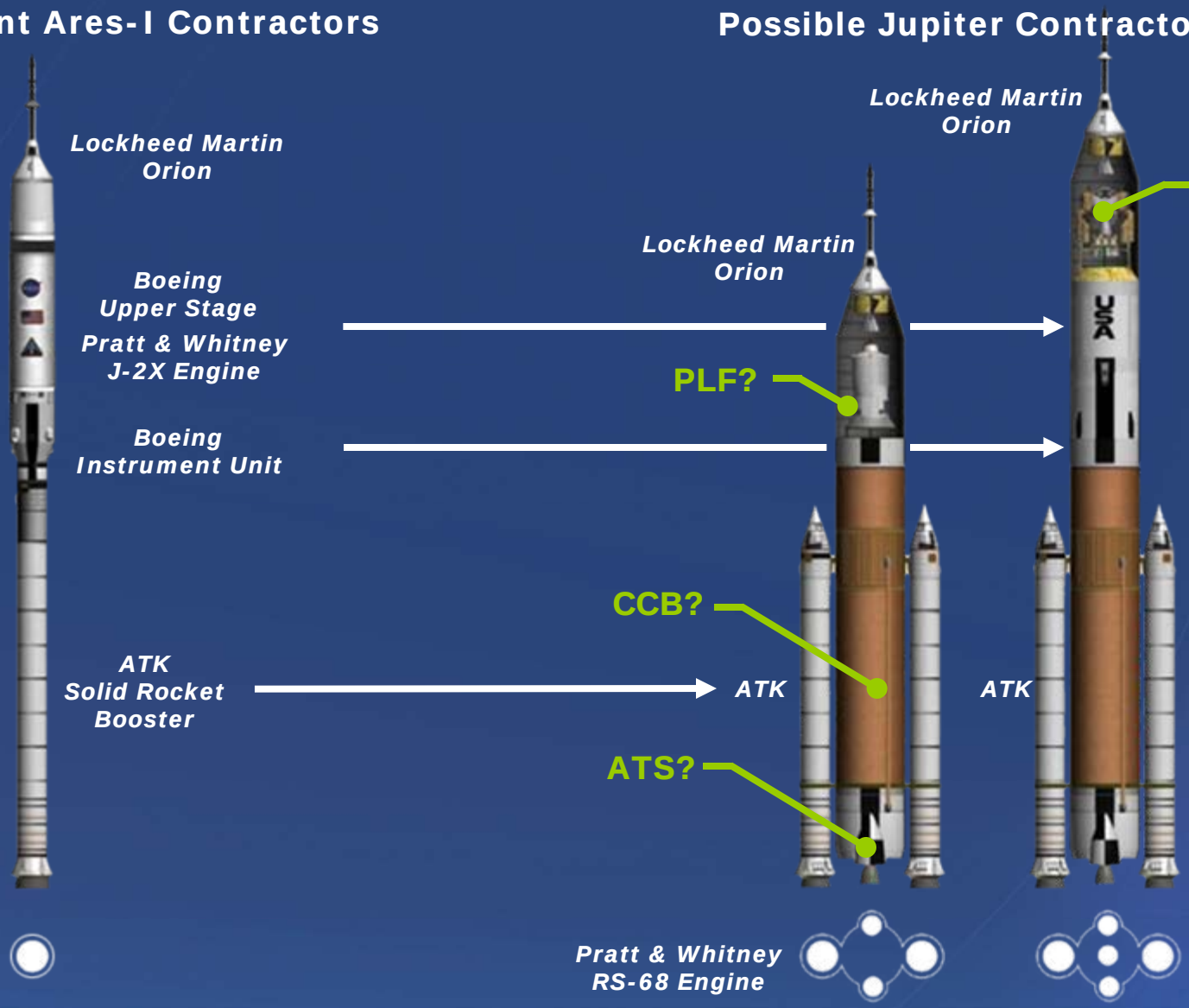
CCB?

ATK

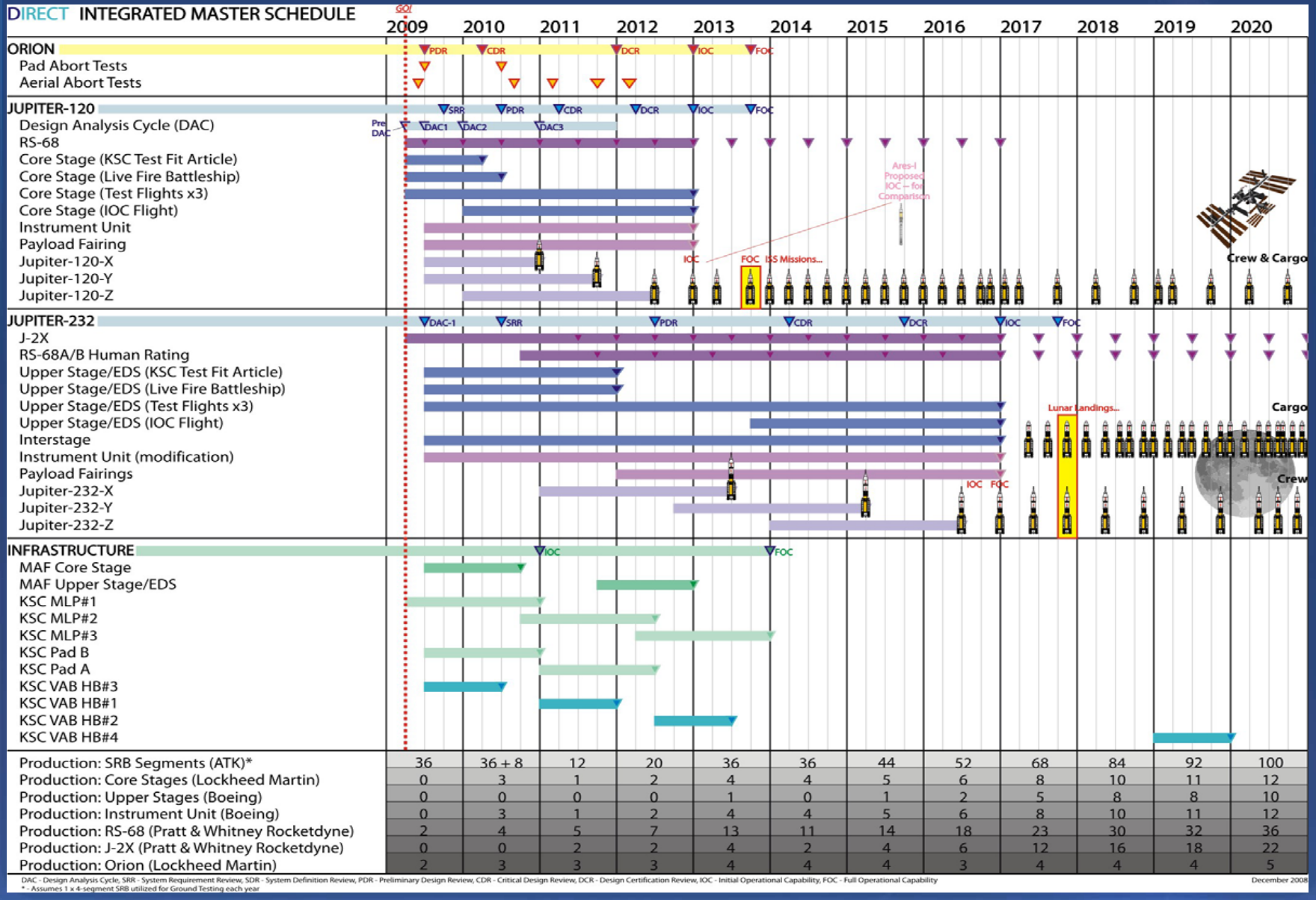
ATK

ATS?

Pratt & Whitney
RS-68 Engine



DIRECT Integrated Master Schedule



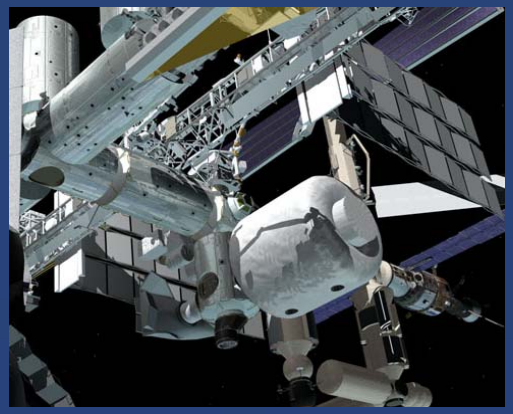
Production: SRB Segments (ATK)*	36	36 + 8	12	20	36	36	44	52	68	84	92	100
Production: Core Stages (Lockheed Martin)	0	3	1	2	4	4	5	6	8	10	11	12
Production: Upper Stages (Boeing)	0	0	0	0	1	0	1	2	5	8	8	10
Production: Instrument Unit (Boeing)	0	3	1	2	4	4	5	6	8	10	11	12
Production: RS-68 (Pratt & Whitney Rocketdyne)	2	4	5	7	13	11	14	18	23	30	32	36
Production: J-2X (Pratt & Whitney Rocketdyne)	0	0	2	2	4	2	4	6	12	16	18	22
Production: Orion (Lockheed Martin)	2	3	3	3	4	4	4	3	4	4	4	5

DAC - Design Analysis Cycle, SRR - System Requirement Review, SDR - System Definition Review, PDR - Preliminary Design Review, CDR - Critical Design Review, DCR - Design Certification Review, IOC - Initial Operational Capability, FOC - Full Operational Capability

* - Assumes 1 x 4-segment SRB utilized for Ground Testing each year

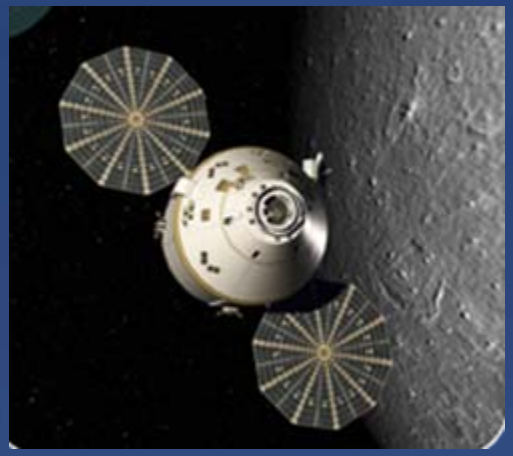
December 2008

The Jupiter is a More Capable Space Shuttle Replacement



ISS Service & Upgrade

Hubble Service & Upgrade

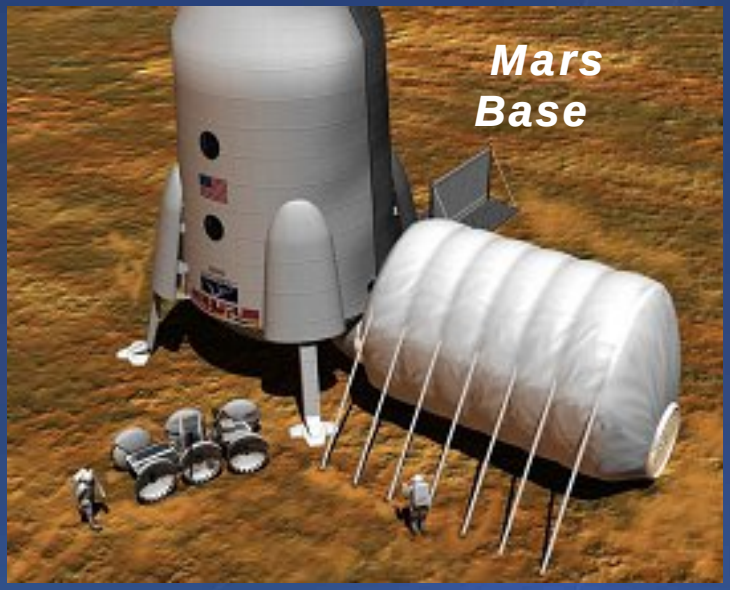


Lunar Capable Orion

That is Safer & Reusable

Enabling New Classes of Manned and Unmanned Missions

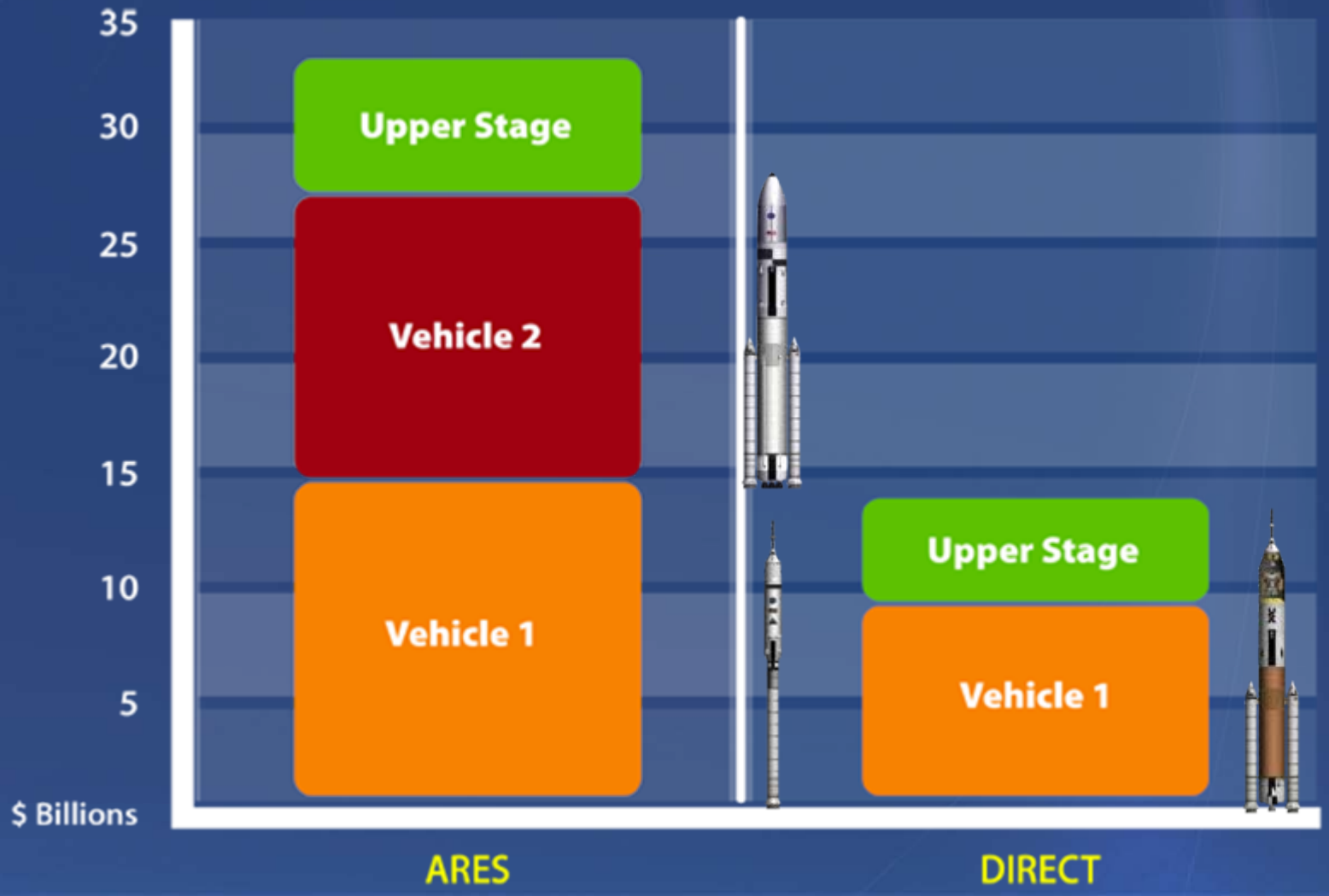
The ISS has a New Life as Platform for Testing Habitats



DIRECT Saves Money Now and Later

Costs are lower because of only one launch vehicle development*

Recurring costs are amortized over a larger number of flights*



**NASA Administrator Dr. Griffin, Space Transportation Association, 22 January 2008*

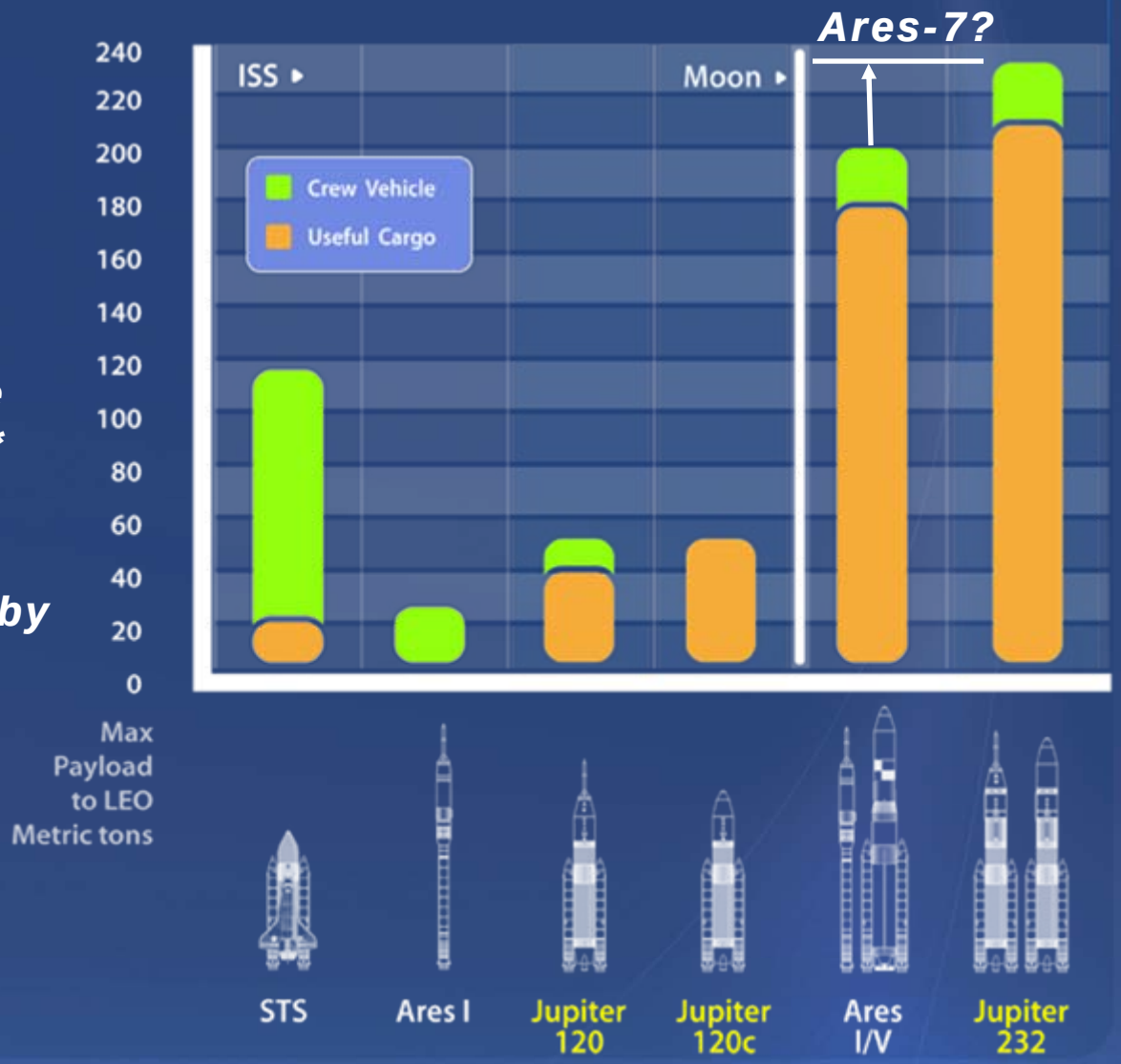
DIRECT Produces a More Capable Lunar Program

It's not a question of performance but what approach will adhere to policy and budget.

*The most obvious split involves launching two identical vehicles**

*This method … was to be employed [for Apollo]**

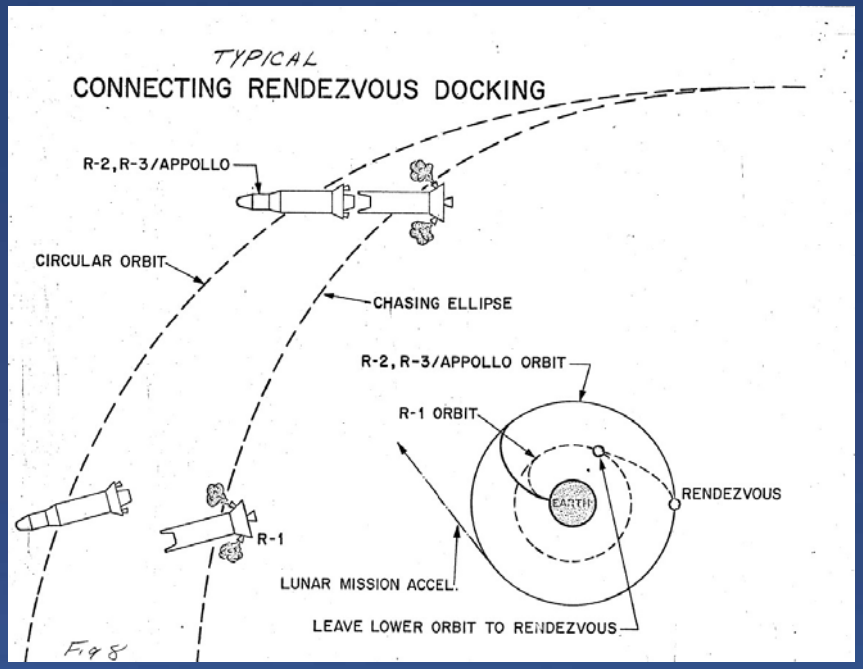
*Knowledge of system reliability is enhanced by flight experience**

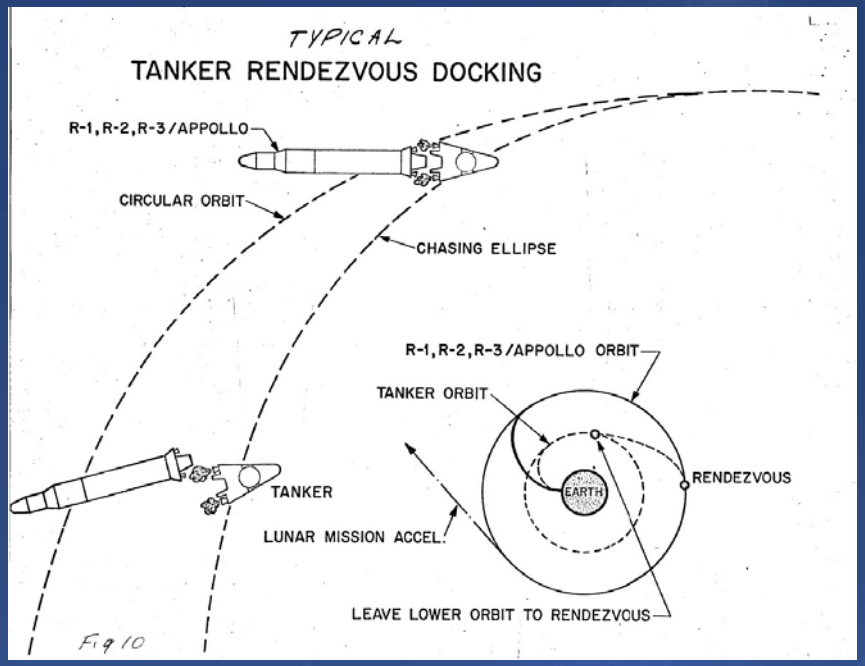


*NASA Administrator Dr. Griffin, Space Transportation Association, 22 January 2008

Wernher Von Braun Figured out Performance 46 Years Ago

"We found the *Tanking Mode* substantially superior to the *Connecting Mode*. The performance margin could be enlarged almost indefinitely by the use of additional tankers."
- Dr Wernher Von Braun June 7, 1962





Orbital Propellant Depots are the Bridge to a Successful VSE

Flexible and Extensible Mission Designs

70% of the Mass is up for Commercial and International Participation

Builds the Base needed to Leveraging Lunar Resources

Enables the Reuse of Expensive Spacecraft

Amplifies the Capability of all Missions Regardless of Nation

Completely Negates the Need for Super Heavy Lift like the Ares-5

The development and exploitation of space has, so far, been accomplished in a fashion that can be described as "all government, all the time". That's not the way the American frontier was developed, it's not the way this nation developed aviation, it's not the way the rest of our economy works, and it ought not to be good enough for space, either.*

***NASA Administrator Dr. Griffin, Space Transportation Association, 22 January 2008**

The Best Solution will Close ALL Gaps within Budget

	Ares-1/5	EELV/COTS	DIRECT
The Workforce Gap	🟡	🔴	🟢
The Flight Gap	🔴	🟢	🟢
The Exploration Gap	🟡	🔴	🟢
The Budget Gap	🔴	🟢	🟢
The Contracts Gap	🟢	🔴	🟢
The COTS Gap	🔴	🟢	🟢
The International Gap	🔴	🟢	🟢
The Performance Gap	🟡	🔴	🟢

"From 1975-1981, between the retirement of the Apollo-Saturn system and the first flight of the Shuttle, the United States did not have the capability to send humans into space, our country was not driving the space exploration agenda, and our aerospace workforce was decimated. We lost valuable people from the program, people who never came back. We lost valuable skills that were relearned with difficulty, or not at all. We lost momentum. Let us learn from these experiences. Let us not repeat them. Let us at least make a new mistake."
- NASA Administrator Mike Griffin, August 31, 2005


"You can always count on Americans
to do the right thing ....
after they've tried everything else."
- Winston Churchill
www.directlauncher.com