National Aeronautics and Space Administration

21st Century Space Launch Complex

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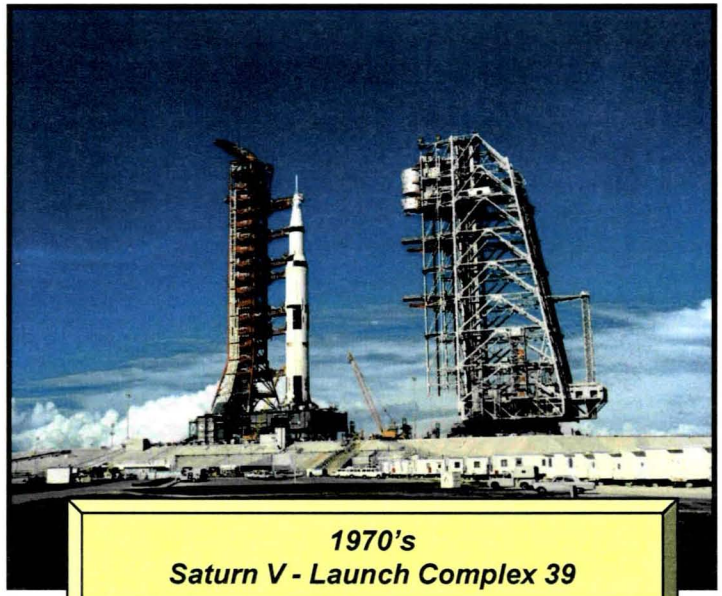
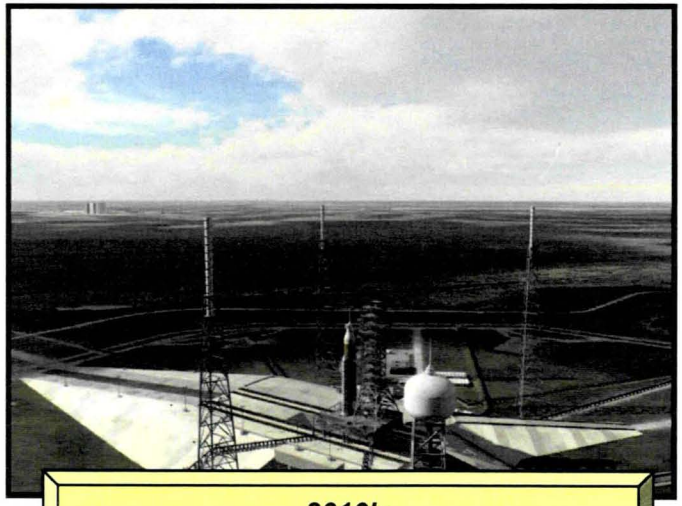
Kennedy Space Center, 1950-2011

1950's
ICBM Row



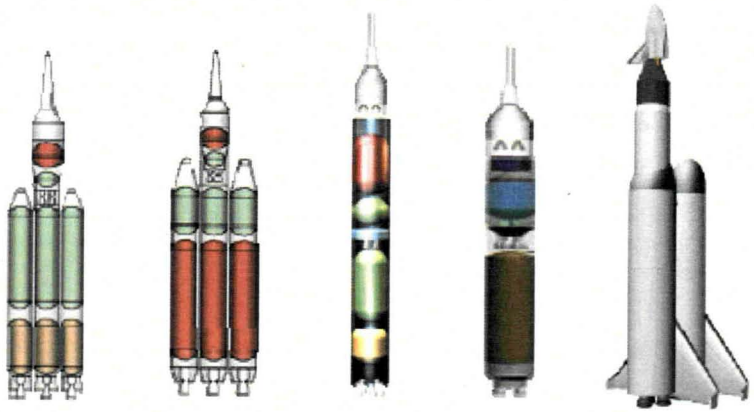
1970's
Saturn V - Launch Complex 39

1980's – 2000's
Space Shuttle - Launch Complex 39



2010's
21st Century Space Launch Complex

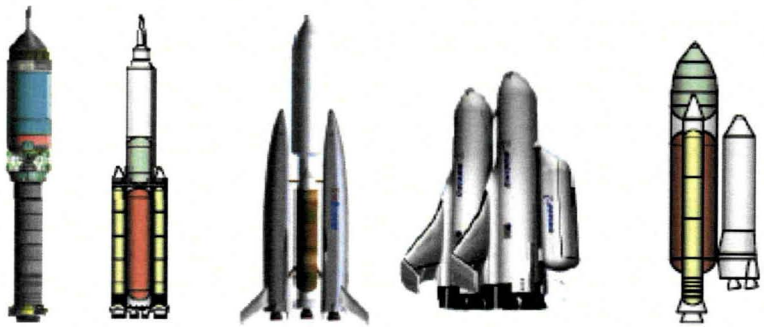
Launch Vehicle Concepts and Architectures



Expendable Launch Vehicles

SSTO-Rocket

SSTO-AB/Rocket

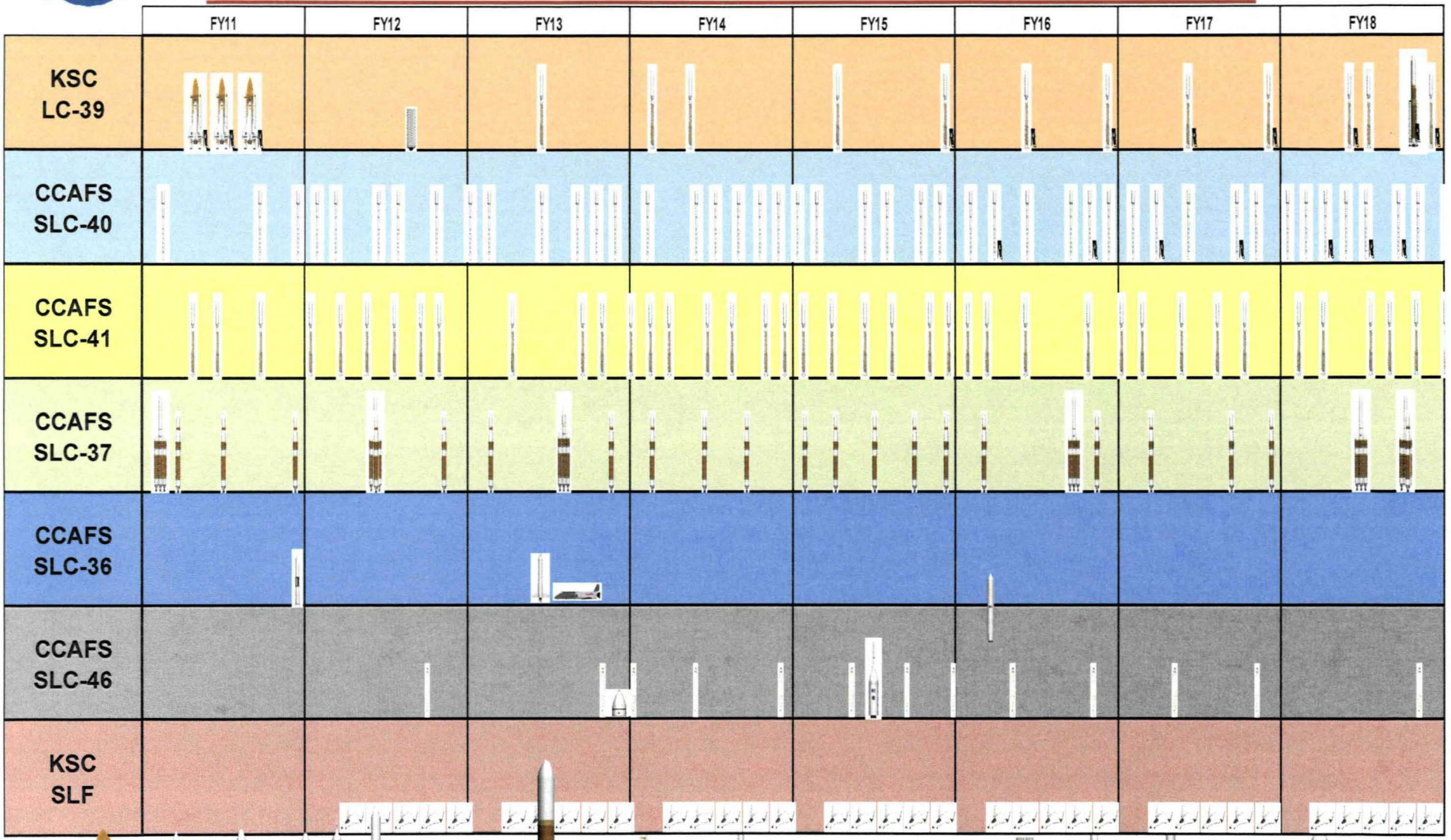


Partially Reusable

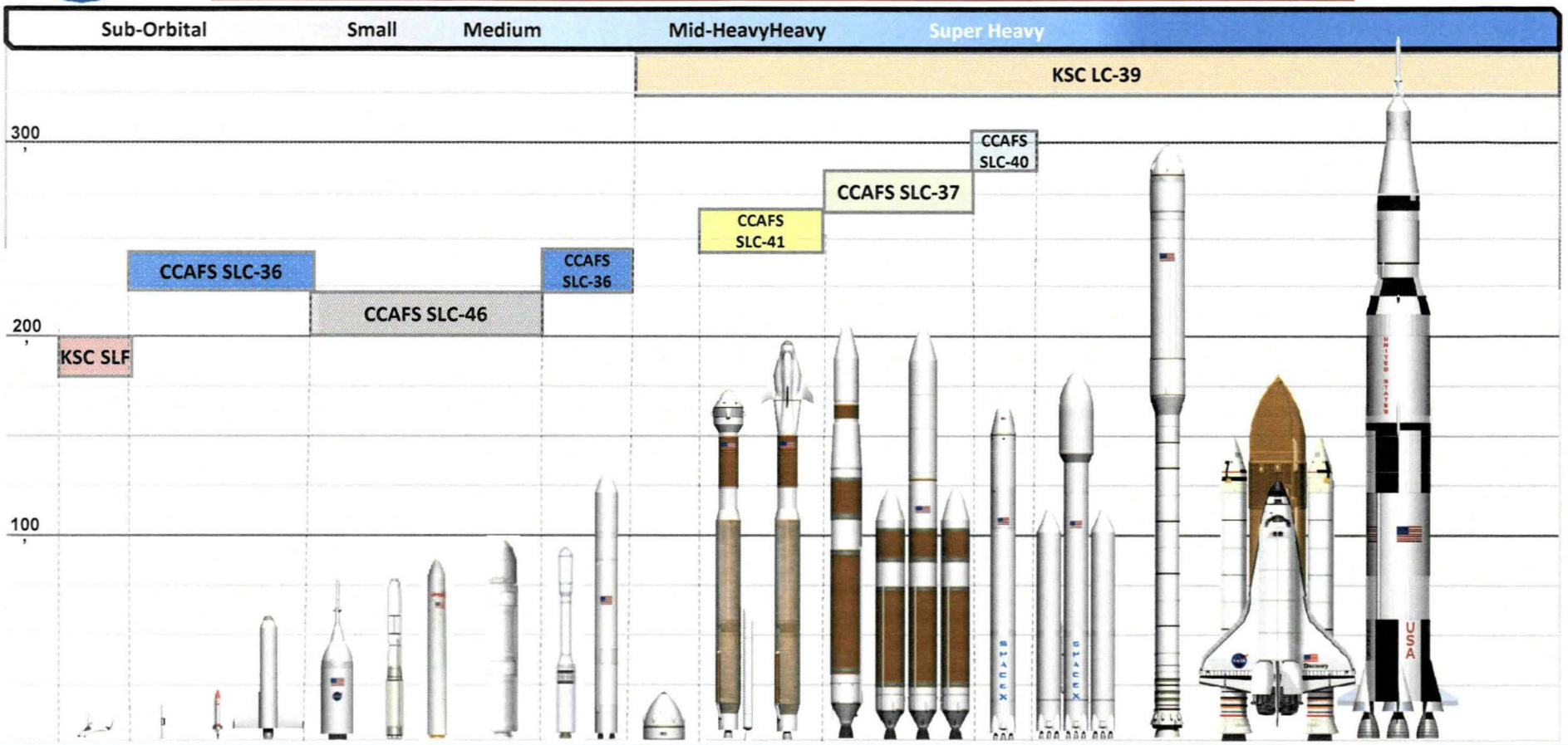
Fully Reusable

Architectures are High-Level System Descriptions With Relatively Little Detail

Notional Launch Manifest

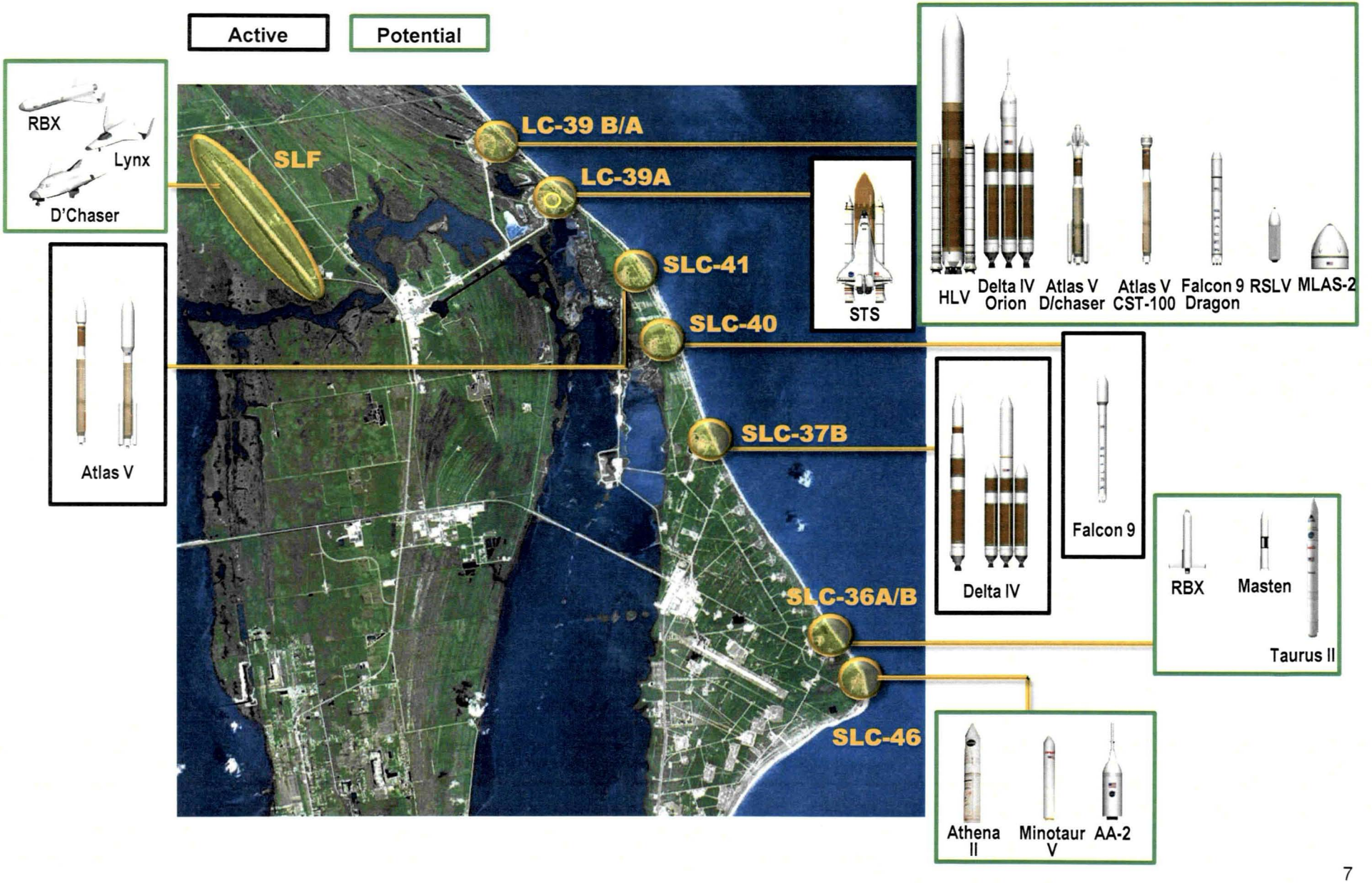


Launch Capability



	XCOR Lynx	Masten XA-1.0	AFRL Prospector 18 RBK	Orbital AA-2	Orbital MinotaurIV MinotaurV	ATK Athena II C	Orbital Taurus I Taurus II	NESC MLAS FT-2	ULA Atlas V 412 Atlas V 402	ULA DeltaIV M Delta IV H	SpaceX Falcon 9 Falcon H	ATK Liberty	NASA Space Shuttle	NASA Saturn V	NASA SLS
Status	Prop osed	Prop osed	Proposed	Prop osed	Prop osed	Prop osed	Prop osed	Prop osed	Active	Active	Active / Proposed	Prop osed	Retired	Retired	Notional
Ht. (ft)	12	15	18 / 62	80	78 / 87	95	92/131	20	171 / 194	205	160 / 180	300	184	363	321.5
FS Comm	LOX/ RP1	LOX/ IPA	LOX/ethanol LOX/ RP1	Solid	Solid	Solid	(I) Solid (II) LOX /RP1	Solid	LOX/RP1/Solid LOX/RP1	LOX/LH2	LOX/ RP1	Solid	LOX/LH2/ Solid	LOX/ RP1	LOX/LH2/ Solid
FS Thrust (lbf)	12K	3.5K	4.5K / 338K	361K	496K	383K	383K / 734K	4.2K	1.2M / 860K	650K / 1.9M	1.1M / 3.4M	2.8M	6.8M	7.6M	~8.8M

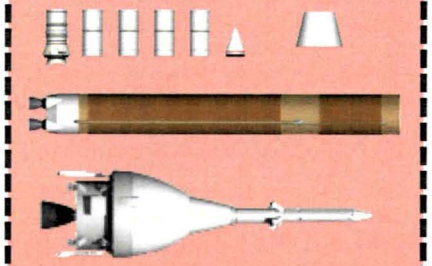
Launch Site for Every Vehicle



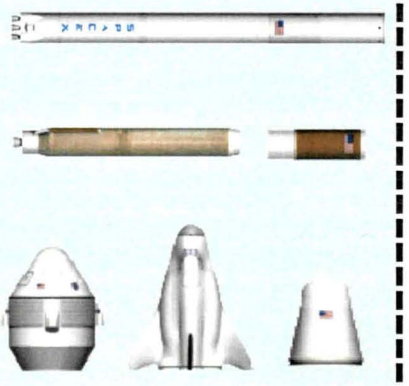
Launch Complex Concept of Operations

SUPPORTED PROGRAMS

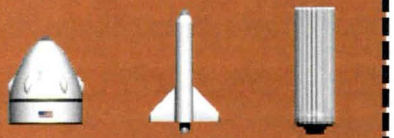
SLS/MPCV



Commercial Programs

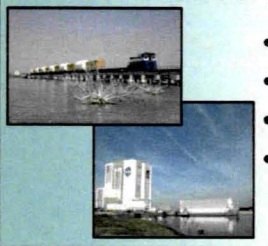


Test Flight Programs



OPERATIONS AND CAPABILITIES

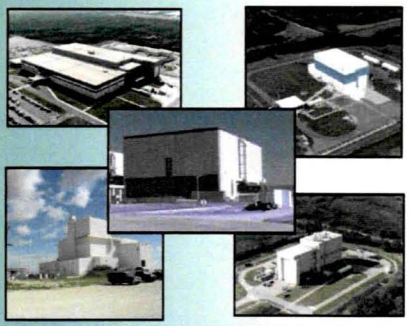
Delivery



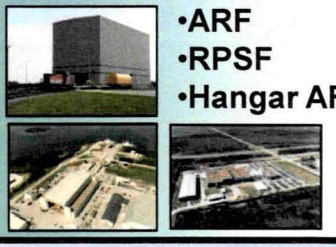
- SLF
- Rail
- Turn Basin
- Over Road Transport

Offline Payload and Spacecraft Processing

- SSPF
- EPF
- MPPF
- PHSF



Offline SRB Processing



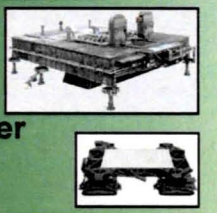
- ARF
- RPSF
- Hangar AF

Vehicle Integration and Launch

Integration

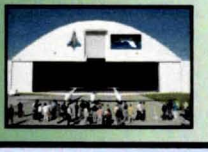
Vertical

- MLP
- VAB
- Crawler



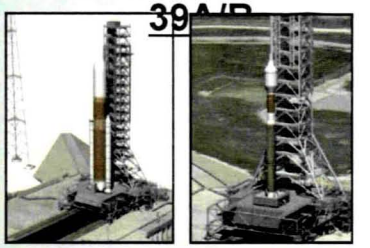
Horizontal

- OPF
- SLF Hangar



Launch

Launch Pad 39A/B



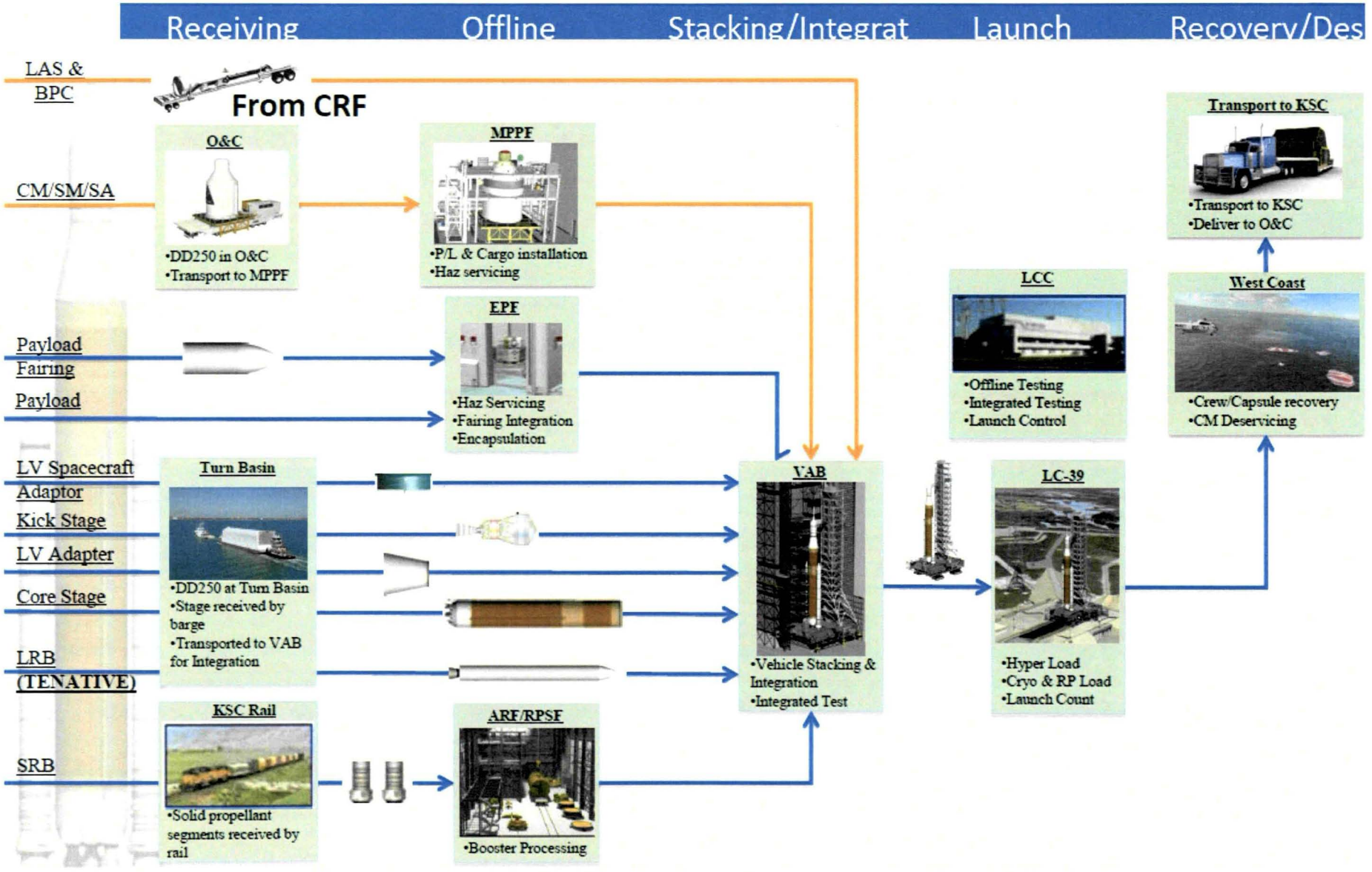
SLF

CCC & Range

Landing & Recovery

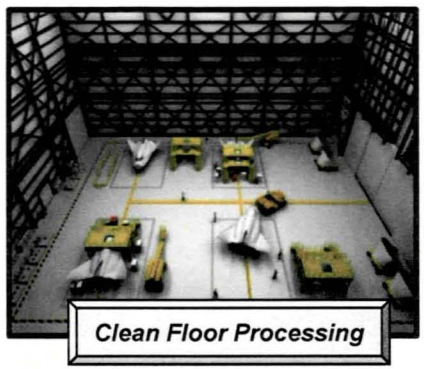
- CM Recovery
- Horizontal Landing
- SRB Recovery

SLS Vehicle Configuration Concept of Operations



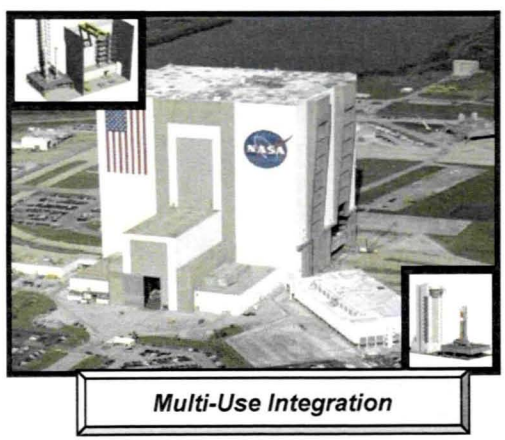
Flexible Approach

Horizontal Launch & Landing

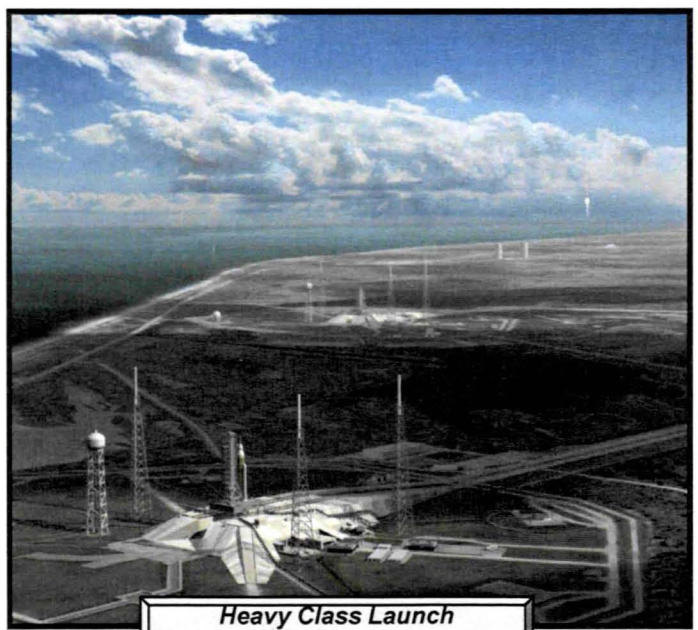


Clean Floor Processing

Small Vehicle Launch



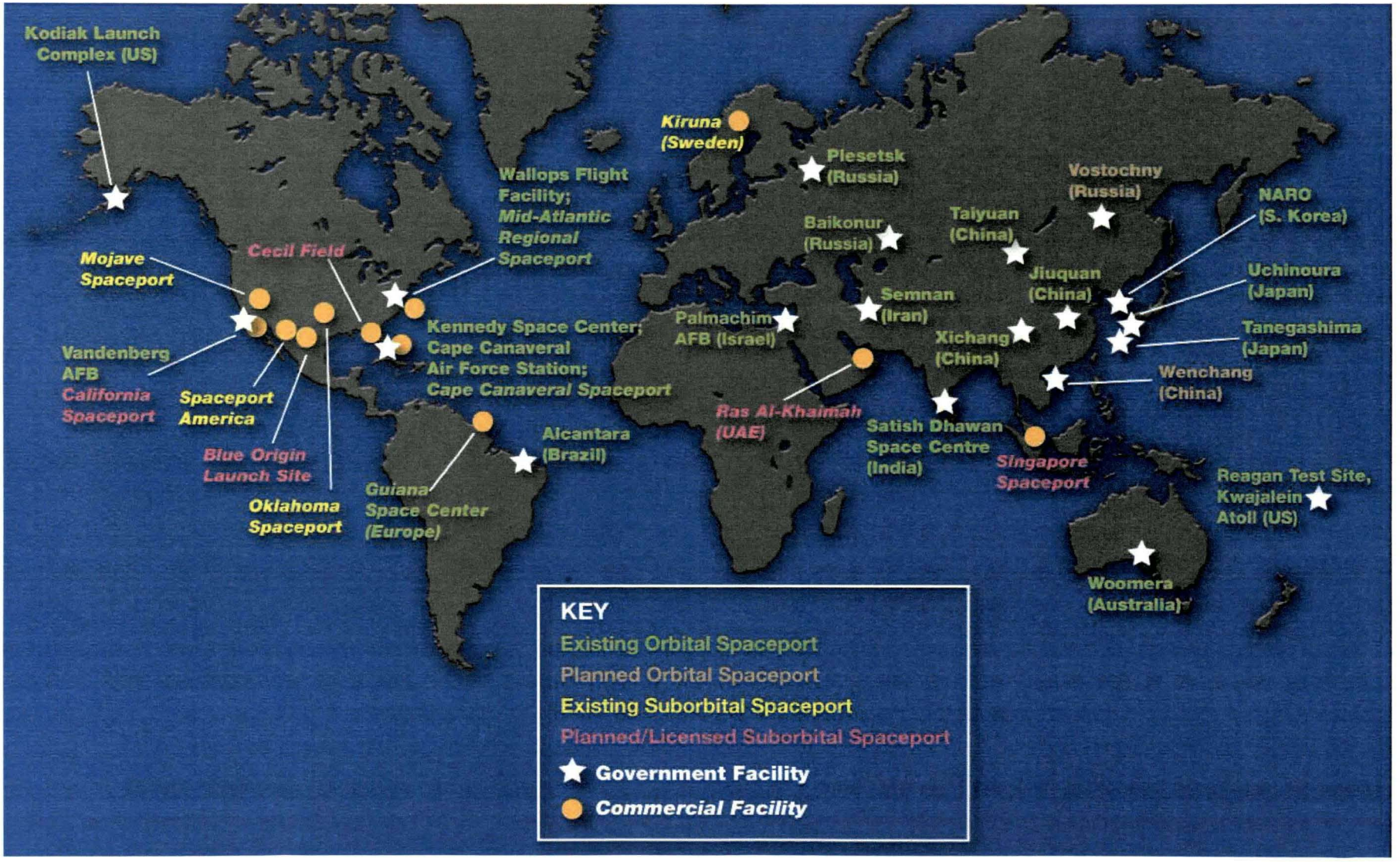
Multi-Use Integration



Heavy Class Launch Capability

Flexible Launch Capability

Spaceports around the World



NASA programs and Commercial Partnerships

- **NASA programs (SLS, MPCV, LSP, ISS) continue to be the core business of Kennedy Space Center**
- **Commercial partnerships expand the portfolio of KSC activities and provide opportunities for growth**
- **Both operating modes complement each other**
  - Low Risk: Programs allow NASA to push the boundaries and develop new capabilities
  - Low Cost: Commercial entities drive down costs for established capabilities and expand the space industry
- **The future KSC combines the best attributes of each to become the location of choice for all Space Commerce**

KSC Directorates and Commercial Partnerships

- Chief Counsel Office (CC) provides legal guidance
- GG provides center-wide costing and financial guidance
- Center Operations (TA) provides institutional coordination during partnership development and implementation
- EX and PA help coordinate the Center's interaction/messaging with the public, legislators, and media
- IT has a strong involvement in modeling and simulation used to secure partnerships and forward planning for new tenants at KSC
- 21st Century Ground Systems Program provides multi-use architecture studies for KSC master planning
- FA administers CCDev program
- LX, UB, PH, VA and NE provide engineering expertise to evaluate and develop partnership
- GPD is designed as the primary implementing organization for sign partnerships

Partnership Example

Center Planning and Development (AA-D)

- Process and Policy definition
- Overarching Agreements

Host Implementation Team (GPD)

- Process requests
- Comply with policies
- Implement agreements and processes
- Coordinate provision of services

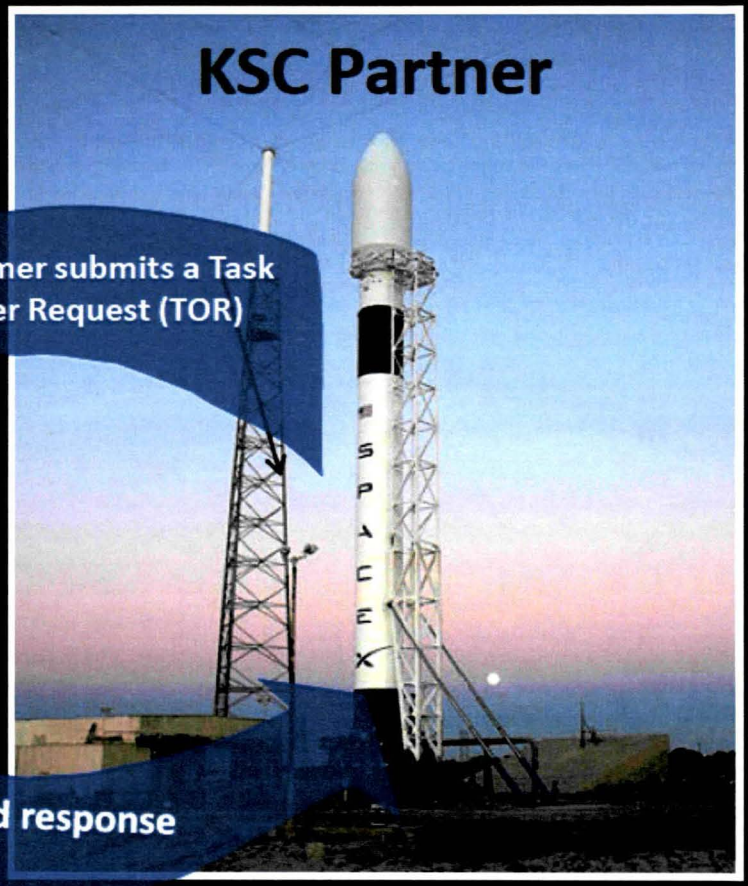
Request Implementation

- delivery of support, service, etc.

TA | NE | IT | Other

Customer submits a Task Order Request (TOR)

Rapid response



Summary

- **Features of a 21 CSLC**
  - Flexibility to support evolving launch vehicles and spacecraft
  - Standard interfaces to support multiple customer needs
  - Enhance Range capability and flexibility
  - Reconfigurable processing areas and control rooms
  - Revitalized infrastructure
- **KSC is open for Business**
  - KSC workforce is shifting to accommodate a multi-user commercial capability in addition to traditional large programs
  - Commercial interaction will lead to improved internal customer focus
  - Implementing technologies to overcome constraints for flexible, multi-use concepts and cost sharing
  - Collaborating with NASA, DoD and commercial Programs