



Presentation to ASQ

Marshall Space Flight Center

NASA S&MA at the Crossroads

***The role of NASA Quality Insight/Oversight
for Commercial Crewed Launch Vehicles***

*Roy W. Malone, Jr., Director
MSFC Safety & Mission Assurance (S&MA)*

3/9/10



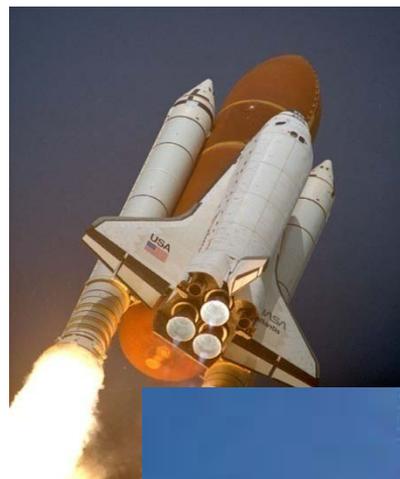




Agenda

Marshall Space Flight Center

- The Journey
- Current S&MA Oversight/Insight Model
- The Change
- The Issue
- Potential NASA relationship with Commercial Partners
- Commercial “X” FRR – Are you Go





Shuttle FRR - Are you Go?

Marshall Space Flight Center





Marshall Space Flight Center



- **“There has to be an optimum balance among technical performance, time schedule and cost.”**

Dr. Eberhard Rees - Director of Marshall Space Flight Center (March 1, 1970 - Jan. 19, 1973) – speaking to the World Management Congress in Munich in 1972

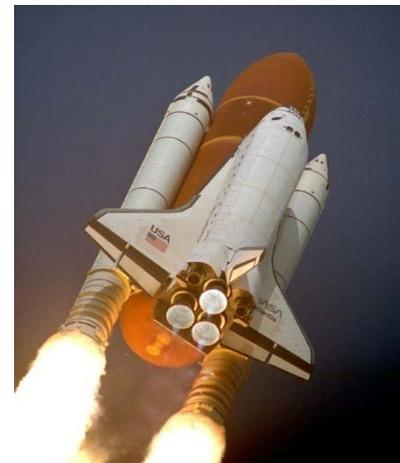


The Journey

Marshall Space Flight Center

- **Following the Space Shuttle Challenger accident, the Rogers Commission reported in 1986:**
 - S&MA was not included in technical issue discussions.
 - Inadequate S&MA staffing at MSFC – “Reductions in the safety, reliability and quality assurance work force at Marshall and NASA Headquarters have seriously limited capability in those vital functions (safety program responsibility) to ensure proper communications.”

“A properly staffed, supported, and robust safety organization might well have avoided these faults (addressing faults within the S&MA organization that contributed to the Challenger Accident)....”





The Journey (cont.)

Marshall Space Flight Center

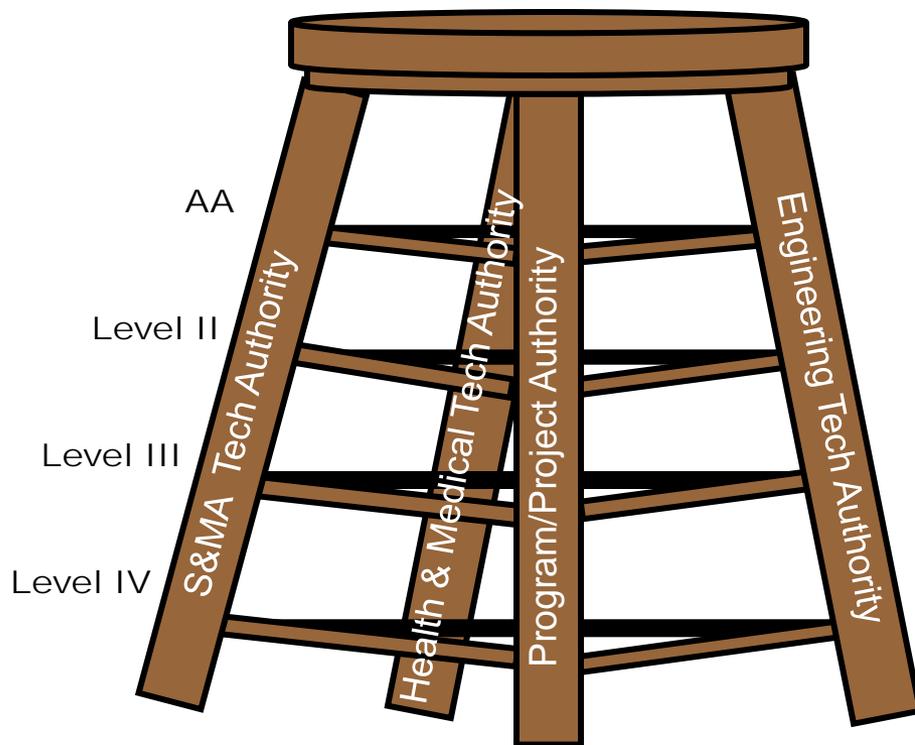
- **Following the Space Shuttle Columbia accident, the Columbia Accident Investigation Board (CAIB) reported in 2003:**
 - “Throughout its history, NASA has consistently struggled to achieve viable safety programs and adjust them to the constraints and vagaries of changing budgets”
 - “The Board believes that the safety organization, due to a lack of capability and resources independent of the Shuttle Program, was not an effective voice in discussing technical issues or mission operations pertaining to STS-107.”





Current NASA Oversight/Insight Model

Marshall Space Flight Center



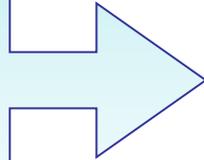
Technical Authority



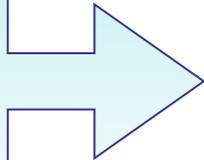
Current S&MA Oversight/Insight Model

Marshall Space Flight Center

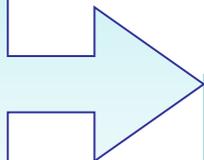
MSFC
SRM&QA



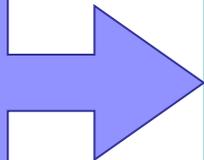
MSFC Prime
Contractor Onsite
SRM&QA



Defense Contract
Mgt. Agency
Onsite (DCMA)



Prime
Contractor
SRM&QA



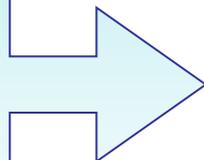
- AS9100 Registration / Compliance
- Procurement Quality
- Hardware Qualification & Acceptance
- Manufacturing & Test Quality
- Assure Requirement Compliance
- Control of Nonconforming Material
- Industrial Safety Monitoring
- Program Critical Hardware Moves



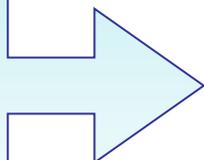
Current S&MA Oversight/Insight Model

Marshall Space Flight Center

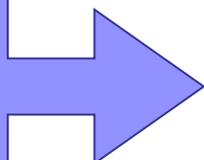
MSFC
SRM&QA



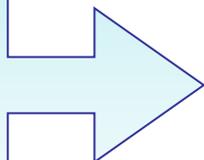
MSFC Prime
Contractor Onsite
SRM&QA



Defense Contract
Mgt. Agency
Onsite (DCMA)



MSFC Prime
Contractor
SRM&QA



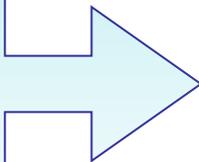
- Procurement Quality Surveillance
- Hardware Qualification & Acceptance
- Manufacturing & Test Quality GMIPS
- Assure Requirement Compliance
- Control of Nonconforming Material MRB
- Industrial Safety Monitoring
- Program Critical Hardware Moves



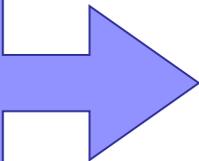
Current S&MA Oversight/Insight Model

Marshall Space Flight Center

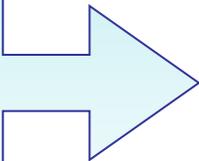
MSFC
SRM&QA



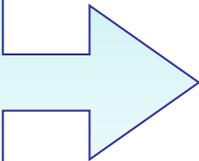
MSFC Prime
Contractor Onsite
SRM&QA



Defense Contract
Mgt. Agency
Onsite (DCMA)



MSFC Prime
Contractor
SRM&QA



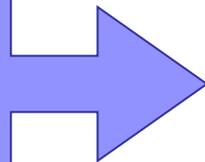
- AS 9100 Registration / Compliance
- Procurement Quality
- Hardware Qualification & Acceptance DD 250
- Manufacturing & Test Quality
- Assure Requirement Compliance
- Control of Nonconforming Material MRB
- Industrial Safety Monitoring
- Program Critical Hardware Moves



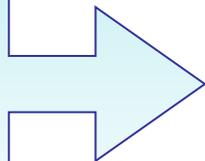
Current S&MA Oversight/Insight Model

Marshall Space Flight Center

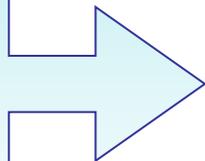
MSFC
SRM&QA



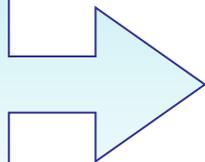
MSFC Prime
Contractor Onsite
SRM&QA



Defense Contract
Mgt. Agency
Onsite (DCMA)



MSFC Prime
Contractor
SRM&QA



- **Flight Readiness (Element Reviews, Launch Support, Post-Flight Assessment)**
- **Material Review Board Disposition**
- **FMEA / CIL / Hazard Reports Approval & Safety Panel Reviews**
- **Design Reviews/Technical Interchange Meetings**
- **Contract Monitoring and Evaluation**
- **Change Evaluation/Boards**
- **NSRS / Safety Concern Reporting**
- **COQ Approval**
- **Problem Reporting and Corrective Action**
- **Failure / Mishap Investigations**
- **Contractor and Subcontractor Audit / Assessments**



Space Shuttle S&MA Flight Readiness Certification

Marshall Space Flight Center

S&MA actively participates in the SSP Flight Certification process

- NSTS 08117, Appendix Q identifies the flight readiness endorsement statements that MSFC S&MA must certify
- In summary, MSFC S&MA certifies flight readiness for the following areas:

Hazard Analyses	Surveillance	LCC's
FMEA/CIL	As-built vs. As-designed	IFA's
Design Verification	NCR's / PRACA's	Waiver's/ Dev's
Risk Analysis (e.g., PRA)	MRB's	Limited Life Items
Audits	GMIP's	Acceptance Reviews
	GIDEP's	

MSFC S&MA's ability to certify the above endorsements requires active participation in each of the above areas

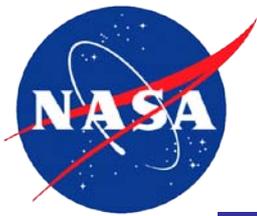


The Change

Marshall Space Flight Center

NASA FY11 Key Budget Points

- \$6 billion increase over five years to spur the development of American commercial human spaceflight vehicles and increase technical innovation
- Intends to cancel the Constellation program including Ares I, Ares V, Orion and Altair
- Adds \$600 million to fund the Shuttle's remaining flights, with funds available to extend Shuttle through the first quarter of FY2011, if necessary



The Issue

Marshall Space Flight Center

- What should be the NASA S&MA role with respect to commercially developed launch vehicles/spacecraft flying NASA crews?



“Let’s face it, space is a risky business. I always considered every launch a barely controlled explosion.”

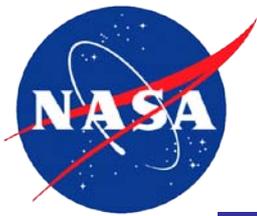
Aaron Cohen, Former JSC Center Director, Acting NASA Deputy Administrator, 1992



Commercial Vehicle X FRR Are you Go?

Marshall Space Flight Center





Launch Vehicle Human-Rating Certification Fundamentals

Marshall Space Flight Center

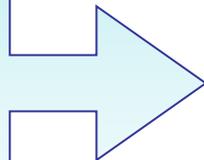
- 1. Define a requirements set that would yield an “acceptable level of safety”**
- 2. Assurance that the design solution meets these requirements**
- 3. Assurance that products (h/w and s/w) are consistent with the approved (*deemed acceptable*) design solutions**
- 4. Flight test demonstrations to build confidence prior to initial launch of NASA crews**
- 5. Complete a Flight Readiness certification process**
- 6. Post-flight assessment process is in place**



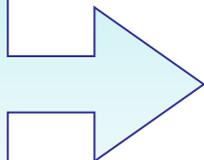
NASA S&MA Oversight/Insight

Marshall Space Flight Center

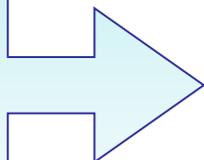
NASA
SRM&QA



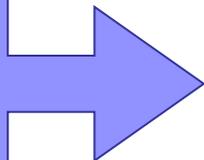
NASA Prime
Contractor Onsite
SRM&QA



Defense Contract
Mgt. Agency
Onsite (DCMA)



Prime
Contractor
SRM&QA





Amount of NASA Oversight/Insight

Things to Consider

Marshall Space Flight Center

- **Quality issues with DOD Aerospace products**
- **Ever increasing issues with counterfeit parts**
- **Experience/Track Record of Commercial Vendor**
 - Toyota
- **Production capability limitations**
 - Production rate
 - Infrastructure availability
- **Roll of other Federal Government Agencies - FAA**
- **Demonstrated reliability of vehicle**

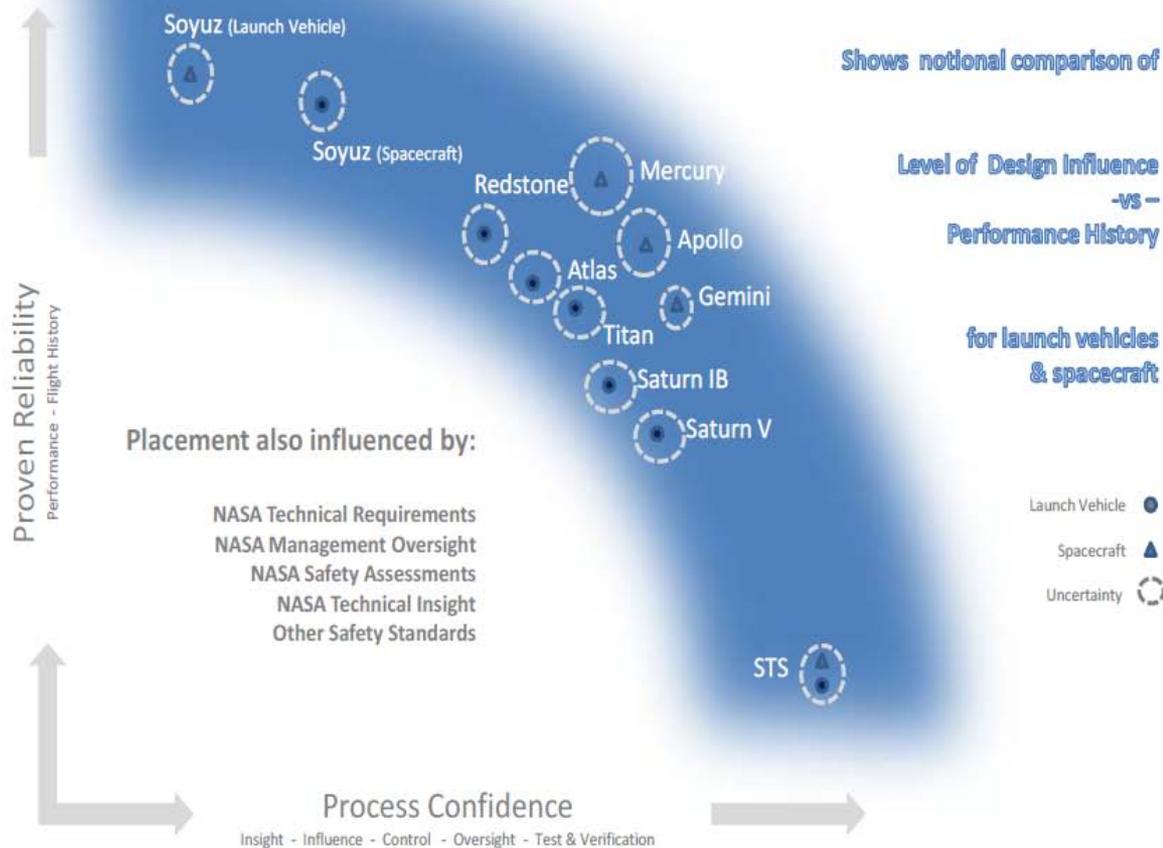


Demonstrated Reliability vs Insight/Oversight

Marshall Space Flight Center

Arc of Acceptability

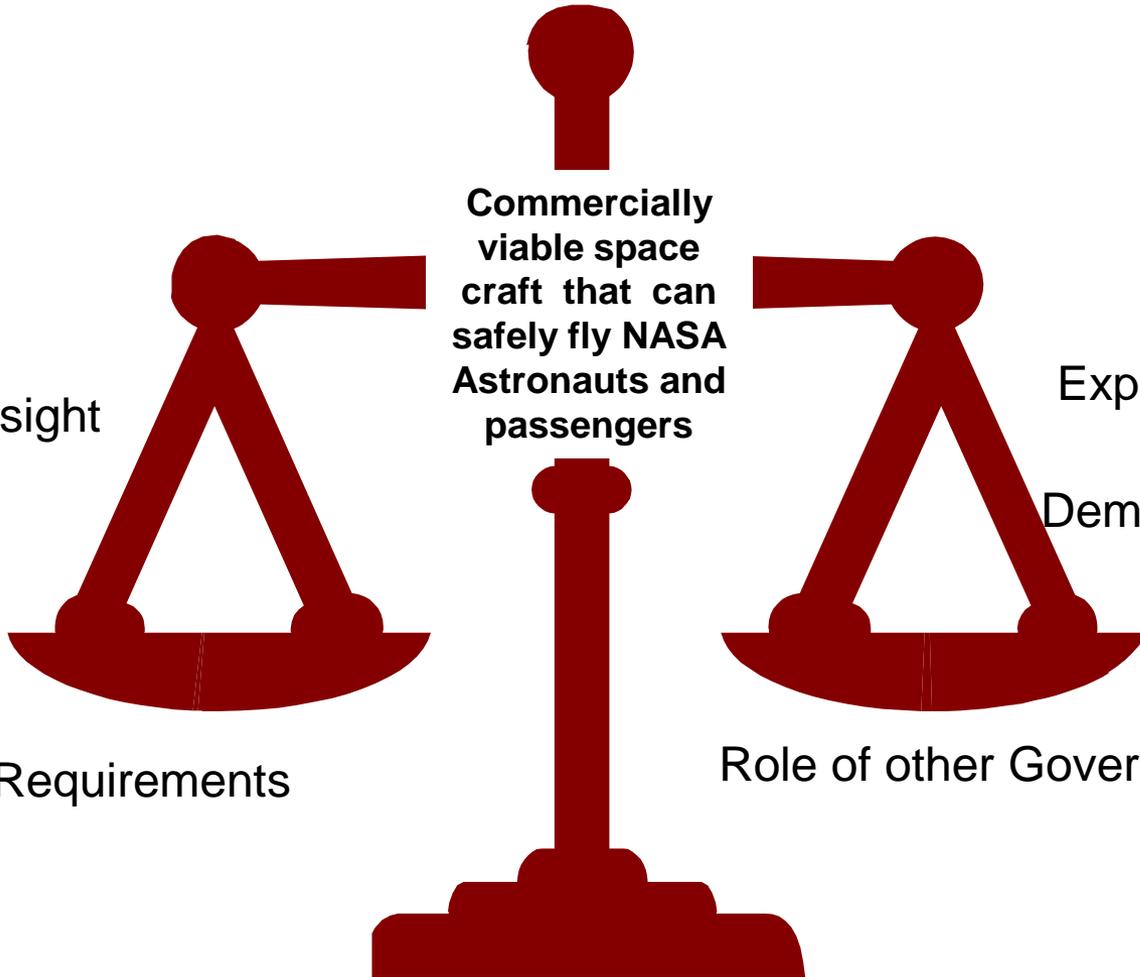
(at time of acceptance for 1st use by U.S. Astronauts)





What is the proper balance?

Marshall Space Flight Center



Commercially viable space craft that can safely fly NASA Astronauts and passengers

NASA Oversight

Experience

Demonstrated Reliability

NASA Insight

NASA Requirements

Role of other Government Agencies



Can you answer the Go – No Go question?

Marshall Space Flight Center





Marshall Space Flight Center

Questions?

- **“If eternal vigilance is the price of liberty, then chronic unease is the price of safety.”**

Professor James Reason

