

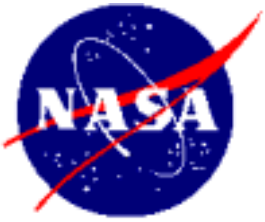


Safety, Risk and the New Vision

Safety and Health Managers Meeting

**Bryan O'Connor
Chief,
Office of Safety and
Mission Assurance**

1 March 2005



Safety as a Core Value

- *We are committed, individually and as a team, to protecting the safety and health of the public, our partners, our people, and those assets that the Nation entrusts to us.*
- ***Safety** is the cornerstone upon which we build **mission success***

Everyone is Responsible for safety.

Anyone who is accountable for mission success is Accountable for safety within the limits of assigned Authority and Capability

Accountability = R x A x C



Columbia Root Cause Conclusion

NASA exhibited “*cultural traits and organizational practices detrimental to safety*”:

- *reliance on past success*
- *organizational barriers to effective communications*
- *lack of integrated management*
- *informal decision-making processes*



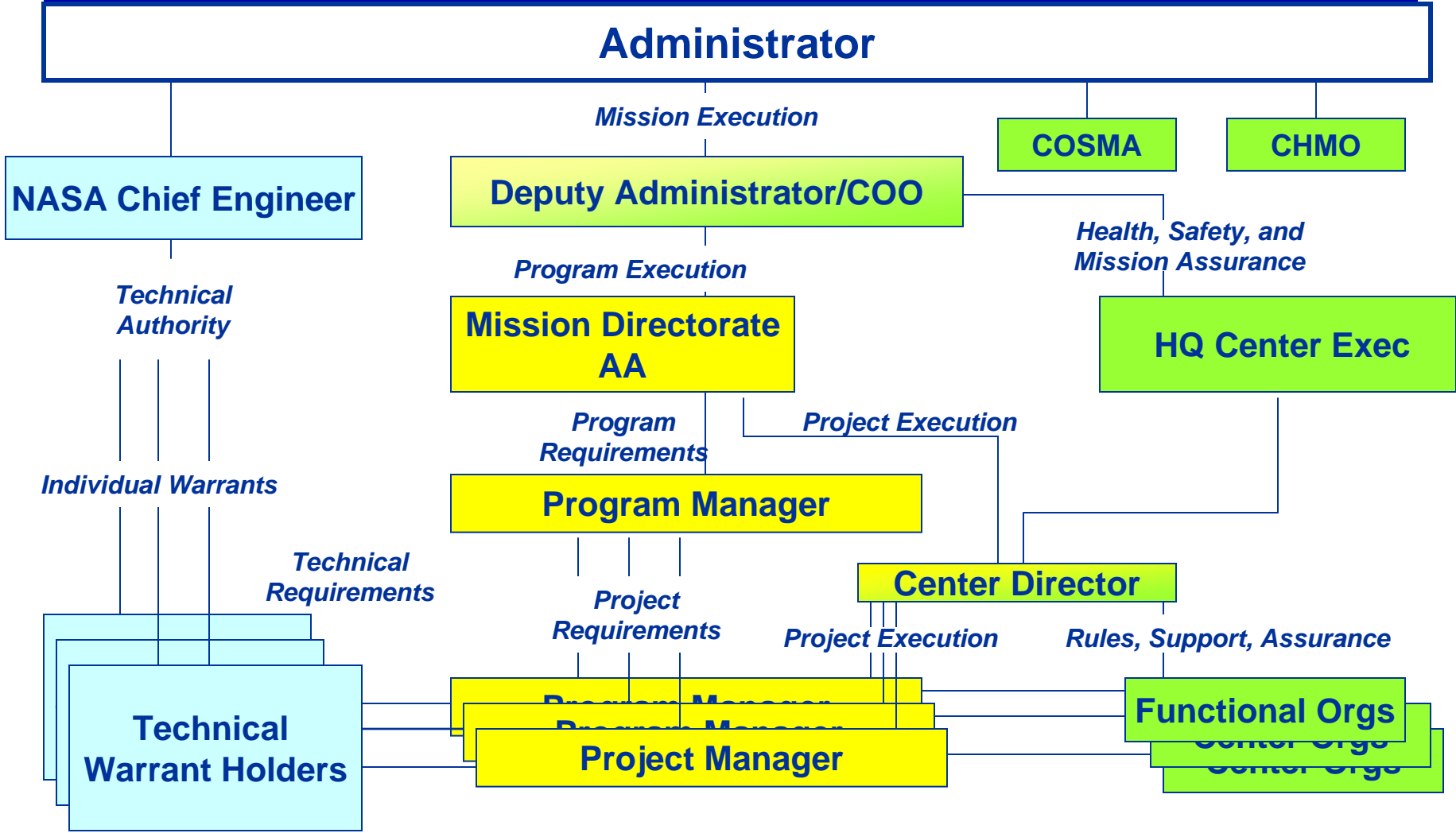
The Culture Initiative

- **The Problems**
 - As decision-makers we too often kill the messenger
 - As messengers, we too often lack professional integrity
 - As leaders, we too often come across as non-supportive
- **Phase I of the BST facilitation is complete**
 - Tested at 3 centers
 - Fewer messenger slayings
 - More professional integrity in our messengers
 - Our people admit our leaders are trying
- **Phase II underway across the agency**

Remember: BST facilitates... We must do the hard work of culture change!



The Organization Initiative Technical Authority, Programs, Centers



Note: This is typical authority flow for unmanned missions



ITA: More emphasis on System Safety

- The Technical Authority will be *independent* of the program
- The *Chief Engineer* is the Technical Authority
- The engineering community will take a major role in system safety engineering (*every engineer a safety engineer*)
 - Own safety related technical requirements
 - Actively participate in system safety engineering tasks
 - Provide the program “technically acceptable” alternatives
 - Accountable for system safety results (within scope)
 - Design engineers: Do not throw system safety engineering over the fence to the system safety engineers
- The SMA organizations will *facilitate, coach, train, and assure* all of the above



Current OSMA Initiatives

- **Rules:**
 - Major ongoing effort to update policy directives: *“Say what we do”*
 - Work with Chief Engineer on rules “ownership” in light of ITA transformation (CAIB 7.5-1: ITA will own technical requirements)
- **Audit and Assessment:**
 - Unprecedented benchmarking has helped us redefine technical and institutional audit processes: *“Do what we say”*
 - SMA is biggest per capita user of NESC for technical assessment to date
- **Tools:**
 - Working with academia and industry to improve process and technology for SRM and Q disciplines




Safety and the Extended NASA Family

- **Public Safety Policy Initiative:**
 - Clear risk-based rules for government range operations
 - Clear accountability for NASA employees, guests and uninvolved public protection
 - New rules for “uncontrolled, manned and unmanned” entry over populated areas (Shuttle and future systems)
- **MOUs with other government agencies:**
 - Share quality practices, data, vendor ratings
 - Joint audits of contractor activities
- **Occupational safety benchmarking**
 - Electrical safety best practices
 - Institutional contractor management



The Exploration Vision in a Nutshell

- As a “nation of explorers”, we will:
 - Return the Shuttle to flight
 - Use Robots and two Space Stations to get us ready for Mars
 - Robotic precursor missions (Moon and Mars)
 - Complete ISS assembly
 - Outfit the moon (assembly completed previously by another “Agency”)
 - Retire the Shuttle in 2010... 
 - Fly people to Mars to look for life
 - Beyond....
- There will, by definition, be risk...



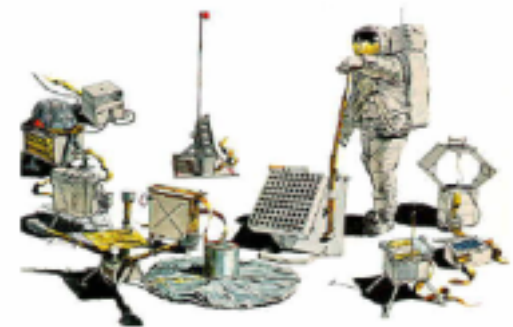
Exploration Systems Major Milestones

- **Objectives**

- Implement a sustained and affordable human and robotic program
- Extend human presence across the solar system and beyond
- Develop supporting innovative technologies, knowledge, and infrastructures
- Promote international and commercial participation in exploration

- **Major Milestones**

- 2008: Initial flight test of CEV
- 2008: Launch first lunar robotic orbiter
- 2011 First Unmanned CEV flight
- 2014: First crewed CEV flight
- 2015: Jupiter Icy Moon Orbiter (JIMO)/Prometheus
- 2015-2020: First human mission to the Moon





The Risk Iceberg





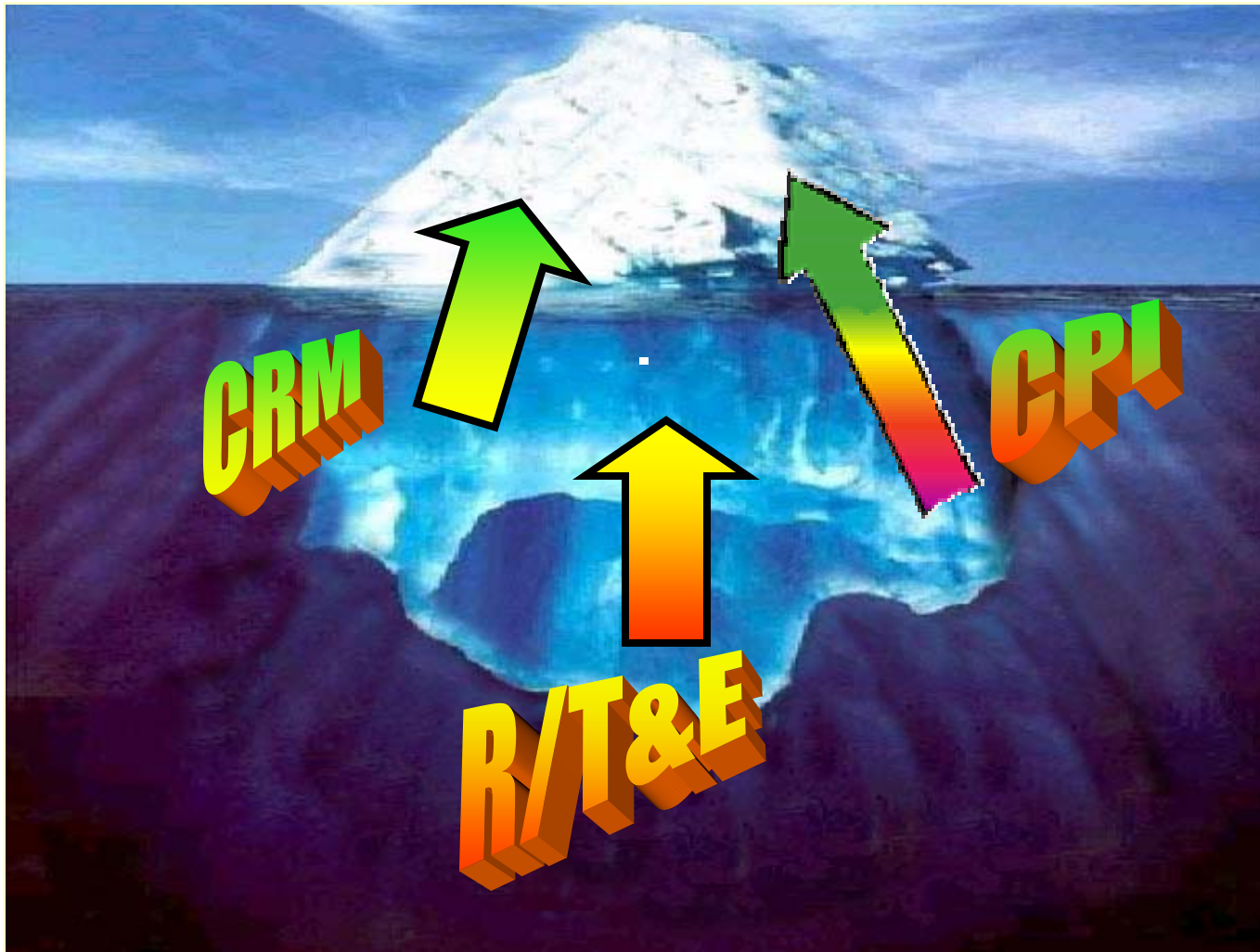
Risk Management for the Exploration Mission

- **Known Knowns: (*Systems Engineering and Program Management*)**
 - High quality program and mission **management processes and people**
- **Known ~~Unknowns~~: (*Continuous Risk Management*)**
 - **Reduce uncertainties** with analysis, test and attention to flight results
 - Manage **residual risk** (including uncertainty) with conservative procedures and contingency plans
- **~~Unknown~~ Knowns: (*Continuous Process Improvement*)**
 - Enforce rigorous **supplier quality** programs
 - **Communications, Communications, Communications**
 - Improve data **analysis** tools and techniques (e.g. trending)
- **~~Unknown~~ ~~Unknowns~~: (*Continuous Research, Test and Evaluation*)**
 - Exercise (**Engineering Curiosity**): the culture thing!
 - Constantly **challenge assumptions**, models and analyses



Safety....The NASA Family....Excellence....Integrity

Ex Scientia Salus et Successus (From Knowledge: Safety and Success)





Safety....The NASA Family....Excellence....Integrity

The Ultimate Risk Acceptance Rationale

“Exploration is not an option”

President Bush, 14 January 2004