



Office of Safety and Mission Assurance

Risk: It is Part of the NASA Mission

October 26, 2004

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The Risk Iceberg





The Strategy for Safety and Mission Assurance

- **Known Knowns: (*Systems Engineering and Program Management*)**
 - High quality program and mission management processes and people
 - “Listen to the hardware”
- **Known ~~Unknowns~~: (*Continuous Risk Management*)**
 - Reduce uncertainties with analysis, test and attention to flight results
 - Recertify to the real environment (has it changed over the years?)
 - Treat residual risk (including uncertainty) with conservative ground and flight procedures, quality assurance, operating margins, contingency plans
- **~~Unknown~~ Knowns: (*Continuous Process Improvement*)**
 - Rigorous supplier quality programs
 - Continuously assess and improve program communications, documentation, workforce competence
 - Improve data analysis tools and techniques (e.g. trending)
- **~~Unknown~~ ~~Unknowns~~: (*Continuous Research, Test and Evaluation*)**
 - Dedicate resources to better understand the limitations of the system in the real environment (*Curiosity saved the cat*)
 - Constantly challenge old assumptions, models and analyses



Risk Related Findings/Observations of CAIB

- **Engineering Models (validation?)**
- **Integrated Risk Analysis (scope?)**
- **Risk Communications (adequate? independent?)**
- **Public Risk Assessment/Policy (complete?)**
- **Hazard Analysis (risk informed?)**
- **Micrometeoroid and Orbital Debris Analysis (used?)**
- **Trend Analysis (adequate?)**
- **Training of Engineers and Managers (adequate?)**

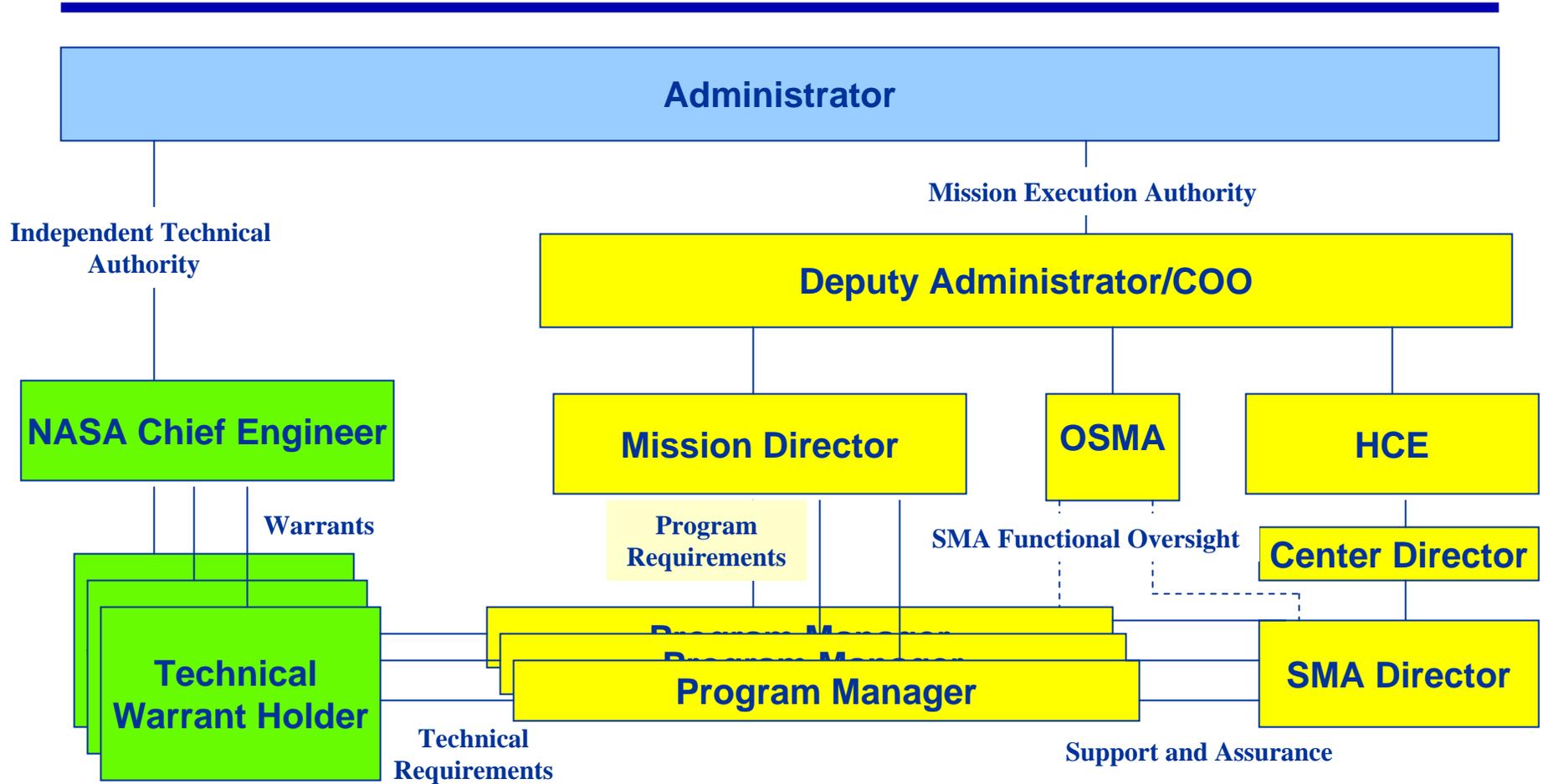


NASA Transformation: Supporting The Vision

- **Core values (key to the “culture” issue)**
 - Safety (it’s not our mission, it’s part of every mission)
 - NASA Family (recruiting, rotation, careers, interactions, communications)
 - Excellence (quality in design and processes (incl. communications))
 - Integrity (functional vs. organizational loyalty (communications))
- **Policy (“real requirements” and enforcement)**
- **Standards (content, rigor and ownership)**
- **Roles and responsibilities (ITA vs. program, HQ vs. center, government vs. contractor)**
- **Supporting new acquisition models**
- **Risk informed decision making (“eyes wide open”)**
- **Process efficiency and effectiveness (reduce stovepipes)**



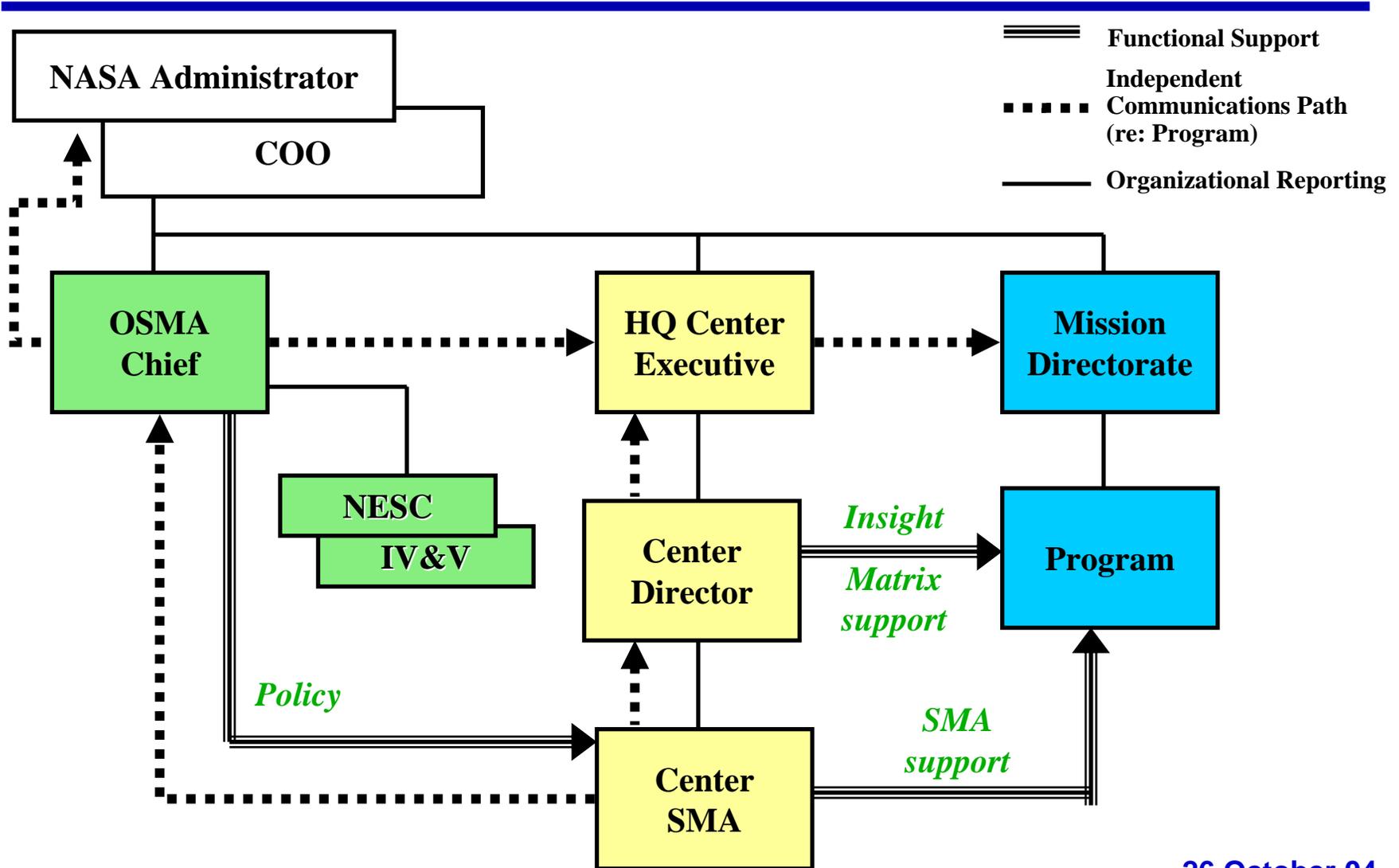
Technical Authority Model





Typical SMA / Program Interfaces

(Example: Headquarters Directed Program)





NASA Engineering and Safety Center (NESC)

NESC Philosophy

- **Mission Success Starts With Safety, Safety Starts With Engineering Excellence**
- **NESC will cultivate a safety culture by providing knowledgeable technical leadership to perform independent in-depth technical assessments in an open environment with unequalled tenacity**

NESC Basics

- **Responsible for performing independent assessments, tests, and analysis of technical trends, potential problems, and safety relevant issues; evaluating programs and processes with recommendations for preventative and corrective actions related to safety and mission success; and providing “value added” independent assessment by having our best technical expertise available where it is needed most**
- **Funded at the Agency level to assure independence**
- **Staffed with the best engineering expertise from across the Agency (with partnerships with DOD, National Laboratories, universities, and expert consultants)**



Accepting Residual Risk

- Programs and Projects accept residual risk on behalf of the risk takers
- Are the risk takers in the loop?
- Who accepts residual risk on behalf of the public?
- For launches on Air Force ranges, do we defer to the Air Force for public safety, or do we defer to the Air Force policy for public safety?
- What is acceptable risk for the uninvolved public?
- What is NASA's responsibility to contractor test pilots, prize competitor test pilots?



The Planned Result: Ex Scientia, Salus (From Knowledge, Safety)

